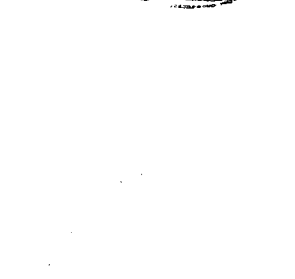

A STUDY OF THE ANIMAL AND CROP PRODUCTION SYSTEMS AND POTENTIAL OF THE BANTU CISKEIAN TERRITORIES

by

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the requirements for the degree of
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(Promoter: Professor J. van Marle)

"Mother Africa is a grand old lady: we may guide her, persuade her - and even seduce her - but we cannot drive her. We must learn to know more of her home life and economy, her ecology".

Field Marshall the Rt. Hon. J.C. Smuts, 1948.

(The gist of a verbal remark to Professor John Phillips).

SINCERELY DEDICATED TO THE AGRICULTURAL AND ENGINEERING OFFICIALS IN THE CISKEI WHO HAVE CONTRIBUTED SO MUCH TO AGRICULTURE AND THE UP-LIFT OF THE BANTU PEOPLE - THEY ARE TRULY THE UNSUNG HEROS OF THIS MODERN AGE.

CONTENTS

GENERAL INTRODUCTION

The rapid development and re-orientation of the existing subsistence-type of farming in the Bantu areas of the Ciskei, is of vital importance, not only to the people who reside within the Reserves, but also to South Africa as a whole. The acceptance and successful implementation of betterment schemes, so that improved agricultural and livestock production is achieved, means that the standard of farming can shift from the present subsistence level, into a market economy level. Not only will this ensure that adequate human food resources are available to meet the ever increasing demands of the Bantu population, but that increased commodity purchases will result due to the greater purchasing power of this group. With the general adoption of sound production techniques, embracing the reclamation, preservation, development and controlled utilization of all natural resources, optimum production must necessarily be the outcome. These resources have been brought to a dangerously low level in past decades, and it is only the comparatively recent introduction of betterment schemes, that have proved to be effective in halting the decline in natural resources. All locations in the Ciskei have been proclaimed Betterment Areas, and, nearly 65 per cent of the total area proclaimed, has been planned to date (August, 1968) while the physical work has either been completed, or is in the process of being completed in these planned locations. Since the introduction of planning, based on economic units, the latter being regarded as corner-stones in the planning in the Bantu regions, a sound, well-balanced approach to planning has been achieved. Using livestock losses, arising from the 1968 drought, as a criterion of the successful application or otherwise, of the betterment schemes, it is clear that these schemes are obviously successful. In the unplanned locations, estimated cattle losses are as high as 35 to 40 per cent of the total cattle population, while in the Betterment Areas, it is unlikely that the mortality rate will exceed 20 to 25 per cent.

The question, as to how sound land utilization can be universally brought about, is uppermost in the minds of agriculturalists dealing with these Bantu territories. One might well ask what the obstacles are in the path of rapid agricultural development, and how can these obstacles be overcome? As will be seen in the text, the problems that are being faced by a small body of dedicated men, are numerous, the human factor being, by far, the greatest limiting factor. Not only are traditional agronomic and livestock-keeping methods deeply ingrained, but the fact that, little or no family-planning practices are in operation, coupled with the existing population number and a restricted amount of land, threatens the very development and even existence of these people. If it is possible that the livestock

counts are between 10 to 20 per cent under assessed, then the chances of the human population being under-estimated or under-assessed, are also possible, as appears to be the position in one of the Ciskeian districts, and according to recent newspaper reports.

Historically and traditionally speaking, the Xhosa-speaking peoples of the Ciskei are pastoralists; crops playing a very minor rôle until the introduction of crops like maize and wheat by the early Portuguese sailors or early settlers in the Cape Province. After the restricting influence of the "digging-stick" (izikhuba) employed in the cultivation of small areas of tribal land, the emancipating influence of the iron-hoe and the plough, brought comparatively large tracts of both suitable and unsuitable land under cultivation. Restriction of movement, by the definition of boundaries of the Bantu areas in the Ciskei, together with the general use of the plough and increasing human and livestock populations over the years, have brought the Bantu population to its present sorry plight. The latter is now being counteracted by the adoption of betterment schemes. In the past, mono-culture, coupled with cultural malpractices, led to a rapid deterioration in soil fertility, stability and structure, resulting in poor soils, badly eroded and with little depth, in many locations. This is the position in large areas of the Ciskei at the present time.

While livestock have long played a major part in the lives of generations of Bantu, the average Bantu farmer in the Ciskei cannot be said to be a stockman in the European sense of the word. He is essentially a livestock-owner or keeper of animals, and stockmanship is at a low level according to European and American standards, and this distinction should be borne in mind when any comparison is applied. Cattle in particular, play an important part in the social, economic, spiritual and ritual life of both the Xhosa and Fingo, who make up the main body of the Bantu in the Ciskei. The other livestock species each play a rôle but are, by no means as important as cattle, with the exception of sheep, which are economically important. As very little has been published about the animal husbandry of the Bantu Ciskei, a study of all phases of livestock production, has been carried out and recorded in the relevant sections.

A general lack of knowledge, understanding and aptitude on the part of the average Bantu farmer in nearly all matters pertaining to crop and animal production, is reflected in the low yields and/or poor quality of the product. Education, which is, today, much sought after, is beginning to accelerate the evolutionary process to a greater degree than hitherto was the position. Progressive farmers are to be found in practically every location and it is these people who can indicate the latent or inherent potential of their respective areas, and serve

as agricultural leaders. These progressives have a significant part to play in helping to revolutionise agriculture in the Ciskei, but, unfortunately, are estimated to be between five to 10 per cent of the total land and livestock-owners in the Ciskei. This emphasizes the fact that the majority of the farmers or peasants, are comparatively backward, tradition-bound, fatalistic and some, apathetic in their approach to agriculture. It is, however, these progressive farmers, supported by agricultural officials of the newly created Department of Agriculture in the Ciskei, who can help realise the agro-potential of the Bantu areas.

The aim of this study is to present as accurate a picture as possible of existing conditions in the Bantu areas of the Ciskei, and the limitations imposed on agronomic and animal production. Suggestions are made as to the means by which most, if not all, of these inhibiting influences can be reduced or eliminated. Animal husbandry statistics and practices are also recorded, and an estimate is made of the average expected crop yields and carrying-capacity of the pasture under improved conditions in the Ciskei. The extent to which full-time and supplementary irrigation can be employed in the Bantu areas of the Ciskei, is also indicated, its contribution being substantial.

PROCEDURE, HISTORICAL BACKGROUND, PHYSICAL CHARACTERISTICS AND BANTU POPULATION OF THE CISKEI

1.1 PROCEDURE:

Method and Duration of Survey:

This survey was commenced at the beginning of 1966 on a part time basis until 1968, when the major part of the survey was carried out on a full-time basis. A questionnaire was drawn up and used as a basis in the questioning of European and Bantu Agricultural Officials in the Ciskei. The whole of the Bantu Ciskei was covered with the exception of Fort Beaufort District, which had no agricultural officer at that time, and Cathcart District, which in reality consists of about 2,100 morgen owned by the South African Bantu Trust.

Production Statistics: These were obtained by investigating all relevant files and annual reports at the Regional Head Office in King William's Town and at the District Offices. Other production statistics were obtained from hides and skins and wool brokers in East London and King William's Town.

Authorities Consulted:

i.	Mr. J.A. Norton	-	Control Agricultural Officer
ii.	Mr. R.H. Mayne	-	Control Agricultural Officer
iii.	Mr. J. Bartels	-	Senior Agricultural Officer
iv.	Mr. K.E.E. Schultze	-	Senior Agricultural Officer
v.	Mr. H. Jacob	-	Acting Senior Agricultural Officer
vi.	Mr. D. Jordan	-	Regional Engineer
vii.	Mr. D. Osborne	-	Regional Town Planning Engineer
viii.	District Agricultural Officials	-	Department of Bantu Administration and Development
ix.	Administrative Officers	-	Department of Bantu Administration and Development

Abattoir Survey:

Permission was obtained from the East London Medical Officer of Health, to carry out a survey at the East London Municipal Abattoir. This consisted of the collection of daily slaughter statistics for all Bantu-origin livestock for a period of 10 years, to enable a comparison to be made with European derived animals. Records at the East London branch of the Livestock Industries and Meat Control Board were consulted for grading statistics.

Personal Discussions:

These were held with the following, amongst others:

Mr. Graham Baker - M. Billson and Co., East London.

Mr. A. Murray - Hides, skins and wool broker, King William's Town.

Mr. E. Hirsekorn - International Wool Co., East London.

Mr. Hall - Billson & Co., East London.

Representatives of the Farmers' Co-operative Union, East London.

1.2 HISTORICAL BACKGROUND TO THE BANTU CISKEI:

According to Kay (1833), the Xhosa first moved into the area near the Great Kei River between the years 1670 and 1675. The northern-most boundary of the Cape Colony in 1778, was considered to be the Great Fish River and in the subsequent frontier wars which developed, the Xhosa were expelled from the territory lying between the Fish and Keiskama Rivers (Commission for the Socio-Economic Development of the Bantu Areas within the Union of South Africa, or Tomlinson Commission, hereafter referred to as Commission, 1955). The Mfengus or Fingos were later settled amongst the European settlers in this region (Hobart-Houghton & Walton, 1952).

The area comprising some 4,500 square miles lying between the White Kei/Great Kei and the Keiskama Rivers, and between the Indian Ocean and Amatola Mountains, which up until the Kaffir War of 1846-1847 was described as "an independent native state", became known as British Caffraria or Kaffraria (Roberts, ca. 1890). In December, 1847, Sir Harry Smith made a proclamation to the effect that the immediate boundary of the Cape Colony was the Keiskama River (Ward, 1848). January, 1856, saw the introduction of a new government for British Kaffraria which, amongst other things, saw to it that the chiefs received a monthly emolument (Cory, 1930). In 1859, British Kaffraria was divided into 1,000 to 3,000 acre farms which were granted free to settlers provided that they agreed to certain conditions, such as defending the territory in the event of an invasion from across the Kei River. This territory was declared an Independent Colony in 1861 and in 1866 was annexed to the Cape Colony (Roberts, c.a. 1890). It should be remembered that during the Governorship of Sir George Grey (1854-1862), this area had been opened up for black and white settlement alike, since he "firmly believed in racial integration in a mixed economic society". (Hobart-Houghton, 1960). Germans, who had served in the Crimean War under the British Flag, were given land grants (Roberts, ca. 1890).

A large reduction in the Bantu population occurred in 1857 and 1858 when the "cattle-killing delusion" in the Transkei, together with the subsequent famine which developed, substantially reduced the Bantu population in British Kaffraria by over two-thirds of its former number (Barker, 1966). However,

by 1866, the Bantu population had increased to over 100,000 (Roberts, ca. 1890) and population pressure on land began to develop. Tribal land fell under the authority of the local chief, and the latter, together with his councillors, allocated land to full members of the tribe. The first experiment in quit-rent holdings was in the Cape when the Smith-Calderwood Location Scheme of 1849 came into being, and the Fingos in the Victoria East District held titles to individual plots, as long as £1 (R2.00) annual quit-rent was paid. By the year 1865, nearly 5,000 individual titles had been issued in this locality (Brookes, 1924).

The Glen Grey Act of 1884, which was amended in 1899 and 1905, sought to define the boundaries in the Glen Grey District (South African Native Races Commission, 1908), which comprises almost a third of the total of the Bantu areas of the Ciskei. Quit-rent land thus became available in this district, which was inalienable and could not be transferred or mortgaged. The land-holder was originally required to pay an annual quit-rent of 15/- (R1.50) for a four morgen garden allotment, plus 3/- (30 cents) for each additional morgen in excess of five (South African Native Races Commission, 1908). As will be seen later, this then progressive step involving official recognition of individual tenure of land, has had repercussions which have affected the correct planning of these districts. The Bill, at the time it was passed, was said to be "without doubt Rhode's greatest legislative achievement" (Rose-Innes, 1949). Later the Council system, that is, district councils, was introduced at the beginning of 1895 (Brookes, 1924). Pim (1933) quotes an official, presumably of the then Department of Native Affairs, as writing in connection with the Glen Grey Act, "Indirectly, however, the effect on the natives has been remarkable. The possession of the title has given a feeling of pride and satisfaction because they have now (that) with the white man denotes ownership. He is a man, not a member or unit of a tribe; he can think and decide for himself and is no longer dependent on the arbitary will of his chief. In short, the man has become a better citizen. There is no doubt that in the surveyed districts there has been a much better response to the teachings of improved methods. There is of course almost entire dependence on rainfall and this does limit progress".

The "Council System" of government was introduced and worked exceedingly well. A labour tax, on those who did not work for Europeans, was also imposed, and Brookes (1924) is of the opinion that this was the only failure of the Glen Grey System.

The difficult question of land ownership was laid before the Union Parliament and resulted in the Natives' Land Act of 1913, which recognised the existing Bantu locations and privately held land, and excluded the non-Bantu

population from acquiring land in these areas. The Native Trust Act of 1936, provided for the future purchase of an extra seven and a quarter million morgen of land for Bantu settlement (Commission 1955).

1.3 PHYSICAL CHARACTERISTICS OF THE BANTU AREAS OF THE CISKEI:

1.3.1 Geographical Areas:

As can be seen from the localisation map, (Figure 3) the Bantu areas of the Ciskei can be divided into four, practically separate land masses, with:

(i) Herschel in the north, lying between the latitude parallels 30 and 31 degrees, and longitude 27 to 28 degrees. This district lies on the Orange Free State and Lesotho boundaries and falls within the Cape Province.

(ii) Glen Grey, north of latitude 32 degrees and lying on longitude 27 degrees, and mostly bordering, in the east, on the Transkei.

(iii) Whittlesea, south of latitude 32 degrees and lying between the longitude parallels of 26 and 27 degrees, which includes the Shiloh irrigation scheme.

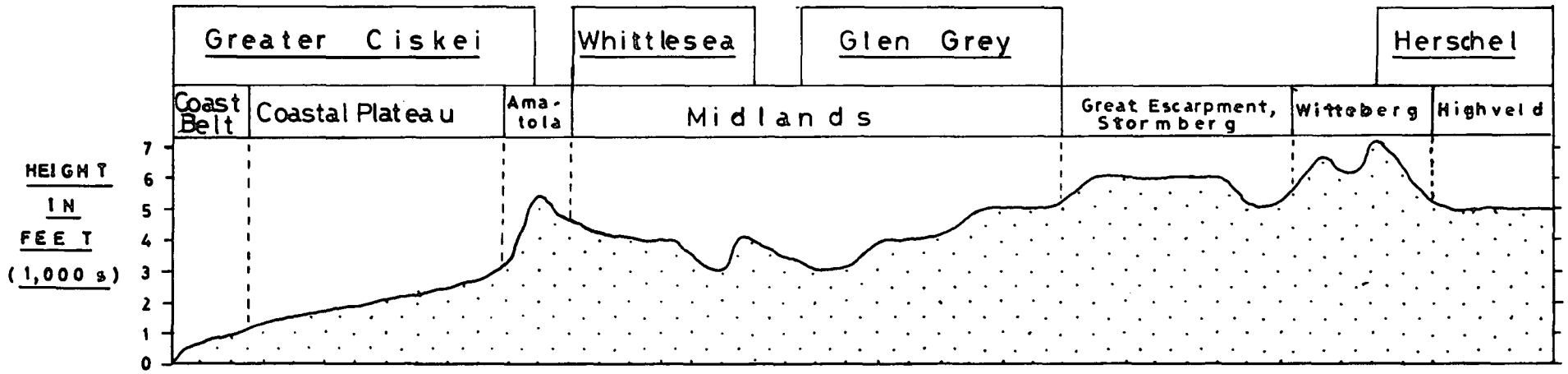
(iv) The Southern Areas, comprising Fort Beaufort, Victoria East, Middledrift, Keiskammahoek, King William's Town, Peddie and East London, which roughly straddle the 33 degree latitude and 27 degree longitude lines. The small, isolated blocks of land in the Stutterheim District, can also be included in this southern area. This "Greater Ciskei" is very much broken into by the European areas, and in some cases, notably areas in the East London, Stutterheim and Victoria East Districts, are totally surrounded by the "white" areas.

However, a study of the relief-profile of the Bantu areas, as indicated in Figure I, shows that these districts can be classified according to their topography, vegetation and climatic characteristics as follows:

(i) Coastal Area or Belt: East London and the southern area of Peddie.

(ii) Coastal Plateau: The northern area of Peddie, Middledrift, Fort Beaufort, Victoria East, King William's Town and most of Keiskammahoek District. A portion of this latter district lies on the Amatola Mountain Range or First Escarpment. This coastal area is comparatively flat and a gradual increase in altitude occurs from near the coast up to about 2, 000 feet,* at the outer edge of the coastal plateau, approximately 35 to 65 miles inland. Rennie (1945) further describes this area by saying "that the surface is by no means flat in detail, even in the broad interfluve strips between the major rivers. The surface is typically deeply trenched by the latter, in many instances to a

* 1 foot = 0.3048 m

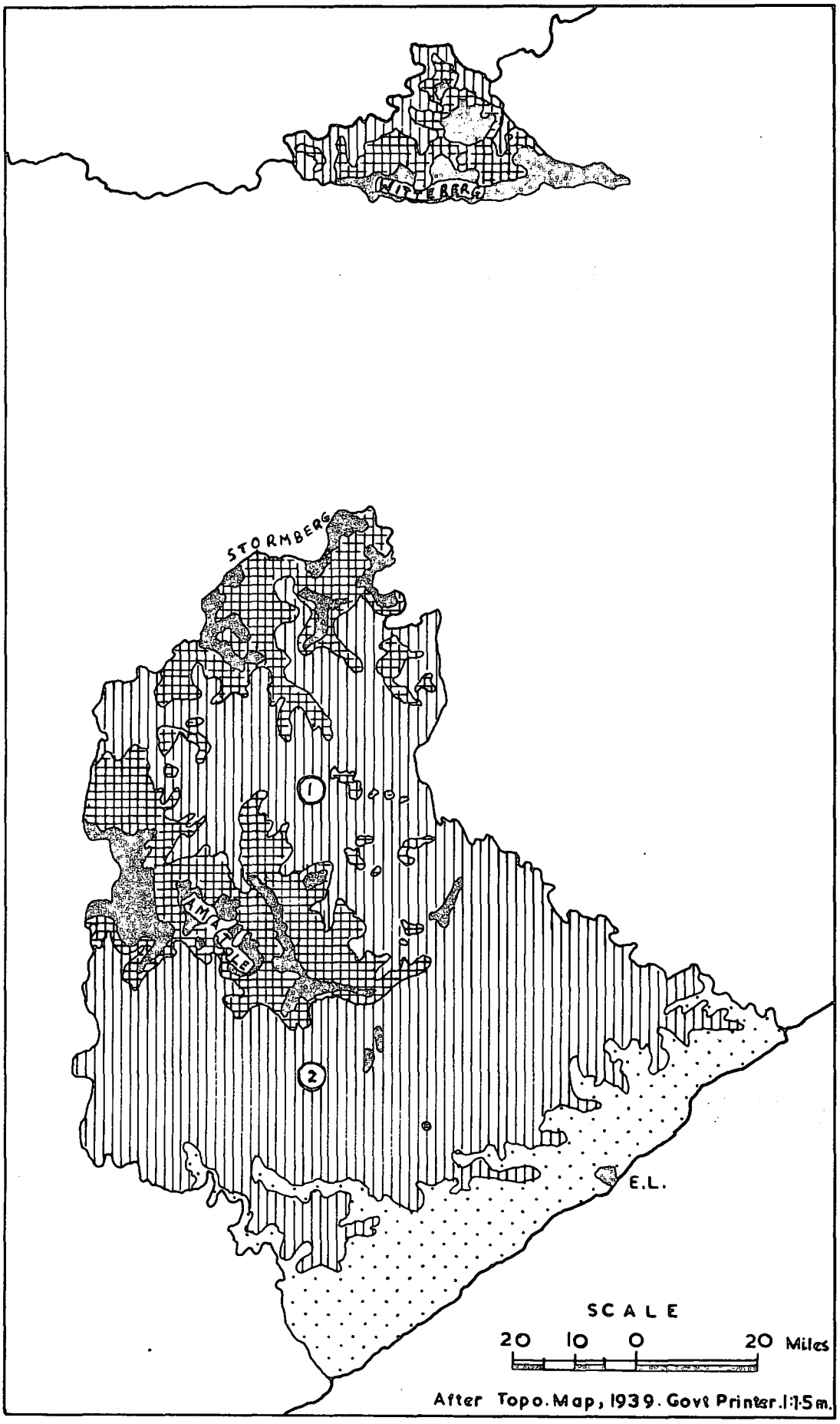


RELIEF PROFILE OF CISKEIAN TERRITORIES

(KEISKAMA R. MOUTH — K.K.Hoek — LADY FRERE — HERSCHEL)

FIGURE: 1

(After ELS · 1967)



Mountainous Regions-Amatola orographic line (south), Witteberg (north).
Mountain Foothills.
Undulating Plateau Region : 1. Midlands, 2 Coastal Plateau.
Undulating Coastal Belt.

FIGURE 2 : RELIEF REGIONS - CISKEI

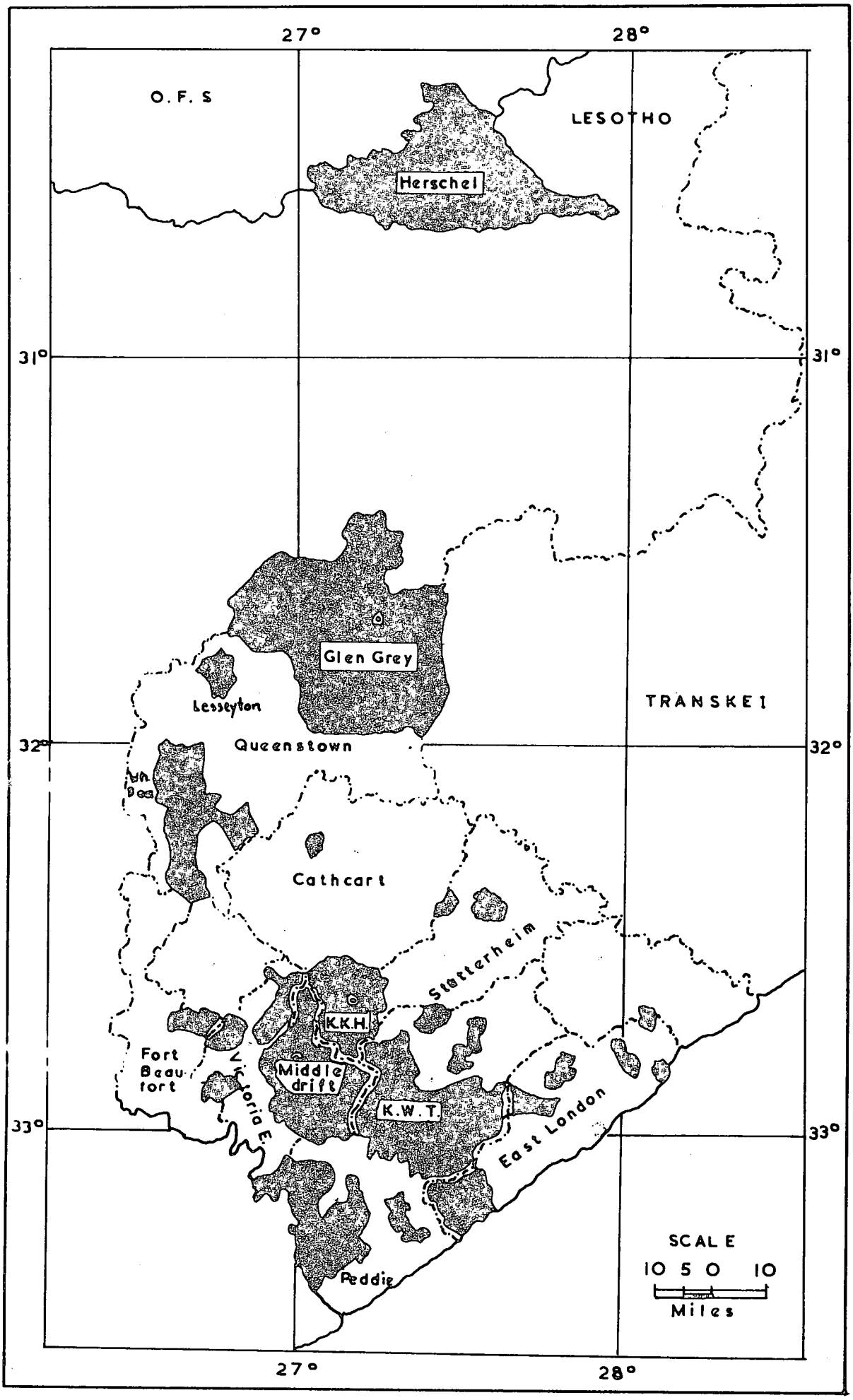


FIGURE 3 : DISTRICTS OF THE CISKEI

depth much in excess of 1, 000 feet, and entrenched meandering river courses within broad confused intensely hilly zones, are a characteristic feature of the coastal belt ....."

(iii) Uplands or Midlands Area: This includes the Whittlesea and Glen Grey Districts as well as the Stutterheim and Cathcart locations. This is the "elevated land" area which lies between the Winterberg-Amatole Mountain catchment region and the Great Escarpment, and constitutes "a physical region, well defined by these features except in the east. Structurally similar to the plateau above the Great Escarpment and only slightly lower, the region descends from 4, 000 feet at Middelburg, to about 3, 500 feet at Queenstown and 3, 00 feet near Cradock, and includes the two extensive upper drainage basins of the Great Fish and Kei Rivers" (Rennie, 1945).

(iv) Highveld Area or Drakensberg Highveld Plateau: This includes the district of Herschel with altitudes varying between nearly 4, 500 to 7, 000 feet. Some of this district lies in the "second escarpment" or Great Escarpment area of the Witteberg Range. Rennie (1945) describes this plateau by saying, "Its surface has undergone dissection by streams tributary to the Orange and over most of the region the soil is thin and immature. It includes some extremely rugged country in the districts of Herschel and Barkley East where the Karroo succession includes the Drakensburg volcanic rocks".

1.3.2 Extent of the Bantu Areas:

According to the 1967 Annual Agricultural Report for the Ciskei, the areas owned by the South African Bantu Trust and privately owned by Bantu, are as given in Table I.

Of the total Bantu occupied land in the Ciskei, 4.02 per cent is owned by Bantu, while the remainder, 1, 018, 814.78 morgen is owned by the South African Bantu Trust. Privately-owned land occurs mainly in Glen Grey with 21 per cent of Bantu-owned land, Peddie with 17 per cent, King William's Town with 15 per cent, Stutterheim with about 15 per cent and Keiskammahoek with nearly 12 per cent.

The largest, single land-unit is the Glen Grey District which consists of about 27 per cent of the total Bantu area, and is followed by Herschel with about 19 per cent, King William's Town with nearly 14 per cent, Peddie, Whittlesea, Middledrift and East London consisting of seven to eight per cent of the total Bantu area, the remaining areas being less than four per cent each. It is logical to assume that consolidation of the Bantu areas will take place and the isolated "black spots" taken over on a compensatory land-exchange basis. The recently purchased European-owned farms in the Elliot District comprising

TABLE 1: TRUST AND BANTU OWNED LAND IN THE CISKEI **

District	Area Trust Owned		Bantu Owned Land		Total for Bantu Areas	
	Morgen	%	Morgen	%	Morgen	%
Herschel	*201,493.00	19.78	447.00	1.05	201,940.00	19.02
Glen Grey	280,651.66	27.55	9,119.00	21.37	289,770.66	27.29
Whittlesea	81,013.00	7.95	1,312.00	3.07	82,325.00	7.75
Cathcart	2,137.00	0.21	-	-	2,137.00	0.20
Fort Beaufort	6,152.00	0.60	-	-	6,152.00	0.58
Victoria East	35,795.00	3.51	719.00	1.69	36,514.00	3.43
Middledrift	78,551.42	7.71	2,539.00	5.95	81,090.42	7.71
Keiskammahoek	33,790.00	3.32	5,065.00	11.87	38,855.00	3.66
Stutterheim	8,839.00	0.87	6,239.00	14.62	15,078.00	1.42
King William's Town	140,271.17	13.77	6,471.00	15.16	146,742.17	13.82
Peddie	76,946.75	7.55	7,366.00	17.26	84,312.75	7.94
East London	68,408.00	6.71	3,399.00	7.96	71,807.00	6.76
Elliot (Trust Farms)	4,766.78	.47	-	-	4,766.78	.45
TOTAL x	1,018,814.78	100	42,676.00	100	1,061,490.78	100.03

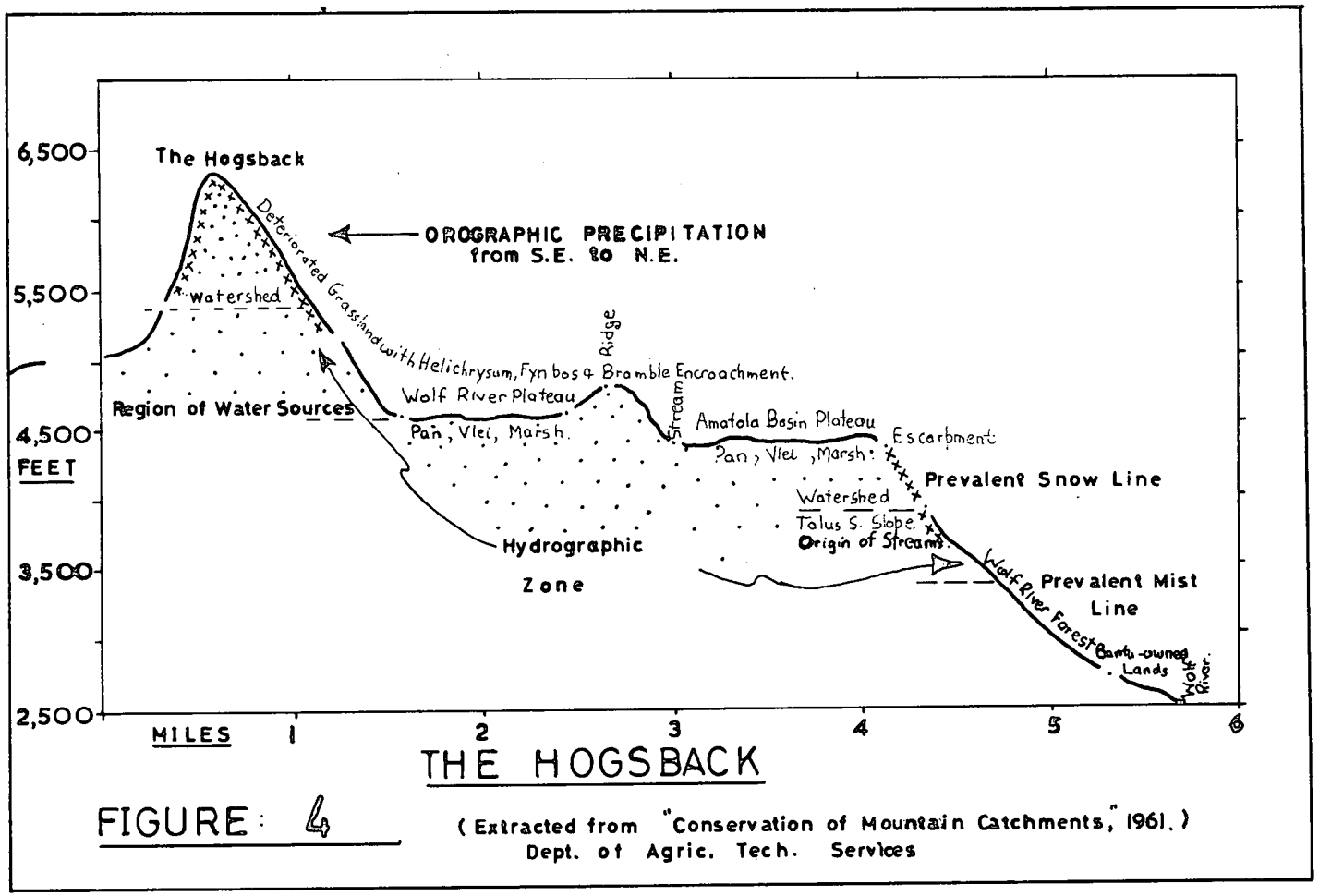
* Includes the villages of Herschel 170 morgen, Sterkspruit 313 morgen and Orange Fountain 308 morgen.
x Humansdorp 9140.34 morgen omitted - now a White area.
** (Adapted from 1967 Annual Agricultural Report).

approximately 4,767 morgen in extent and comprising 0.45 per cent of the total area, will not be included in the area under survey, while the Cathcart District Trust-owned land, comprising 0.20 per cent of the total, will be included only where necessary.

1.3.3 Mountain Catchment Areas and Drainage:

The Bantu territories include several mountain catchment areas, or portions of these catchment areas, and are as follows:

(i) Amatole Catchment: Also referred to as the Winterberg-Amatole watershed, extends from Gaika's Kop, altitude 6,439 feet, in the west, which is on the watershed from which the tributaries of the Kat, Tyumie and Klipplaat Rivers flow, to Dohne Peak, altitude 4,777 feet, in the east, passing through the Hogsback Ridge, altitude 6,360 feet. There are numerous southern spurs which separate out the various drainage systems, namely Mabandla's Rock, 3,578 feet, which lies between the Tyumie and Amatole basins; G'xulu-Wolfridge,



THE HOGSBACK

FIGURE: 4

(Extracted from "Conservation of Mountain Catchments," 1961.)
Dept. of Agric. Tech. Services

3, 605 feet, which lies between the Amatole and Wolf River basins; and Kubusie, 5, 457 feet, and other peaks in the area. The latter group form a horn on the east side, which together with the Mabandla horn in the west, encloses the whole of the headwater basin of the Keiskama River. The Mbambane Spur, 2, 477 feet, has a plateau separating the Cata from the Ngolo-Ngolo sub-catchment areas in the Keiskammahoek District. Numerous mountain streams, vleis and pans exist in this region, as they do in the other parts of the Amatole Catchment (Interdepartmental Committee, 1961). Summer mists and winter snowfalls occur in the higher-lying areas of this range. Figure 4 gives an illustration of this catchment as at the Hogsback.

Mention should be made of the interesting small depressions formed by fairly large earthworms which serve to collect and hold rainwater. These occur on some of the ridges of the Keiskama basin, such as Maxesha ridge (Interdepartmental Committe, 1961) and are also found in other lower-lying regions such as the Debe Nek area.

The rivers, which drain the various basins in the western catchment area, are the tributaries of the Koonap and Kat which flow into the Great Fish River, and the tributaries of the Tyumie and Keiskama Rivers. Between King William's Town and Queenstown, numerous tributaries of the Black Kei, Toise, Mgwali and Kubusi, amongst others, flow into the Great Kei River, while tributaries of the Buffalo and Gonubie Rivers also drain this south-eastern section of the Amatole Catchment. Some of the smaller tributaries of the Nahoon have their origin in the Peelton Location, near King William's Town. On the north side of this range, the Klipplaats River, together with its main tributaries, the Oxkraal and Brakkloofspruit, the latter draining the Whittlesea area, flows in a northerly direction until it joins up with the Black Kei.

The total area covered by this mountain catchment in both Bantu and European areas, is 335 square miles, and if the outliers of the Winterberg and Amatole Range are included, the total is over 800 square miles (Inter-departmental Committe, 1961).

(ii) Mount Arthur Range: This lies approximately in the middle of the Glen Grey District and rises to a height of over 6, 500 feet, and has a north-easterly strike of about 15 miles. The area covered by this catchment is in the region of 156 square miles (Water-planning Commission, 1967), and it is drained by the White Kei River in the west, and its tributary, the Cacadu River, in the east. A characteristic of this range, is that the surface run-off is rapid, not only due to the steepness of the slopes, but also to there being insufficient vegetation covering the mountain sides. The mean annual rainfall is in

the vicinity of 25 inches* and due to the serious state of denudation over practically the whole range, all degrees of erosion are encountered. The streams arising in the catchment are intermittent in flow due to the fact that the water is almost all on the surface with no "underground reserves" (Water-planning Commission, 1967). This catchment lies entirely in the Bantu area. Mist occurs in summer, and heavy snowfalls are experienced in winter.

The eastern side of this district is drained by tributaries, for example, Bengu River, of the Indwe River which forms the boundary between the Ciskei and Transkei, as well as by the White Kei and its numerous branching tributaries. The western areas are all drained by tributaries of the White Kei River, particularly the Bolotwa and Macibini in the south, and Bird's River, Grootvleispruit and Swartwater in the north.

(iii) Witteberg Range (Part of Catchment): This range consists of a ridge carved out of the great Basutoland basaltic larva stream which flowed over the Cave sandstone. The two rivers mainly responsible for this carving out process, are the Telle, which forms part of the northern boundary of Herschel, together with the Orange, and the Kraai, the latter being in the Lady Grey District. The total area of this mountain catchment is somewhere in the region of 564 square miles (Inter-departmental Committee, 1961). Just over half of this figure falls in the Herschel District, and forms part of the southern boundary. Due to severe denudation of the northern side of this range, serious erosion of the topsoil is encountered, and the Bitterkarroo shrub (Chrysocoma tenuifolia) has almost entirely replaced the natural grass, although some Hypharrenia species is found on this slope. Due to the steep slopes, and the high precipitation, the mean annual rainfall being about 40 inches on the summit, together with heavy snowfalls and severe frost in winter, there is a high surface run-off which regularly removes the weathered rock and decomposition products. This results in shallow, immature soils. In some parts, where for example, the colluvial soil has accumulated on the slopes of the catchment, soil depth is somewhat greater and can support plant life. Generally, the soil has a high absorption and water holding capacity, but on desiccation, is easily eroded by wind or subsequent rainfall. Many seepage springs occur throughout the mountain range. However, on the northern or Herschel side, the position as far as lack of cover and soil-erosion are concerned, is critical (Water-planning Commission, 1967).

The western section of Herschel District has the Orange River as the boundary and has several small tributaries, the most important of which

* 1 inch = 25.4 mm.

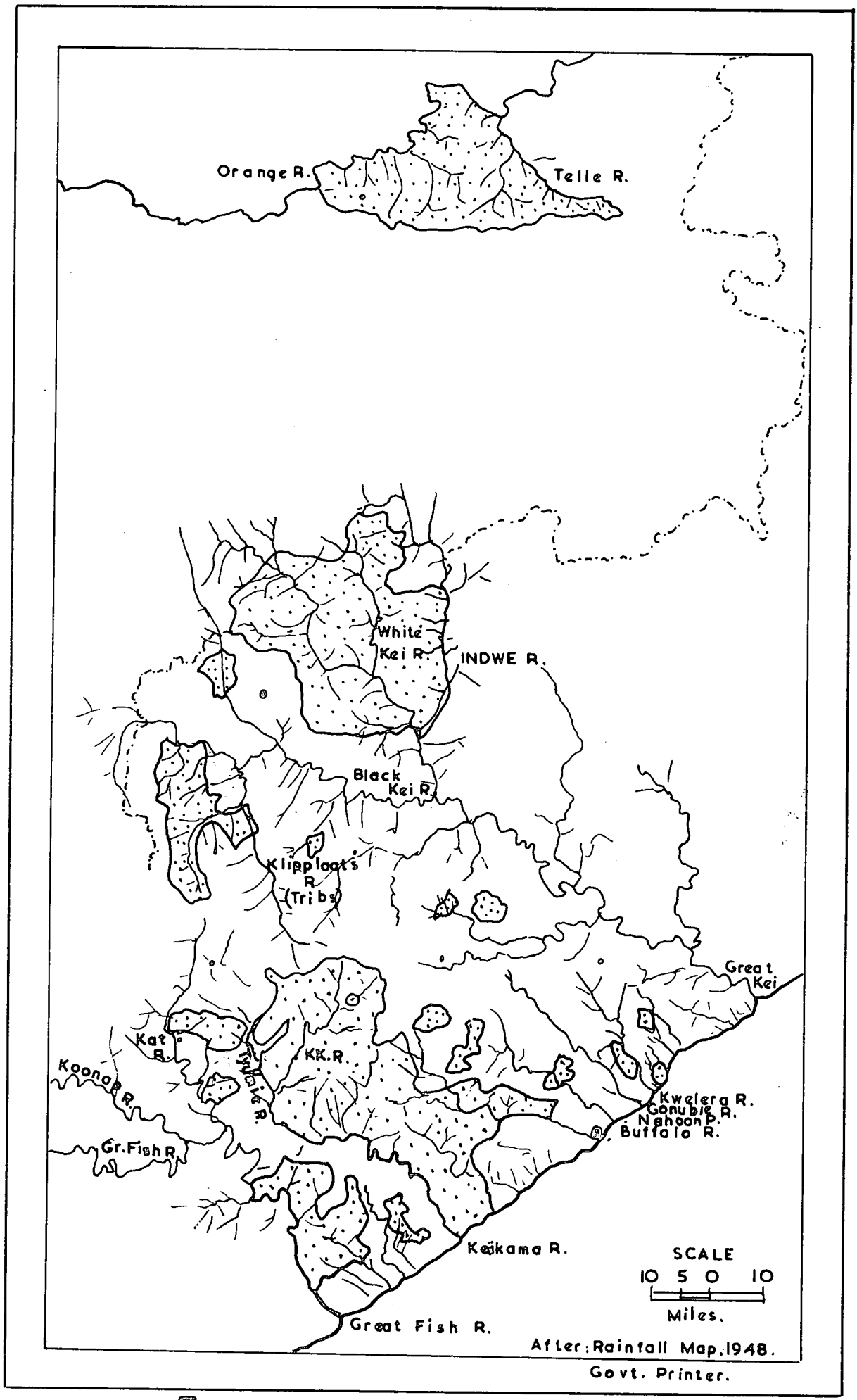


FIGURE 5 : DRAINAGE IN THE CISKEI

are the Wilgespruit, Tugelaspruit and Bamboespruit. The central section is drained by the Sterkspruit and its tributary the Kromspruit, which ultimately flow into the Orange River. Numerous tributaries of the Orange drain the northern region, while in the east and south-east, numerous branches of the Pelandaba and Blikana Rivers drain the two locations of the same names. These two rivers, plus other tributaries of the Telle, join up with the Telle and flow into the Orange River.

A sketch-map of the main drainage system is indicated in Figure 5.

1.3.4 Climate:

As would be expected in these territories, which rise from sea-level up to over 6,000 feet (1,829 m) in altitude, extremes of climate are experienced from hot summers to cold winters and great variability inbetween these two extremes. The effect of topography on climate is well known and needs little mention here.

(a) Climatic Regions: According to Schultze (1947), who applied Köppen and Thornthwaite's classification to climatic regions in South Africa, the various Bantu districts of the Ciskei can be classified, on a generalised basis, as follows:

Herschel: The northern or north-western section has a temperate to warm climate with summer rainfall and the mean temperature of the warmest month lies below 71.6° F (22° C). While the Commission (1955) accepts the above weather classification, the height of the rainy season is indicated as being in autumn, that is, March/April. The southern or south-eastern section, is described as having a humid, temperate climate with sufficient rainfall in the season, but with a dry winter. The height of the rainy season occurs in autumn.

Glen Grey: The northern part has the same climate as indicated for the southern portion of Herschel, while the south and south-western area has an arid or Steppe climate, cold and dry with a mean annual temperature below 64.4° F (18° C), but the hottest month exceeds 64.4° F. The height of the rainy season occurs in autumn (Commission, 1955).

Schultze (1947) indicates this whole district as having a homogeneous climate, similar to that for south Herschel.

Whittlesea: In the north, an arid Steppe climate, being cold and dry, prevails with a dry winter, and the height of the rainy season occurs in autumn. The mean annual temperature is below 64.4° F (18° C), but the warmest month exceeds 64.4° F. The southern section is given a similar climate rating as that for the southern section of Herschel (Schultze, 1947).

Cathcart, Fort Beaufort and Northern Victoria East: These areas are indicated as having the same climate as found in south Herschel (Schultze, 1947).

Keiskammahoek, the East Section of King William's Town and Stutterheim: These regions are indicated as having a humid temperate climate with sufficient rainfall in the season, but dry in winter with the mean annual temperature of the warmest month being below 71.6° F (22° C) (Schultze, 1947).

Middledrift, Southern Victoria East and the Western Locations of King William's Town: Schultze (1947) indicates these areas as having an arid Steppe climate, both hot and dry, the mean annual temperature exceeding 64.4° F (18° C) and the mean temperature of the warmest month exceeding 71.6° F (22° C).

Peddie, East London and the Southern Areas of King William's Town District: These areas have a humid temperate climate with a sufficient rainfall in all seasons and the mean temperature of the warmest month being below 71.6° F (22° C). The mean temperatures of all months lie between 50 and 71.6° F or 10 and 22° C (Commission, 1955). Schultze (1947) classifies the Peddie inland region as being an arid climate, hot and dry with the mean temperature of the warmest month being over 71.6° F (22° C), and this would seem to be a better "fit" than that indicated by the Commission (1955) using the Köppen/Schultze classification.

In general, the climate prevailing over the inland region can be termed semi-arid since it has a rainfall which increases up to a 500 mm (about 20 inches) maximum in the east. Showers and thunderstorms occur in the summer months October to March with the peak period in February and March, when up to 10 days of rain per month can be expected. The winters are usually dry and sunny but unsettled weather can prevail on one or two occasions per month and can be accompanied by snow. This snow can occur on up to five times per year on the southern mountain slopes, with resultant cold, miserable conditions generally prevailing, especially in the north.

Hail can be expected and can be extremely severe over relatively small areas. Usually, hail occurs in the early summer months especially in the month of November.

A large diurnal and seasonal variation occurs in air temperatures with the midsummer temperatures, especially January, which has an average daily maximum between 86 to 91.4° F (30 to 33° C) and extremes up to 105.8° F (41° C), being on the warm side. July average daily maximum is in the region of 62.6° F (17° C) with extremes up to 82.4° F (28° C). Average daily minimum

temperatures in January, are in the region of 59° F (15° C), with extremes as low as 37.4° F (3° C), and in July, 32° F or nought° C with extremes as low as 12° F or minus 11° C. These extreme minima occur in isolated localities where topographical characteristics favour such low temperatures. The frost period lasts for up to 150 days in the south of this area and can be expected between the months of May and September (refer to Figure 7).

Prevalent winds are north-westerly and attain their maximum speed in the afternoons. South westerly, gusty winds which are strong, occur during thunderstorm periods and are consequently of short duration. Very cold southerly winds cause occasional cold snaps.

The sun shines for up to 70 to 80 per cent of the possible sunshine duration, even in the rainy season. (The above information is extracted from Weather Bureau Publication 28, Climate of S. A., Part 8).

Herschel, Whittlesea and Glen Grey Districts fall in this region.

The climate prevailing in the coastal areas, is best described as being temperate to warm and humid, and has a summer rainfall season with a peak in autumn (March) and lowest in June. Approximately 12 rainy days per month occur in summer on the average, compared with four per midwinter month. From the Fish River valley up to Mooiplaats, the average annual rainfall increases from about 500 mm (20 inches) to nearly 850 mm (about 34 inches). Up to 25 mm can be expected in July. Most of the rain falls in showers, and thunderstorms are fairly frequent, occurring on the average on 20 to 30 days per year. Hail can accompany some of these storms, especially inland. Prevailing winds are usually north-easterly or south-westerly and, at times, can reach gale force. The south-westerly winds are responsible for the cool, cloudy weather accompanied by rain. Occasionally, in late winter, dry, hot "berg winds" occur.

The area receives approximately 70 per cent of its possible sunshine hours in winter, while in summer, only about 50 per cent of the possible sunshine period can be expected.

In January and July, the above daily maximum temperatures are in the vicinity of 82.4° F (28° C) and 69.8° F (21° C) respectively, although in hot windy weather, the temperatures can increase up to 109.4° F (43° C) and 93.2° F (34° C) respectively. Average daily minimum temperatures for these two months are about 62.6° F (17° C) and 46.4° F (8° C) respectively, while extremes can be 53.6° F (12° C) and 37.4° F (3° C) respectively on the coast. Interior temperatures can be as low as 41° F (5° C) in July, with 23° F (minus 5° C) being recorded in the valleys, where the average frost period is 30 to 40 days between early July and late August. (The above information is extracted from Weather

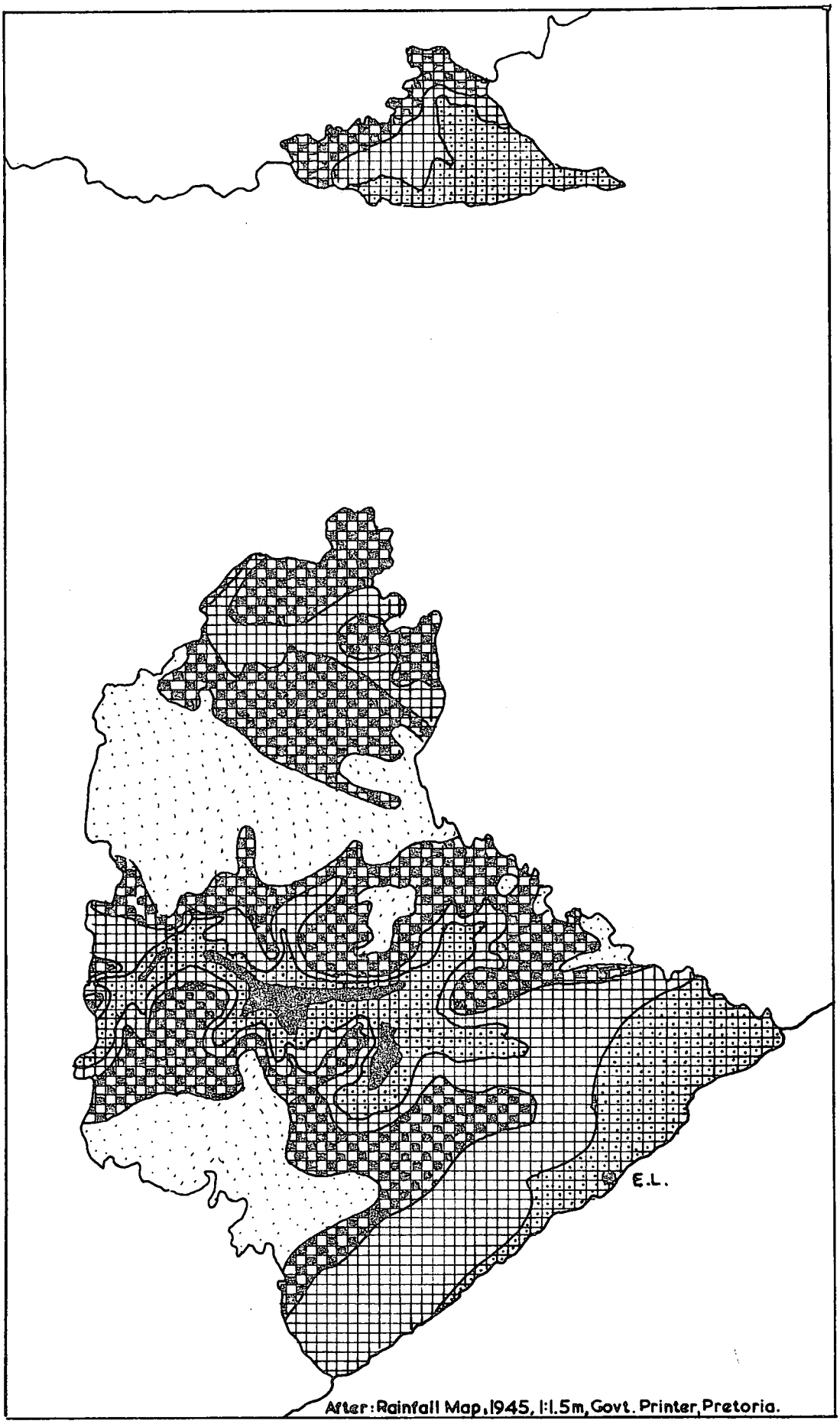


FIGURE 6 : RAINFALL ZONES OF THE CISKEI

Bureau Publication 28, Climate of S. A., Part 8). The coastal area includes the districts of Peddie, Fort Beaufort, Victoria East, King William's Town and East London.

(b) Rainfall: To obtain an overall picture of the annual rainfall distribution in the Bantu areas, Figure 6 should be consulted.

All districts fall within the summer rainfall region and the territory is characterised by the seasonality of the precipitation and by this summer rain frequently being heralded by frightening thunderstorms and heavy downpours resulting in floods at times.

Moolman (1955), indicates the following percentages of the Bantu Ciskei as falling in the different rainfall zones:

Rainfall Zone	Per cent of Total Area
10 to 15 inches (254 - 381 mm)	0
15 to 20 inches (381 - 508 mm)	17
20 to 25 inches (508 - 635 mm)	28
25 to 30 inches (635 - 762 mm)	27
30 to 35 inches (762 - 889 mm)	21
35 to 40 inches (889 - 1016 mm)	6
40 inches and over (1016 + mm)	1

On the above basis, approximately 55 per cent of the Ciskei enjoys an annual average rainfall of 25 inches (635 mm) and higher.

Rainfall figures on a district basis are presented in Table 2, and Table 3 gives the monthly rainfall as a percentage of the annual rainfall.

Due to wide topographical differences existing in each region, Table 2 is by no means able to represent the true picture, but is, nevertheless, an indication of what can be expected. Table 3 merely serves to show that the main rainfall period commences in about mid-September or early October, and continues until March, although rain is possible in any or all of the autumn and winter months.

A more accurate picture of the rainfall pattern in the Bantu districts, is presented in Table 4 where representative weather stations, as far as possible, have been used for each district.

The October to March seasonal rainfall expressed as a percentage of the total rainfall, indicates that in the coastal belt seasonal rainfall, between October and March, is marked lying between 54 to 65 per cent. In the inland areas, the seasonality of rainfall is more accentuated, varying between 68 to 78 per cent of the total annual rainfall. With reference to Schultze's (1947) work on the climates of South Africa, the quarterly figures expressed as percentages

TABLE 2: MEAN MONTHLY AND ANNUAL RAINFALL (IN MM) FOR THE BANTU DISTRICTS OF THE CISKEI [1].

District [2]	J	F	M	A	M	J	J	A	S	O	N	D	Total	% Oct. - March
8	44.25	45.50	63.75	49.00	48.50	35.25	34.50	38.75	54.00	61.50	59.75	51.50	589.25	55.37
12	58.75	67.00	79.75	42.75	31.75	19.50	17.50	19.50	36.50	47.75	56.25	56.75	533.75	68.62
14 A	106.25	103.00	109.00	54.00	34.25	21.00	21.75	26.50	53.00	78.75	91.75	98.50	797.75	73.36
16 A	79.25	84.75	86.25	41.00	25.25	13.25	13.25	16.25	27.00	40.25	57.00	65.75	549.25	75.24

1) Adapted from W. B. 6 Table 4.

2) District 8 : Peddie, King William's Town, East London.

District 12 : Fort Beaufort, Victoria East, Middledrift.

District 14A: King William's Town (N), Stutterheim, Cathcart, Keiskammahoek.

District 16A: Lady Frere (Glen Grey), Herschel.

TABLE 3: MEAN MONTHLY DISTRICT RAINFALL AS A PERCENTAGE OF THE MEAN ANNUAL DISTRICT RAINFALL [1)]

District	J	F	M	A	M	J	J	A	S	O	N	D
8	7.5	8.2	10.8	8.3	8.2	6.0	5.9	6.6	9.2	10.4	10.2	8.7
12	11.0	12.6	14.9	8.0	6.0	3.7	3.3	3.7	6.8	8.9	10.5	10.6
14 A	13.3	12.9	13.7	6.8	4.3	2.6	2.7	3.2	6.7	9.9	11.5	12.4
16 A	14.4	15.4	15.7	7.5	4.6	2.4	2.4	3.0	4.9	7.3	10.4	12.0

1) Extracted from W. B. 6 Table 5.

TABLE 4: AVERAGE MONTHLY AND ANNUAL RAINFALL UP TO THE END OF 1960 IN MILLIMETERS [1] AND THE AVERAGE NUMBER OF DAYS ON WHICH RAIN WAS RECORDED [2] [3]

Weather Station	Altitude in metres		J	F	M	A	M	J	J	A	S	O	N	D	Year Total	Oct.-Mar. R. F. as % of Total
Herschel	1,555	1) 2)	97.6 8	95.3 8	103.1 9	57.2 6	35.4 4	16.0 2	13.4 3	20.5 2	29.9 3	51.9 5	66.6 6	82.3 7	669.2 63	74.24
Sterkspruit	1,454	1) 2)	93.4 9	97.1 9	98.5 9	52.1 6	32.0 4	12.2 2	12.8 2	13.2 2	31.1 4	50.6 6	68.1 7	90.8 8	651.9 68	76.47
Blikana	1,676	1 2	105.0 11	103.9 11	107.2 10	57.4 7	37.7 5	18.2 3	14.5 2	17.7 3	38.1 5	63.5 7	86.7 9	97.8 10	741.7 83	76.06
Lady Frere (Glen Grey)	1,036	1 2	93.7 8	96.7 8	86.5 8	37.4 5	19.3 3	10.9 2	12.5 2	15.8 2	31.0 3	41.9 5	63.2 6	82.2 7	591.1 59	78.53
Whittlesea	1,052	1 2	79.0 8	86.6 8	74.2 7	34.0 5	17.5 3	13.0 2	7.9 1	8.6 2	32.0 4	34.3 4	34.0 4	64.8 5	485.9 53	76.74
Fort Beaufort	456	1 2	49.2 9	59.5 10	70.7 9	38.3 6	31.8 6	11.0 4	13.3 4	18.4 4	36.7 6	48.9 9	55.0 9	49.1 8	481.9 84	68.98
Alice (Victoria East)	525	1 2	60.6 7	63.4 7	81.4 9	46.0 6	33.4 4	20.1 3	24.6 3	23.0 3	41.3 5	50.5 7	64.9 7	63.1 7	572.3 68	67.08
Pleasant View	701	1 2	74.6 6	62.0 5	79.6 7	46.1 4	35.4 3	16.4 2	24.4 3	18.8 2	44.0 4	68.3 7	71.9 7	69.9 7	611.4 57	69.73
Middledrift	488	1 2	51.0 6	58.7 7	70.1 7	38.4 5	33.1 4	12.1 2	18.3 3	18.0 3	32.8 5	52.9 6	61.8 8	51.3 5	498.5 61	69.37
Xukwane	457	1 2	67.5 6	58.5 6	64.3 5	46.8 4	28.8 3	14.9 2	16.4 2	17.5 3	38.9 5	63.1 6	59.4 5	56.0 6	532.1 53	69.31
Dankden Goewerneur	305	1 2	37.6 2	64.8 4	59.2 4	21.3 1	18.0 1	8.4 1	17.8 1	9.7 1	23.9 2	44.2 3	45.5 3	40.1 2	390.5 25	74.62
Debe Nek	608	1 2	79.5 7	90.2 7	103.1 8	46.5 4	36.6 3	25.9 3	30.5 2	23.1 2	52.1 5	69.6 7	85.1 7	60.5 6	702.7 61	69.45
Keiskammahoek	671	1 2	71.2 8	76.3 8	82.6 9	49.1 6	34.0 4	21.3 2	23.2 3	25.2 4	44.7 6	61.0 8	70.4 8	69.6 7	628.6 73	68.58
Cata	975	1 2	118.3 10	124.2 10	137.0 10	66.5 6	39.6 5	26.4 4	26.0 4	29.1 5	65.1 7	91.4 9	110.1 9	121.4 10	955.1 89	73.54
Wolf Ridge	1,067	1 2	127.5 12	130.4 11	138.6 12	73.0 8	51.9 5	30.6 4	32.1 4	36.3 5	79.9 8	109.2 11	121.8 11	126.1 12	1,057.4 103	71.26

TABLE 4: (continued)

Weather Station	Altitude in metres		J	F	M	A	M	J	J	A	S	O	N	D	Year Total	Oct.-Mar. R. F. as % of Total
Heckel (Stutterheim)	1,495	1 2	83.0 12	83.6 9	96.8 9	51.6 6	32.9 4	8.8 1	13.4 2	14.5 3	48.7 6	57.5 9	61.1 8	77.2 9	629.1 78	72.99
Toise River	1,047	1 2	73.3 7	81.8 7	90.0 7	37.7 4	24.2 2	15.1 2	19.1 2	15.2 2	29.5 3	63.3 6	71.9 6	69.2 7	590.2 55	76.16
King Williams Town	375	1 2	55.0 7	69.0 7	74.7 8	41.9 5	28.8 4	15.2 3	17.4 2	19.7 4	41.0 5	54.9 6	60.3 7	57.8 7	535.7 65	69.39
Pirie	610	1 2	119.0 13	114.5 12	119.8 12	65.0 8	41.2 5	25.3 4	27.3 4	30.7 5	65.8 8	96.4 12	110.6 12	113.1 12	928.7 107	72.51
Bekruipkop	365	1 2	68.6 6	70.1 7	81.8 7	42.2 5	52.6 4	15.3 2	22.6 3	28.7 4	81.0 6	88.9 8	81.5 7	62.8 7	696.1 69	65.18
Peddie	305	1 2	47.8 6	56.2 6	71.8 8	46.7 5	39.9 4	25.5 3	27.2 3	27.8 4	50.1 6	62.7 6	62.4 7	53.3 6	571.4 64	61.99
Breakfast Vlei	457	1 2	62.2 3	55.6 4	62.0 4	37.6 3	35.6 2	19.1 1	10.9 1	17.0 2	32.3 3	59.2 4	71.6 4	48.5 3	511.6 34	70.19
Gt. Fish Point	73	1 2	40.0 7	47.0 7	62.3 9	45.9 7	58.9 7	37.4 5	33.4 5	32.1 6	60.2 8	69.0 9	58.2 8	45.4 7	589.8 85	54.58
East London	44	1 2	72.1 11	76.7 11	98.3 11	66.1 8	53.9 6	36.2 4	35.8 4	43.5 6	75.0 8	93.6 11	85.0 11	76.7 11	812.9 102	61.80
R. A. 33	137	1 2	63.2 5	73.9 5	77.3 6	34.2 4	58.9 4	17.6 3	28.3 3	36.3 4	95.7 5	96.2 6	67.2 6	65.4 6	714.2 57	62.06
Mooiplaas	305	1 2	89.8 9	77.4 8	92.6 8	55.7 5	52.8 3	16.0 2	24.5 2	39.8 3	108.4 6	102.5 8	91.6 7	97.4 10	848.5 71	64.97

3) Extracted from W. B. 29.

TABLE 5: QUARTERLY RAINFALL FIGURES EXPRESSED AS A PERCENTAGE OF THE MEAN ANNUAL RAINFALL

Weather Station		Sept-Oct-Nov.	Dec-Jan-Feb.	Mar-Apr-May.	June-July-Aug.
Lady Frere	Rainfall in mm	136.1	273.2	143.2	39.2
	% of Total	23.02	46.22	24.23	6.63
Whittlesea	Rainfall in mm	100.3	230.4	125.7	29.5
	% of Total	20.64	47.41	25.87	6.07

of the total rainfall for Lady Frere and Whittlesea, do not show that the height of the rainy season occurs in autumn (see Table 5).

Reliability, Variability and Frequency of Rainfall: To a large extent the rainfall can be described as being "periodic" in the Bantu areas, and this is possibly more applicable to the lower lying districts, where the uncertainty of the onset of rain has an unfavourable effect on plant growth. According to King (1963), a periodic rainfall climate is one in which "occasional rains are separated by long periods of drought". Such rainfall climates can also be termed "episodic". However, King (1963) describes "periodic" rainfall climates as ones which have "a regular occurrence of rainy seasons, between which long intervals of dryness hold sway. In exceptional years the country may receive rain during normal drought seasons; but the essential attribute is periodical dryness in marked degree". "Episodic" rains are non-seasonable and have a similar effect, "but increased uncertainty of its arrival reacts even more unfavourably on plant growth" (King, 1963).

Making a visual comparison of the reliability of rainfall in the higher lying areas with the lower lying regions, it appears from the annual rainfall figures, that the rainfall is less erratic in the higher regions than in the lower altitude regions. The relative variability of annual rainfall is indicated as being 20 per cent and less on the eastern coastal region, which includes all districts up to and including Keiskammahoek and Stutterheim, while Whittlesea, Glen Grey and Herschel Districts fall in the 20 to 25 per cent variability belt (Weather Bureau Publication 28, Part 8). The coefficient of variability for rainfall, even in the highveld areas such as Herschel, is seldom less than 40 per cent even during favourable months, while the corresponding figure for the coastal areas, is well over 50 per cent (Whitmore, 1957a).

The relative frequency of the annual district rainfall for the various districts, is reflected in Table 6.

(c) Evaporation: Apart from the erratic incidence of rain, a major factor contributing to unfavourable plant growth in most of the Bantu areas, is

TABLE 6: RELATIVE FREQUENCY OF THE ANNUAL DISTRICT RAINFALL RECORDED OVER 61 YEARS [1)]

District	Out of a period of 10 years, the number of years expected to be:					
	Normal or Close to Normal		Drought Years		Excessively Wet	
	Approximate Number	%	Approximate Number	%	Approximate Number	%
North Herschel	6	59	2	20	2	21
South Herschel & Glen Grey	7	74	2	18	1	8
Whittlesea, Middledrift, Fort Beaufort, Victoria East	$7\frac{1}{2}$	77	$1\frac{1}{2}$	15	1	8
King William's Town, Stutterheim	8	82	$1\frac{1}{2}$	13	$\frac{1}{2}$	5
Peddie, South King William's Town, East London	8	79	1	10	1	11

1) Adapted from W. B. 28, Part 8, Table 43.

the high evaporation rate, which can reduce drastically, the total amount of soil moisture available for plant growth. King (1963) indicates to what a marked extent this factor is relevant when he points out that Kimberley, with an average rainfall of approximately 300 mm, has an annual evaporation of about 2191 mm. Whitmore (1957b) mentions that about 50 per cent of the summer rainfall is lost by evaporation from maize lands.

An idea of monthly evaporation losses from a Symon's pan, on the coast and inland, can be obtained from Table 7.

It should be noted that the American Pan has normally been used and recorded annual losses were 67.5 inches (1714 mm) and 85.8 inches (2179 mm) respectively for East London and Aliwal North. Expressing the above moisture losses on a seasonal basis and as percentages, summer evaporation was 34 and 38 per cent respectively, autumn 21 and 19 per cent respectively, winter 18 and 11 per cent respectively, and spring 27 and 32 per cent respectively for East London and Aliwal North.

The mean relative humidity for each month varies from year to year, as for example Queenstown at two p.m., from November to March 1965, varied between 32 and 43 per cent, and in 1966, between 55 and 75 per cent, while Aliwal North, in 1965, was 20 to 33 per cent, and in 1966, 26 to 44 per cent (Report on Meteorological Data 1965 & 1966, W.B. RP32 & 75,1967). These figures, within certain limits, will be representative of the interior of the Ciskei.

(d) Mist: Orographic precipitation occurs on the higher peaks of the mountain catchments, as for example the Hogsback as illustrated in Figure 4. Mist in the mountainous regions such as the Amatole and Mount Arthur ranges, and the mountains of the Herschel District, occurs fairly frequently in summer. The Report of 1961 of the Interdepartmental Committee, in referring to the Amatole Range, says "Dense moist mist is prevalent during the rainy season, and orographic condensation of south-east mist preceding the onset of the season, is sufficient for the self-irrigation of vegetation and krantzes at higher altitudes". These mists, which occur even at the lower altitudes, must play some rôle in the supply of moisture to the plant, albeit small.

(e) Snow: The incidence of snow in the South-east Escarpment, can be gauged from Table 8, which indicates the months that snow can usually be expected.

From the above data it can be seen that the maximum occurrence is in June and July, and that snow can be expected to fall approximately eight times in each year on the average. Snow contributes most favourably to the water supplies in the areas in which it occurs, and in the lower reaches of the drainage

TABLE 7: AVERAGE MONTHLY AND ANNUAL EVAPORATION [1] IN INCHES FROM A SYMON'S PAN [2]

Weather Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Total
East London	6.2	5.9	4.8	3.5	2.9	3.0	2.7	4.0	3.7	5.0	5.8	6.1	53.6
Aliwal North	8.6	7.5	5.8	3.9	2.3	1.7	2.1	3.4	5.0	6.9	8.5	8.6	64.3

1) Averaged over a period of four years.

2) Extracted from W. B. 28, Part 8, Table 42.

TABLE 8: SNOW FREQUENCY PER MONTH AND PER ANNUM BASED ON RECORDS FROM 1947 TO 1961 [1]

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Frequency	0.21	0.09	0.16	0.55	1.07	1.45	1.45	1.24	0.88	0.55	0.36	0.26	8.3

1) South-east Escarpment, W. B. 28, Part 8.

areas, but has its detrimental side in that livestock losses can be quite high in periods of heavy snowfalls of a protracted nature.

(f) Hail: The hail frequency for the Bantu Ciskeian territories can be summarised briefly as follows:

TABLE 9: HAIL FREQUENCY IN THE BANTU CISKEI [1)]

District	Average Number of days in which hail can occur in the District per annum
Herschel	6 - 8
Glen Grey	4 - 5 (rarely up to 6)
Whittlesea	3 - 4
Keiskammahoek and Stutterheim	2 - 3 (estimated)
All other areas except coast	1 - 3
Coastal areas	less than 1

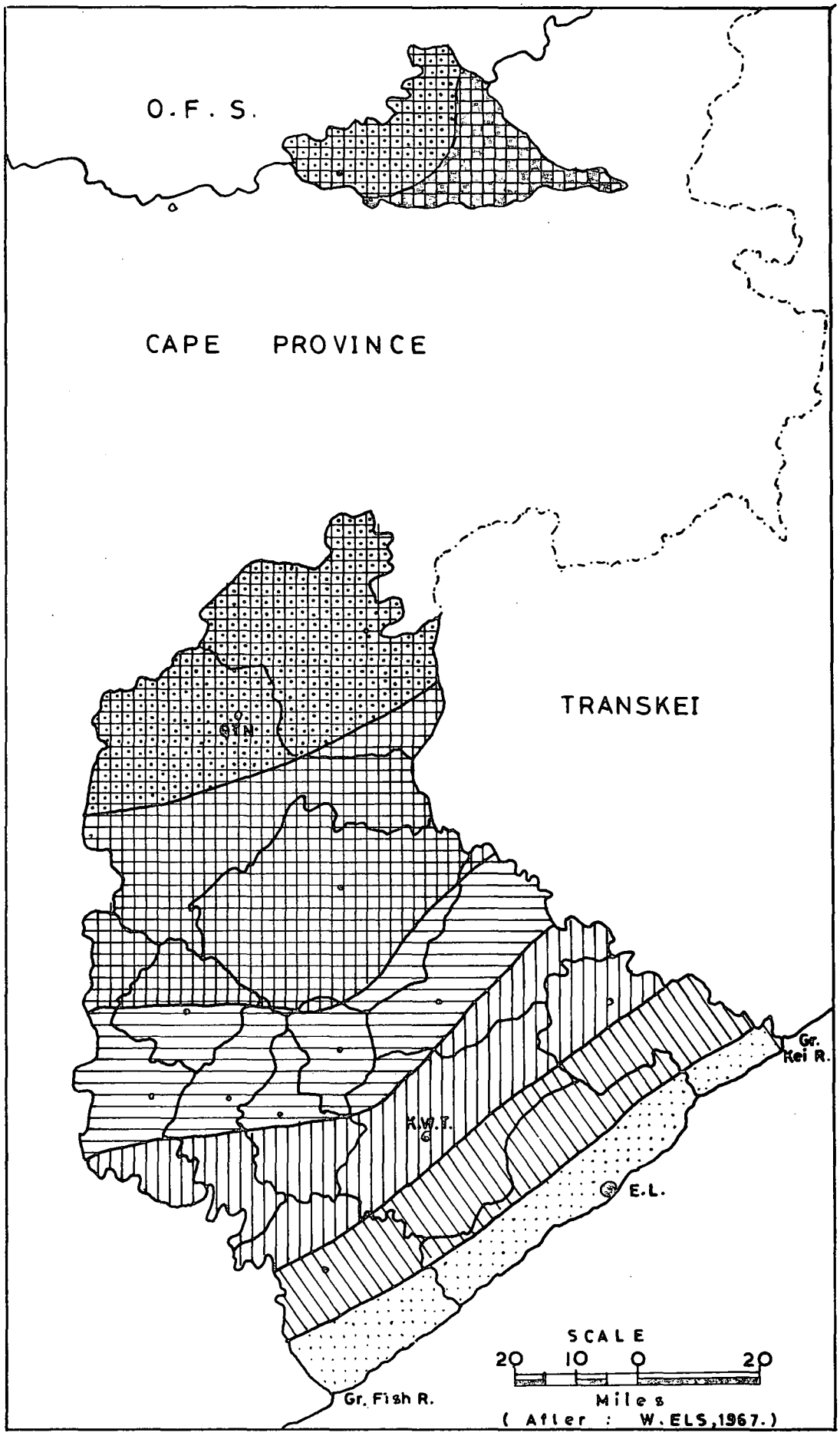
1) Adapted from Climate of S. A., W. B. 4.

While hail is generally experienced in an isolated area, it can cause severe damage to crops, fruit trees and plants generally, apart from being the direct or indirect cause of livestock losses.

(g) Frost: This occurs in most districts, especially in the high-lying regions. The coastal belt does not experience frost. An attempt has been made to calculate the earliest and latest dates that frost occurs in each district and is based on the Weather Bureau map.

TABLE 10: FROST FREQUENCY IN THE BANTU CISKEI

District	Average Number of days in which frost can occur in the District per annum	
	Earliest Dates	Latest Dates
Herschel & Glen Grey	1 - 10th May (In recent years - 10th April)	30th Sept. -10th Oct.
Whittlesea	10th - 21st May	20th Sept.
Keiskammahoek & Stutterheim	15th - 21st May	15th Sept.
Fort Beaufort & Victoria East	31st May	15th Sept.
Peddie	1st July	1st - 15th Aug.
King William's Town	15th June - 1st July	1st - 15th Aug.
East London	No frost on the coast; slight frost inland	



Duration of Frost Period (32°F-0°C)- Days per Year.

Frost-free
1 - 30
31 - 60
61 - 90
91 - 120
121 - 150
151 +

FIGURE 7 : FROST DURATION in the CISKEI

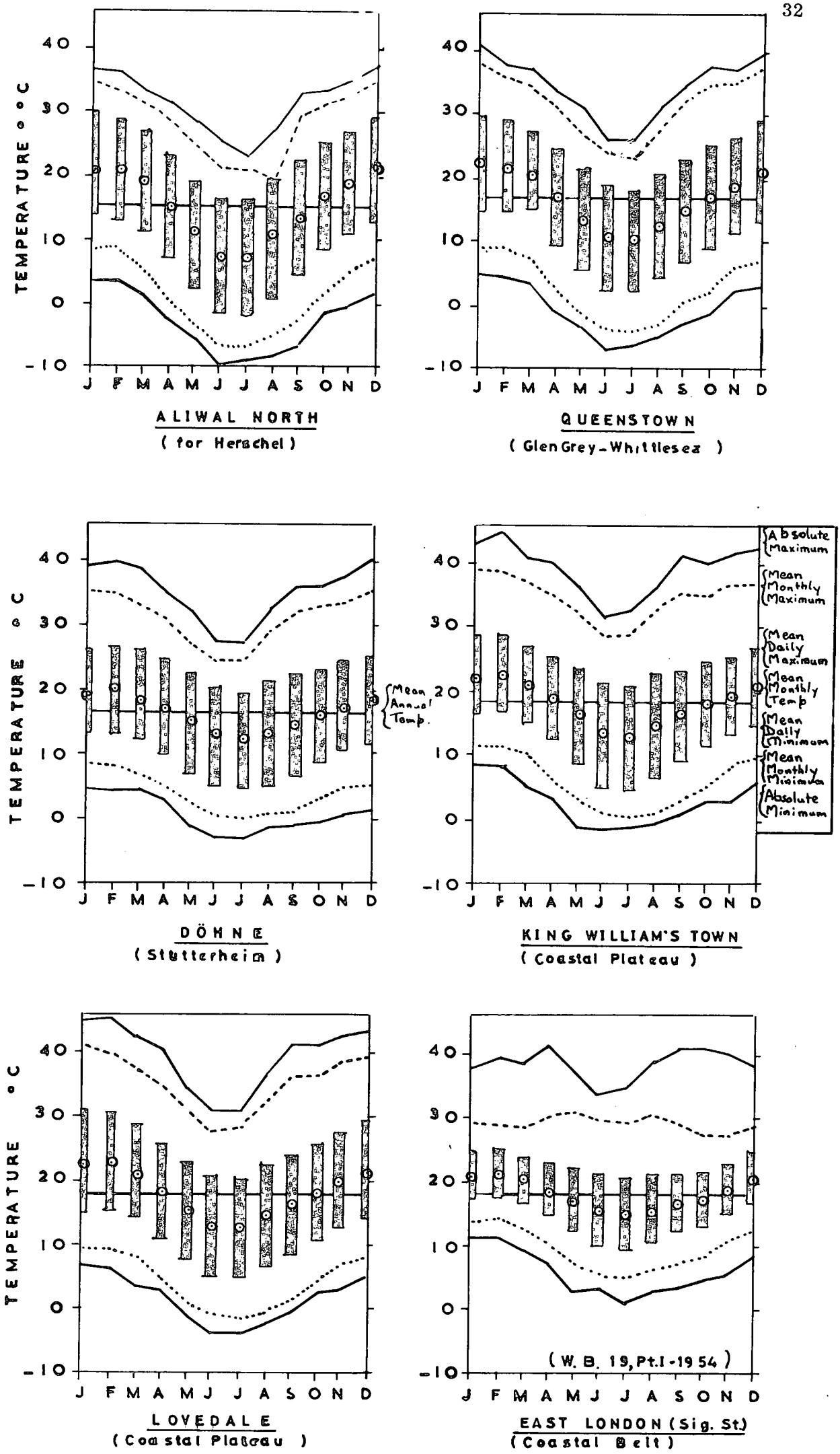


FIGURE: 8 : TEMPERATURE STATISTICS
DAILY, MONTHLY, YEARLY

It is possible that the extreme dates have been exceeded in recent years, especially 1968.

The duration of the frost period in each of the above regions, is indicated in Figure 7.

(h) Temperature: This plays an eminent rôle in crop and animal production influencing practically all phases, more particularly in crop production. Mean maximum and minimum monthly temperatures, together with absolute maximum and minimum, and mean monthly temperatures, are illustrated graphically for six towns in the vicinity of the Bantu regions of the Ciskei. These can be assumed to be reasonably representative of the areas in which they occur.

(i) Climographs and Hythergraphs: Climographs for Aliwal North, Queenstown, Lovedale and East London are shown in Figure 9A and give a general indication of the suitability of these areas for various cattle breeds in particular. Being relatively short-haired, cattle are more likely to be susceptible to changes in humidity, and thus relative humidity is an important factor associated with air temperature. Wright (1954) further illustrates the value of hythergraphs, which are more specifically applied to sheep breeds, and hythergraphs for Aliwal North, Queenstown and East London are illustrated in Figure 9B.

As indices of heat tolerance, the hythergraphs have a limited use, but "they are unique in furnishing a combined indication of environmental temperature and of the probable nature, quantity and period of seasonal growth of the local vegetation" (Wright, 1954).

1.3.5 Soil Types of the Ciskei:

Very briefly, the soils occurring in the Bantu Ciskeian areas, can be noted as follows:

Herschel: Indicated as having Solonetzic soils by the Commission (1955), while Van der Merwe (1962) describes the northern portion as having Gley-like podzolic soils or Highveld Prairie soils, with the southern section falling under the Lithosolic types or Drakensberg Black Clay Soils and Basalt. Du Toit (1939) classifies the soils generally as being of the Stormberg Series with some Basaltic larva-flow soils. Soils derived from Basalt are fine turf soils, and are, agriculturally-speaking, rich. (The Drakensberg Grazing Regions, Bulletin No. 289).

Miller, Turk & Foth (1965) define:

(i) Gley: As being "a soil horizon in which the material is usually bluish-gray or olive-gray, more-or-less sticky, compact, frequently without definite structure, developed under the influence of excessive moisture".

(ii) Podsol Soils: "A zonal group of soils having an organic matter and a very thin organic-mineral layer above a gray leached layer which rests

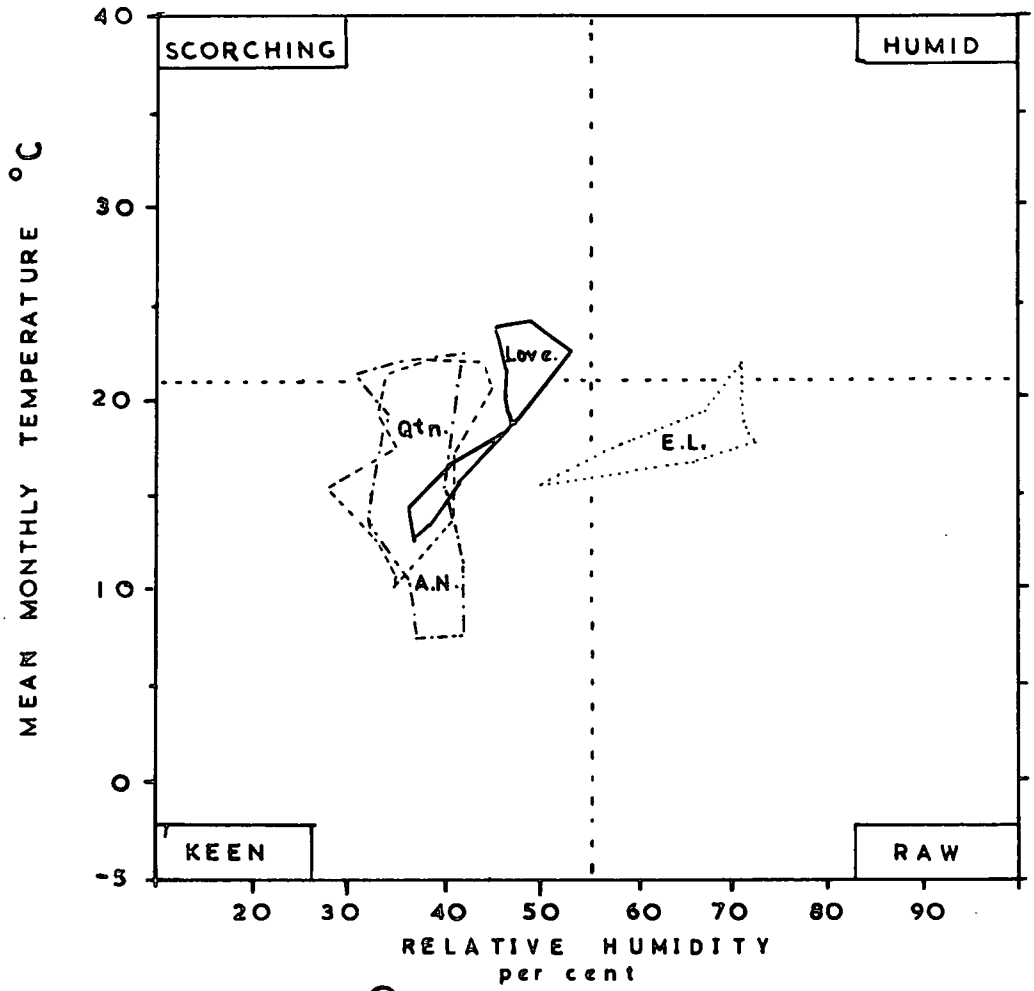
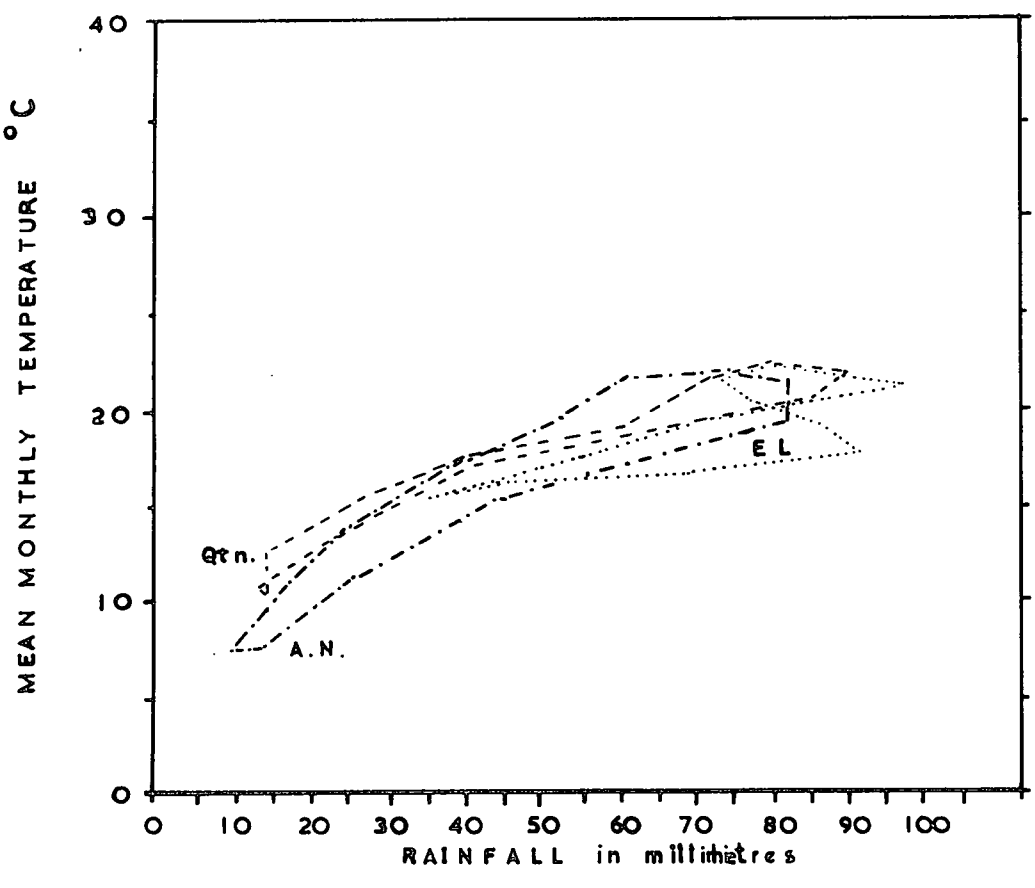


FIGURE: 9 A : CLIMOGRAPHS FOR ALIWAL NORTH, QUEENSTOWN, LOVEDALE, and EAST LONDON



B HYTHERGRAPHS FOR ALIWAL NORTH, QUEENSTOWN and EAST LONDON

(Weather Bureau Pub.19 Pt I 1954)

upon an alluvial dark brown horizon; developed under the coniferous or mixed forest or under heath vegetation in a temperate to cold moist climate. Iron oxide and alumina and sometimes organic-matter, have been removed from the A and deposited in the B horizon".

(iii) Solonetzic Soils: "An intrazonal group of soils having a variable surface horizon of friable soil underlain by dark, hard soil, ordinarily with columnar structure; usually highly alkaline; developed under grass or shrub vegetation, mostly in a sub-humid or semi-arid climate".

Glen Grey: In the north Gley-like podzolic soils abound, with Solonetzic soils in the south (Commission 1955), while Van der Merwe (1962) indicates the soils in the north as being Highveld Prairie soils of the Lithosolic type, and those in the south as being Solonetzic soils (Alkali Soils).

Whittlesea: Sandstone of the Beaufort Series of the Karroo System predominate throughout this district, which gives rise to sandy loam to loam soils. Doleritic soils occur mostly in the northern section of the district, as well as outcrops in the central area, which give rise in some places to clay soils. Lateritic soils occur as isolated outcrops in the Nyana Location in the eastern section (Planning Reports for the Whittlesea District). Van der Merwe (1962) classifies the soils in this district as being Solonetzic soils, with a small section below Shiloh having yellow Ferrallitic soils.

Fort Beaufort and Victoria East: Podsolic soils (Commission, 1955), derived from the Beaufort Series, exist throughout this area (Du Toit, 1939). These soils are referred to as Eastern Province Semi-coastal Belt Soils by Van der Merwe (1962), and occur throughout the coastal and coastal plateau areas, while most of Sheshegu Location in Victoria East, is classified as having "desert" soils.

Middledrift: Same as for Fort Beaufort, with the exception that the soils near to the coast are derived from the Ecca Series (Du Toit, 1939).

Keiskammahoek: Loamy or podsolic soils are generally in this district. These are derived from sedimentary rocks of the Beaufort Series of the Karroo System (Du Toit, 1939). Mountain (1952) states that "The sediments of the Beaufort Series in general, are typically feldspathic and the sandstones are very distinct from the purer quartz sandstones of the Cape System. For this reason, they generally give rise to richer soils". Karroo dolerite, which covers approximately 25 per cent of the total district area, occurs as inclined sheets or dykes, and give rise to clay soils. Some alluvial soils are encountered, but owing to the lack of flood plains, these are restricted to small areas. Colluvial soils also occur (Mountain, 1952).

Stutterheim: Sandy loam soils of the Beaufort Series occur in the Bantu areas, with smaller outcrops of doleritic soils (Du Toit, 1939). The soil in the Stutterheim Locations are classified by Van der Merwe (1962), as Eastern Province Semi-coastal Belt Soils.

King William's Town: Sandy loam soils occur which are derived from the sedimentary rocks belonging to the Lower Beaufort Series of the Karroo System, and these soils are found generally throughout the district with the exception of those locations through which a sheet of dolerite runs from west to east above Bekruipkop (Mountain, 1952). Other bands occur north of King William's Town, with one band in the Pirie, Kwelerana, Braunschweig, Peelton area and another running through Evelyn Valley forest across to Donnington Location. These sheets give rise to red doleritic clay soils found in some of the locations, apart from isolated outcrops in other areas as for example, Noncampa.

Peddie: Podsolic soils of the Ecca Series occur in this district, while soils of the Witteberg Series of the Cape System are found in certain areas (Du Toit, 1939). With reference to the latter soils, Du Toit (1939) says that such "soil is always scanty and the pasturage on the hills invariably poor".

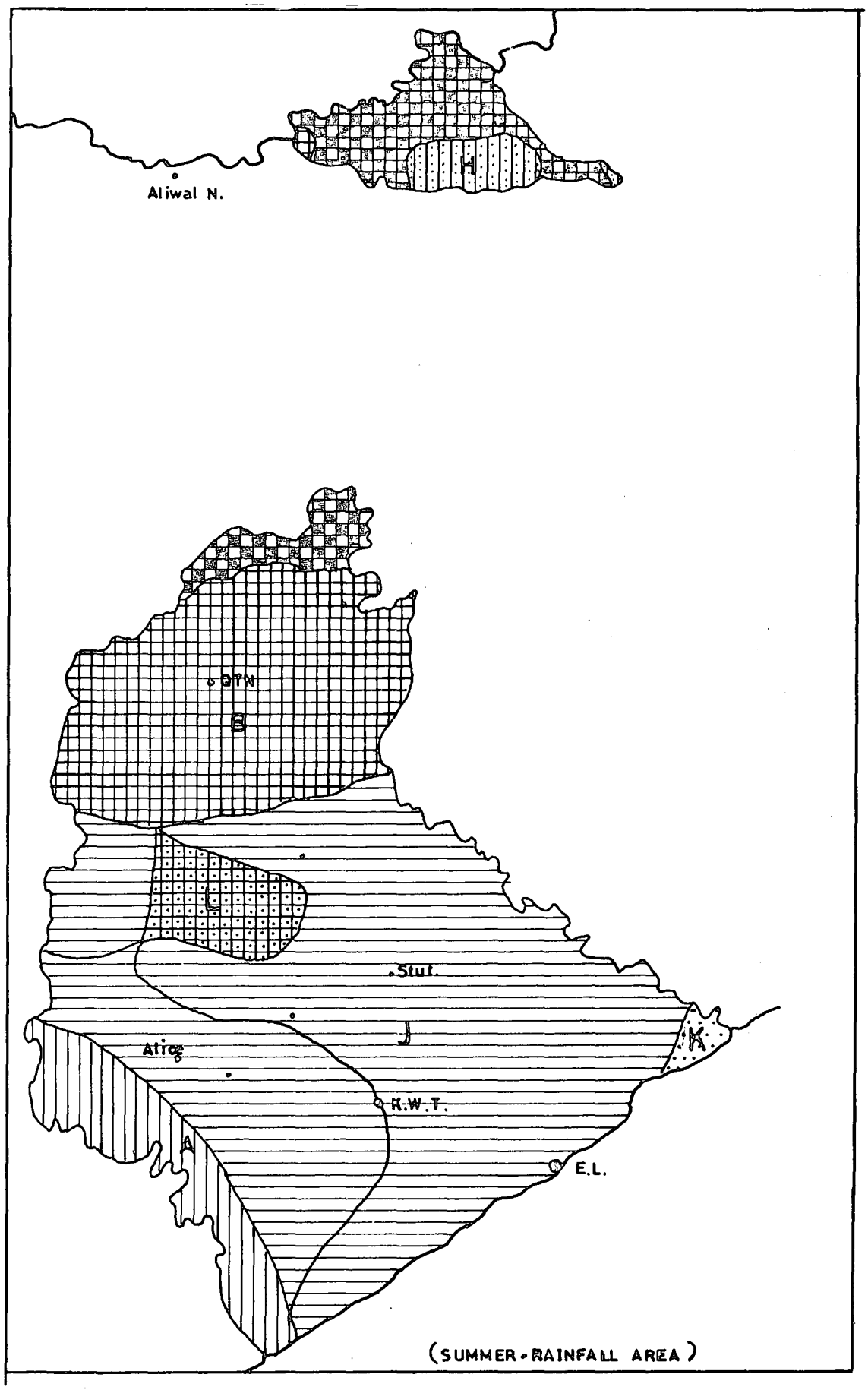
Mountain (1952) refers to there being Lower Beaufort Series sandstone in the Peddie District which is in the region of 10, 000 feet thick. From an agricultural viewpoint, a soil which consists "dominantly of a pale-grey quartzitic sandstone", such as those of the Witteberg Series (Mountain, 1946), is on the poor side, due to the higher proportions of quartz (Malherbe, 1962). Van der Merwe (1962) includes these soils under Eastern Province Semi-coastal Belt Soils on the eastern section, and under Desert Soils in the west.

East London: Grey sandy loam soils are commonly encountered throughout this district, being derived from Beaufort sandstone and shale. Black and red doleritic clays occur in this area, and overly portions of the doleritic sheet in Released Area 33, Mooiplaats and Kwelera (Bader, 1962), but to what degree is not recorded. Alluvium occurs on the west bank of the Chalumna for approximately two miles, as well as on the Keiskamma River banks to the same extent. These all occur in Released Area 33 (Mountain, 1952).

Figure 10 indicates the distribution of the above soils, as classified by Van der Merwe (1962).

1.3.6 Vegetation:

For the sake of simplicity, the veld can be divided into three broad categories - sourveld, sweetveld and mixed veld. Sourveld types of grasses "are termed 'sour' because the constituent grasses become unpalatable at a comparatively early stage in growth - usually as soon as they flower and set seed". Grazing is generally good to excellent in spring and early summer



DESERT SOILS

SOLONETZIC SOILS - Alkali Soils

LITHOSOLIC TYPES
Drakensberg Black Clay Soils and Basalt

GLEY-LIKE PODZOLIC SOILS
Highveld Prairie Soils

GLEY-LIKE PODZOLIC SOILS
E.P. Semi-Coastal Belt Soils

GLEY-LIKE PODZOLIC SOILS
Natal Coastal Belt Soils

FERRALLITIC SOILS - Brown and Red Ferrallitic Soils

FIGURE 10 : SOILS OF THE CISKEI

AFTER van der Merwe 1962

prior to it becoming unpalatable, and it is thus seldom useful from a nutritional viewpoint for longer than four to five months of the year under natural conditions (Scott, 1955).

Such veld is found in the higher altitudes on the plateaux which are comparatively cool and wet, and a characteristic of its growth, is its sward density. Dohne Sourveld is a good example of this type of veld. Themeda triandra, Aristida, Eragrostis, Elyonurus, Harpechloa, Tristachya, and Digitaria species, are some of the components of this type of veld in the Eastern Province. Where the veld is subjected to intense and continuous overstocking and other malpractices, Themeda triandra, one of the climax species, can be virtually eliminated and the hardier species of a lower succession order, such as Aristida junciformis, Eragrostis, Sporobulus, and Elyonurus species, are the natural successors. In some areas, Senecio retrorsus, Chrysocoma tenuifolia or "Bitter Karroo", Euryops multifides or Harpuis, together with other small "weed" plants and Karroo shrubs, can severely encroach on the grazing areas. In the high lying Bantu Homelands, this latter stage has already been reached in many cases, and exceeded, for that matter, in other areas where shrublets almost completely dominate the grazing. Burning of the veld is hardly a problem at present owing to the droughts which have ravaged the country in the past few years, together with overstocking in certain locations or districts as, for example, Glen Grey and Fort Beaufort.

Sweetveld: Sweetveld types generally occur in the low rainfall areas, and are referred to as "sweet" because the majority of the species remain palatable throughout the growing and winter seasons. However, rain in winter can cause a rapid deterioration in nutritional value due to leaching. This type of veld is more susceptible to mismanagement because of the comparatively sparse ground cover and the fact that it remains palatable at all times (Scott, 1955).

Throughout the Bantu Ciskeian territories, Themeda triandra appears to be the climax grass species, with Hyparrhenia hirta the next most dominant. With the lack of correct grazing management practices, which includes proper rest-periods at the critical stages in the growth of the veld, Panicum in some areas, Eragrostis, Sporobulus, Aristida species and Cynodon dactylon, are next in the retrogressive phases in veld. Cynoden dactylon, a recumbent species, is the last or lowest rung in the order of succession of the grass species, prior to reaching the shrublet or weed stage. In the Bantu areas, a large proportion of Bitter Karroo (Chrysocoma tenuifolia) is found today, along with other small bushes, such as Pteronia incana.

Mixed Veld: This consists of veld which falls between the two ecological zones, "sour" and "sweet", and which is composed of species common to both

categories of veld mentioned above. Generally, this veld is palatable for a longer period than sourveld, but relatively unpalatable species exist which are only eaten due to grazing pressure. In the Bantu areas, these grasses very seldom have the opportunity to reach maturity, and where they do, they are grazed right down, notwithstanding their comparative lack of acceptability. Scott (1955) indicates that Mixed Veld provides useful grazing for six to nine months of the year depending on the composition of the sward.

Acocks (1953) in his map and publication on the veld types of South Africa, indicates the various ecological zones, which are illustrated in Figure 11.

Herschel: With the exception of a belt varying in width from approximately one to 10 miles, which includes the villages of Herschel, Bluegums and Bensonvale, with Palmietfontein on the border, the remainder of Herschel District falls in the Themeda/Festuca Alpine Veld zone (Acocks, 1953). The narrow belt mentioned above, consists of Dry Cymbopogon/Themeda Veld (sandy) which runs from the Telle River down the Orange River on its eastern boundary. Near the Orange River the veld is "sweet", while near and on the Witteberg, it is sourveld. As previously mentioned, a certain amount of Hyparrhenia species are found on the Witteberg, and most of the natural grass has disappeared being replaced by Bitter Karroo and other Karroo shrubs (Water Planning Commission, 1967).

While Acock's classification still holds for Herschel, and the other districts for that matter, as far as the dominant climax or sub-climax species are concerned, the position in these districts today is such that very little of the original veld grasses of the higher-succession species remain. These have been replaced by Aristida, Eragrostis and Cynodon species, and some annuals and other lower-succession species. However, on resting the veld, some of the higher-succession species put in an appearance, and with judicious veld management practices, rehabilitation of the veld can be realised.

Glen Grey: The higher lying areas of this district are classified as having Highland or Dohne Sourveld and fall under Temperate and Transitional Forest and Scrub Types, and this includes the Mount Arthur Range (Acocks, 1953). However, an appraisal of the slopes of these areas, reveals that Harpuisbos (Euryops multifides) predominates over wide areas. In the riverine areas, notably along the Indwe, Bolotwa and White Kei Rivers, Valley Bushveld of the Karroo and Karroid Bushveld types, predominates. The remaining areas between the high and lower-lying regions, consist of grassveld areas which have been invaded by Acacia karroo, falling under the False Bushveld Type in Acocks' classification, and include Lady Frere and Bolotwa villages. Generally, the cover on the higher plateaux is what, at a stretch of the imagination, could be referred to as "reasonable" as far as the density of the sward is concerned, but

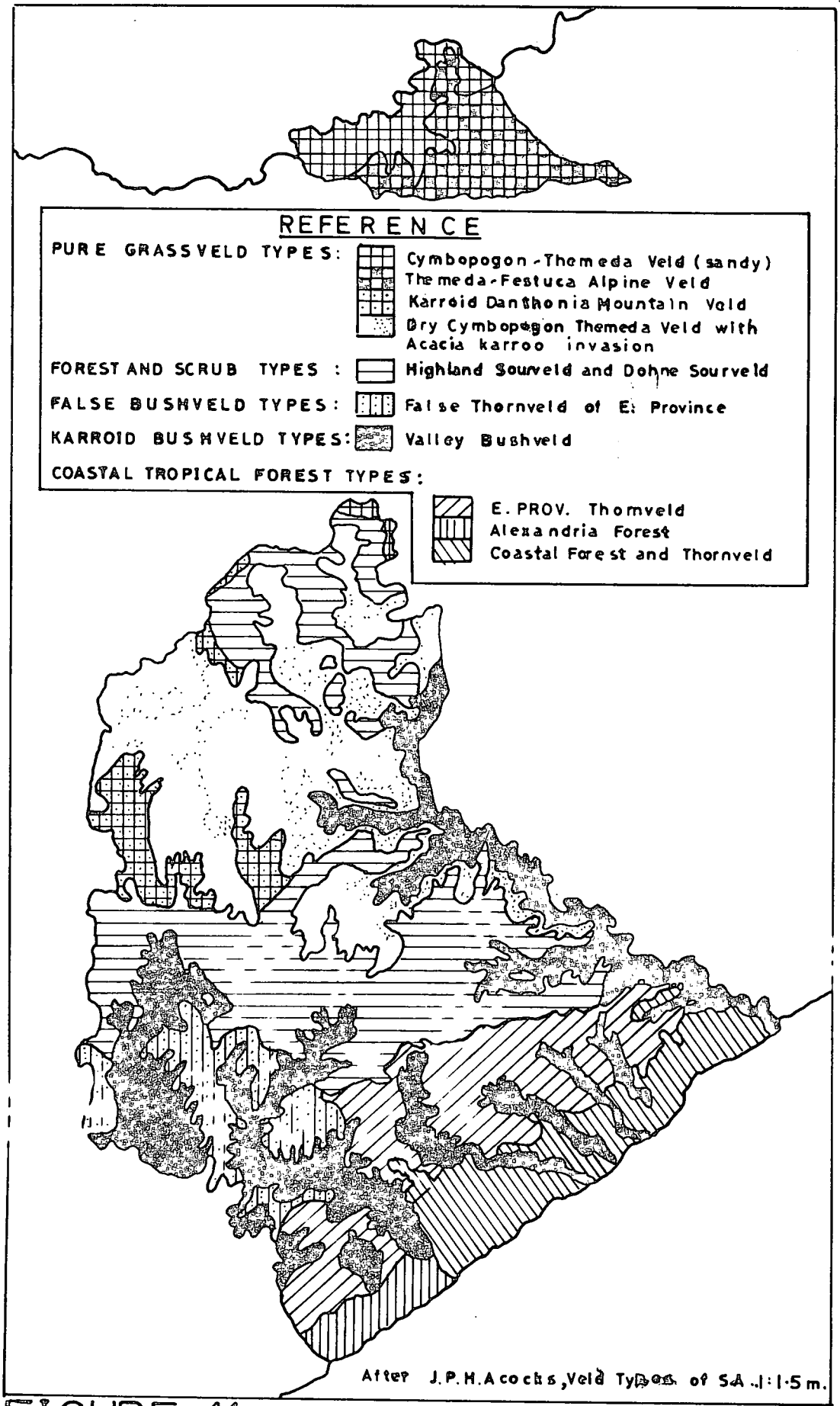


FIGURE 11: VELD TYPES OF THE CISKEI

this is most certainly not the case in the lower-lying regions where the cover is distinctly poor.

Whittlesea: The southern locations, which lie on or near the Witteberg and include Umtwakazi, Mousa and part of the Hackney location, fall in Acocks' Dohne Sourveld zone. The middle and northern regions, including Shiloh, are generally classified as being in the Dry Cymbopogon/Themeda Veld zone. Very little Themeda is present today in the majority of locations, where Aristida and Eragrostis species predominate, but the recent droughts have taken their toll of even these species. Karroid Danthonia Mountain Veld occurs on the higher slopes.

Plant encroachment has occurred in many areas, where Bitter Karroo, Aster fillifolia and Harpuisbos have become established. Up until fairly recently, Harpuisbos covered the greater part of the hillsides in the central and northern sections, but this is no longer the case, although areas still exist where this plant remains a menace. While very little Cymbopogon or Themeda is evident, the present cover consisting of Aristida and Eragrostis to a certain degree, as well as Cynodon species, when rested and well-managed, restores the Themeda over the years, based on observations by the Agricultural Officer.

Cathcart: Goshen Trust Farm falls partly in Dohne Sourveld and partly in Themeda veld which has been invaded by Acacia Karroo bush (Acocks, 1953).

Fort Beaufort and Victoria East: Generally, these districts fall in the False Thornveld of the Eastern Province zone with Valley Bushveld in the depressions (Acocks, 1953).

Middledrift: The northern portion, which includes the Amatole Basin, falls under False Thornveld of the Eastern Province, with the remainder being classified as Valley Bushveld (Acocks, 1953).

Keiskammahoek: Acocks (1953) describes the vegetation as being of the Valley Bushveld Type, with the exception of the high lying areas, which fall under the False Thornveld area. These higher areas are, to a major extent, covered by "Fynbos" or Macchia which includes the Erica, Cliffortia, Stoebe, Parserina and Protea species over 3,000 feet, and Cliffortia linaerifolia, the most dominant species, occurring below 3,000 feet with Helichrysum species covering large areas especially on the higher areas (Trollope, 1968).

Story (1952), in a botanical survey made of this district, indicates that areas receiving less than 25 inches (about 625 mm) of rainfall annually, are associated with bush and scrub; 30 inches (750 mm), with dry forest, and 35 inches (875 mm) with wet forest. He also points out that the line of division between the sourveld or moist areas, and sweetveld or dry areas, was near the 25 inch isohyet.

Due to grazing pressure, and erosion which has brought about a removal of grass cover in some areas, the Acacia scrub is on the increase. This removal of the grass, and hence growth competition, has been shown to accelerate the Acacia spread. Between the 15 and 20 inch isohyets, the Acacia virtually disappears, except along the water courses and roads (Story, 1952).

Fort Cox thorn scrub, seven to 10 feet in height, and greyish in colour, grows in the lower sections, and is reputed to be good cattle country. Digitaria, Panicum, Themeda and Cymbopogon species grow in between the thorn trees (Story, 1952).

In the Nqhumaya Location area, taller trees grow, and the spiny type of plants become fewer in number, until nearer to the forest, Zanyokwe Bush occurs having a larger number of broad-leafed trees. Story (1952) also distinguishes, between Dry Forest in the 29 inch plus rainfall belt where most of the trees can be eaten by stock, and Wet Forest, which prefers an average annual rainfall of over 35 inches and has trees varying in height from 50 to 70 feet. Lastly, on the mountain tops, the xerophytic Macchia makes its appearance, and is reported as being the climax vegetation.

Reports, concerning the mountain range more than 50 years ago, stress the fact that Themeda triandra covered a great deal of the range, and could carry two to three head of cattle per acre for seven to eight months of the year, and, as Robb (1952) points out, this might well have been accepted as the standard carrying capacity. Records indicate that there was an abundance of vegetation in the district prior to 1890, with a scarcity after 1910 (Story, 1952).

Stutterheim: Dohne Sourveld occurs in the two locations of Wartburg and Mgwali and on the Heckel Trust Farm (Acocks, 1953).

King William's Town: From Mount Coke up to Mngqesha, including the area round King William's Town, is covered by Eastern Province Thornveld. South of Mount Coke, Coastal Forest and Thornveld is found. The higher lying locations, such as Pirie, fall in the Dohne Sourveld region, while the locations near Debe Nek, are in the False Thornveld area (Acocks, 1953).

Comins (1962) points out that some of the locations in the lower lying regions, show gross mismanagement in that certain shrublets have encroached in the sweetveld areas to such an extent that the final retrogressive stages in the plant succession have been reached. He also makes a photographic comparison of the Peelton Location boundary with that of the grazing of a neighbouring White farmer. In the Bantu area a distinct lack of Acacia scrub is noticed, together with a "noticeable difference between the nature of the grass cover of the two areas". While invasion of the grassveld by Acacia karroo is widespread and is associated with poor veld management practices which reduce the veld cover,

the problem of bush encroachment in the Bantu areas, although serious in places, is probably much less of a problem when compared with that of the White areas, due to firewood being at a premium.

Peddie: The locations surrounding the town of Peddie, lie in the Eastern Province Thornveld Region (Coastal Tropical Forest Types or Coastal Bushveld), while the northern section lies in the False Thornveld zone, and the southern end falls under Coastal Forest and Thornveld (Acocks, 1953).

East London: Acocks (1953) includes this area under Coastal Forest and Thornveld. The Border Regional Survey, conducted in 1957, in a map prepared by Comins (1957), classifies the area as follows:

Apart from the Coast Dune Bush, and some Vlei and Saltmarsh Vegetation, the latter referring to submerged and floating aquatics, sedge meadows and halophytes in the Keiskamma River estuary, the vegetation along the Keiskamma River is Scrub, which includes Kruisbessie, Wag-'n-Bietjie, Knobwood and Clematis amongst others. Rivertine Bush and Gully Bush also occur along this river and includes such species as Euphorbia, Red Milkwood, Acacia caffra, Strelitzia and Combretum. In Released Area 33, this scrub runs up to the boundary with the King William's Town Magisterial District, while the central and east portions consist of Grassland, composed mainly of Themeda triandra and Hyparrhenia hirta, as well as Eragrostis, Aristida, Sporobolus and Cynodon species, and Acacia Woodland consisting of Acacia karroo in "bush clumps" together with other sequents. In the locations Kwelera and Mooiplaats, both Scrub and Grassland abound (Comins, 1962).

Camping capacity of the natural pastures are given, on a district basis, in Chapter 3.

1.3.7 Water Resources: Water resources are still being developed and a considerable amount of work has yet to be done before water provision reaches the optimum level for availability and reliability. At the end of 1967, there were seven irrigation dams and 2,879 human and stock-watering dams of all types, while 868 boreholes have been drilled to date, out of which 645 have proved to be successful. This represents a failure-rate of nearly 35 per cent. Dam-building and bore-hole drilling are apparently limited by insufficient and inadequate equipment and, no doubt, trained staff, all of which are dependent on the provision of adequate finances. Water availability might well prove to be a serious limiting factor in the development of both rural and urban areas, and present and future industrialisation. With an expected, estimated human population of two and a half million Bantu in the Ciskei in the year 2000, rural water demands have been estimated to be in the region of 17 million gallons per day, while urban requirements will be near 30 million gallons per day (information extracted from file number

N 512 - Water, Head Office, King William's Town). While the demand for water for livestock drinking is expected to decrease slightly, by about 250, 000 gallons per day, over the years 1970 to 2000, the increase in human requirements will increase by nearly 23 per cent in the rural areas to over 17 million gallons according to the Committee appointed to investigate the water position in the Ciskei in 1968. According to preliminary figures for the Victoria East District, where the existing population appears to be more than 35 per cent under-estimated (Els, 1968), the future position will be such that much more water will have to be made available then that mentioned above.

1.3.8 Agro-Economic Zones of the Ciskei:

The Ciskeian Districts fall in the agro-economic classification, as indicated in the Tomlinson Report and Agro-Economic Map of South Africa, as follows:

Herschel	:	North - C5 : South - D2
Glen Grey	:	North - D2 : South - C3
Whittlesea	:	North - C3 : South - D3
Cathcart	:	D3
Fort Beaufort	:	A7
Victoria East	:	F4
Middledrift	:	North - F3 : South - F4
Keiskammahoek	:	North - D3 : South - E6 and - D4 : and - F3
Stutterheim	:	E6
King William's Town	:	North - E6 : South - F4 and - F3 : and - H3
Peddie	:	North - F4 : South - H3
East London	:	F3, F4 and H3

Where:

A	-	Irrigation area.
C3	-	Mixed Farming Region - Queenstown area - 2.5 bags grain per morgen and 8.0 morgen per mature large stock unit (MLU).
C5	-	Mixed Farming Region - Herschel area - 2.0 bags grain per morgen and 10.0 morgen per MLU.
D2	-	Mountain Grazing Region - Stormberg Grazing Area. 2.0 Bags grain per morgen and 3.0 morgen per MLU.
D3	-	Mountain Grazing Region - Winterberg Grazing Area. 2.0 Bags grain per morgen and 6.0 morgen per MLU.
E6	-	Mixed Farming Regions - Transkei Area. 6.0 Bags grain per morgen and 2.5 morgen per MLU.

F3 - Thornveld Region - Southern Thornveld Area.
4.5 Bags grain per morgen and 4.0 morgen per MLU.

F4 - Thornveld Region - Keiskamma Thornveld Area.
3.5 Bags grain per morgen and 4.5 morgen per MLU.

H3 - Coastal Region - Pondoland Coastal Area.
6.0 Bags grain per morgen and 3.5 morgen per MLU.

As will be shown, these average yields and veld-carrying capacities have already been exceeded in some areas. The Healdtown Fingo Location falling in the "irrigation" area is purely fortuitous as there is a very remote chance of irrigation being practised in the future.

1.4 HUMAN POPULATION OF THE BANTU AREAS OF THE CISKEI:

1.4.1 Origin and Early History:

The Xhosa group is an offshoot of the Abe-Nguni tribe which migrated southwards from, probably, the north-east of Central Africa, and which settled in the area known today as Natal. Branches of this tribe moved further south into what is today the Eastern Cape Province (Soga, 1931). The Bantu areas of the Ciskei, as they are at present delineated, were recognised as such in the second half of the 19th Century, although it appears that the "Ama-xosae" first moved into the area near the "Kae" River between the years 1670 and 1675 (Kay, 1833). In 1778, the Fish River was regarded as the northern-most boundary of the Cape Colony (Commission, 1955). Somerset initiated the carrying of Cape Colony influence across the Fish River and in the subsequent war that developed, the Xhosa were expelled from the area lying between the Fish and Keiskamma Rivers, which at this point in history, was looked upon as a "buffer zone" between the Europeans and Bantu (Commission, 1955).

However, this zone was subsequently regarded as ceded land and became open for settlement by the European. Gradually the Mfengu (Fingos) and Xhosa returned and re-populated some of this land (Commission, 1955). The Mfengu, that is, "the wanderers", remnants of the nations destroyed by Tshaka and Matawana, sought asylum in the Colony from 1928 onwards (Cory, 1930) and groups were settled in areas among the European settlers across the Keiskamma River. The idea behind this settlement was the easier control of the tribes and the provision of labour for the farmer settlers, and "to better acquaint the Bantu with western culture and agriculture and other crafts" (Hobart-Houghton & Walton, 1952). The Maitland Treaty of 1845 (Brownlee, 1923, gives the date as 1844) made land grants to the Fingos in perpetuity (Cory, 1930) but the outcome is not clear.

A large reduction in the Bantu population occurred in 1857 and 1858 when the "cattle-killing delusion" in the Transkei, together with the subsequent famine, reduced the Bantu population in British Kaffraria from approximately 105,000 to

about 37,000 (Barker, 1966). Out of these survivors, 5,093 were given permission to enter the Colony for the purpose of obtaining work mainly as farm labourers (Commission, 1955).

The population of British Kaffraria in December, 1858, was Bantu 38,559 and Europeans 4,148, and by 1861, these figures had increased to 81,353 and 6,705 respectively (Cory, 1930). In 1866, the population was in the region of 112,000 of whom about 12,000 were Europeans (Roberts, ca. 1890). Thus pressure on land, with all its subsequent problems, began to build up, and the stage had arrived when boundaries needed to be defined.

1.4.2 Ethnic Groups:

The ethnic groups for the various districts of the Ciskei are indicated in Table 11, and fundamentally, and for the sake of simplicity, can be considered as two main groups Xhosa and Mfengu or Fingo. Both these main groups are Xhosa-speaking, and judging from the figures supplied by the Chief Bantu Affairs Commissioner's office in King William's Town, about 16 to 20 per cent of the total Bantu population, are of Fingo extraction. It is estimated that 50 per cent, and possibly more, of the population have an understanding of English, while five to 10 per cent have a working knowledge of Afrikaans, according to a Senior Agricultural Official. In the Herschel District, about 50 per cent of the Bantu population speak Xhosa, while the remaining 50 per cent speak Sotho (Rennie, 1945).

1.4.3 Population Statistics:

Population statistics are also indicated in Table 11 and as both Komga and Humansdorp have been scheduled "White" areas, it is proposed not to consider these areas further.

In the eleven and a half year period, the total increase in population has been in the region of 28 per cent, or 87,707, the main increases occurring in East London 222 per cent, Whittlesea 60 per cent, Fort Beaufort 49 per cent, and Victoria East 48 per cent. Over the same period, the overall increase in land has been of the order of 3.2 per cent. In the 1951 census of the Ciskei, the total Bantu population was 1,222,567 of which number approximately 35 per cent were resident in urban areas and 65 per cent in rural areas. The latter percentage represents 791,442 souls and bears very little relationship to the 1967 figure of 404,818 mentioned in the Annual Agricultural Report, and the assumption is made that nearly 400,000 Bantu reside on European-owned farms and elsewhere.

The population density is highest in Fort Beaufort with 271 people per square mile, and lowest in Glen Grey with 87 people per square mile. However, it will be noted that the density per square mile averaged nearly 93 in 1955-1956

TABLE 11: POPULATION DENSITIES ON TRUST AND PRIVATELY-OWNED LAND FOR THE YEARS 1955/56 AND 1967 AND TRIBAL AUTHORITIES AND SIMPLE ETHNIC GROUPINGS [1]
(Adapted from Annual Agricultural Reports)

District	Population		Land-Morgen		Population per square mile on:- 1955/56			Population per square mile on:- 1967			Land owned in 1967 by:-		% Increase Between years in:-		Tribal Authority and Ethnic Grouping of the Majority of Members under Authority. X = Xhosa F = Fingo B = Basuto (Sotho)
	1955/56	1967	1955/56	1967	SABT Land	Private Land	Total Bantu Land	SABT Land	Private Land	Total Bantu Land	SABT sq. miles	Private Bantu sq. miles	Land	Population	
Herschel	61,300	63,851	197,654	201,150	93.8	-	93.8	95.8	168.9	96.0	663.70	1.48	1.8	4.2	Basotho (B), Myemane (X), Ama-Vundle (B), Batlokwa (B), Ama-Qwathi (X), Ama-Hlubi (F)
Glen Grey	65,600	83,378	279,942	289,771	72.6	19.9	73.2	89.0	26.7	87.0	928.08	30.16	3.5	11.9	Hala (X), Gcina (X), Mhlonthlo (X) (Tembu)
Whittlesea	15,606	24,994	80,303	82,325	59.7	-	59.7	92.6	43.3	91.8	267.90	4.34	2.5	60.2	Zulukama (X), Mdadlana (F), Shiloh (F), Ndlovukazi (F)
Cathcart	602	960	2,111	2,137	86.2	-	86.2	135.8	-	135.8	7.07	-	1.2	26.2	Fingo
Fort Beaufort	4,879	7,283	6,756	8,132	218.4	-	218.4	270.8	-	270.8	26.89	-	32.2 [2]	49.3	Healdtown Community Authority (F)
Victoria East	11,071	16,433	35,211	36,514	92.7	210.3	95.1	135.8	148.4	136.1	118.37	2.38	3.7	48.4	Tyumie (F), Gaga (F), Zwelonke (F)
Middledrift	24,797	32,896	87,782	81,090	86.6	45.3	85.4	123.2	107.9	122.7	259.76	8.40	Decr.	32.7	Gaika-Mbo (X), Amagqunukweba (X)
Keiskammahoek	20,928	25,097	37,062	38,855	175.5	140.9	170.8	208.3	109.0	195.3	111.74	16.75	4.8	19.9	Keiskammahoek North and South (F)
Stutterheim	4,244	4,950	13,969	15,078	132.3	41.8	91.9	134.6	49.2	99.3	29.23	20.63	7.9	16.6	Zibula (X)
King William's Town	70,456	73,117	144,682	146,742	149.9	91.1	147.3	152.2	117.3	150.7	463.86	21.40	1.4	37.8	Imidushane (X), Imiqhayi (X), Amagasela (X), Amantinde (X), Amahlati (F), Amahleki (X), Peelton (X)
Peddie	19,943	28,183	84,716	84,313	73.2	50.1	71.2	102.5	85.9	101.1	254.45	24.36	Decr. 0.5	41.3	Amahlubi (F), Njokweni (F), Msutu (F), Bhele (F), Dabis (F), Mpahla (F), Mareledwana (F)
East London	12,864	41,469	42,748	71,807	89.4	108.3	91.0	174.6	175.1	174.6	226.22	11.24	68.0	222.4	Nowawe (X), Nxaruni (X), Kwelera (X), Kwenxura (X) Tyolomnqa (X)
Komga	3,152	-	11,899	-	89.5	72.2	80.1	-	-	-	-	-	-	-	-
Humansdorp	1,669	2,203	9,001	9,140	59.7	34.1	56.1	72.9	-	72.9	30.23	-	1.5	32.0	-
TOTAL	317,111	404,818	1,033,836	1,067,054	-	-	-	-	-	-	3,387.50	141.14	3.2	27.7	
MEAN	-	-	-	-	94.3	65.4	92.8	115.9	84.4	115.0	-	-	-	-	

1) Adapted from Annual Agricultural Reports.

2) Figure extracted from 1956/1957 Annual Agricultural Report

and 115 in 1967, showing the upsurge in population growth in the Ciskei Bantu areas. In a preliminary study made by Els (1968) in the Victoria East District it is apparent that population statistics for the various locations are under estimated by over 35 per cent, and the position is more serious than shown above.

In the areas owned privately by Bantu, the overall increase in density has been from 65 to 84 people per square mile, and in most districts, there is much less "pressure" on private land compared with South African Bantu Trust land, Herschel and East London Districts being the exceptions.

TABLE 12: POPULATION, ARABLE LAND AND ARABLE LAND PER CAPITA IN THE BANTU CISKEI, [1] TRANSKEI [2] AND IN SEVERAL COUNTRIES [3]

Region or Country	Arable Land & Land under Tree Crops - morgen	Population	Arable Land per Capita - morgen
Africa	260, 202, 644	211, 200, 000	1.232
Australia	31, 537, 027	10, 108, 000	3.120
Canada	47, 373, 217	17, 442, 000	2.716
India	186, 298, 092	402, 600, 000	0.463
Japan	7, 084, 980	92, 740, 000	0.076
Latin America	119, 016, 456	201, 000, 000	0.592
Netherlands	1, 207, 667	11, 346, 000	0.106
U.S.A.	267, 203, 612	195, 200, 000	1.369
Transkei [4]			0.614
Ciskei	142, 424 [5]	404, 818	0.352
Ciskei including townships	142, 424 [5]	506, 018	0.282

1) From 1967 Annual Agricultural Report.
2) J. van Wyk (1967).
3) Adapted from Millar, et al (1965).
4) Does not include area under tree crops.
5) 28, 767 Morgen under indigenous forests not included.

Ciskei grazing land per capita averages 2.10 morgen compared with that of the Transkei, for example, with 2.79 morgen (J. van Wyk, 1967).

Approximately 20 per cent of the total population or 25 per cent of the "rural" population, reside in Bantu townships in the Ciskei and a population estimate made by the Regional Town Planning Engineer on the 21st October, 1968, is as follows:

Mdantsane	-	East London	65, 000 residents and 7, 800 houses
Zwelitsha	-	King W. Town	19, 000 residents and 2, 311 houses
Mnxesha	-	King W. Town	3, 000 residents and 500 houses
Sada	-	Whittlesea	7, 200 residents and 1, 078 houses
Ilingi	-	Glen Grey	6, 000 residents and 994 houses
Orange Fountain	-	Herschel	1, 000 residents and 200 houses

Regarding the ability of the two main Bantu groups in the Ciskei, it has been pointed out, on more than one occasion, that the Fingos are invariably the leading agriculturalists in some areas. This is the case in the Stutterheim District in particular. It appears that they are not only prepared to work harder but they are usually willing to try out "new" ideas and to adopt such ideas or methods when they have proved to be successful. Nel (1965) alludes to the Fingos being more educationally-minded than the Xhosa in the Transkei, while J. van Wyk (1967), also makes reference to the Fingos being more progressive in agricultural matters.

In a survey of the Keiskammahoek District, a Fingo area, Hobart-Houghton & Walton (1952) make it clear that "in the matter of entrepreneural ability .... the Bantu peasant shows the greatest deficiency; economic enterprise and initiative are most noticeably lacking. This fact presents the greatest obstacle to any improvement in the situation".

1.4.4 Tribal, Regional and Territorial Authorities:

The Bantu Authorities Act of 1951 paved the way for the establishment of Tribal Authorities - passed in 1953 and amended in 1960, Regional Authorities - passed in 1957, and Territorial Authorities passed in 1961. There are 41 Tribal Authorities in existence and each is comprised of members residing in the locations within its territorial limits. These Tribal Councillors, under the chairmanship of the local chief or headman, concern themselves with the material, moral and social well-being of all Bantu residents in its area of jurisdiction. Their functions include the development and improvement of land, anti-erosion measures and fencing, dam-building, road maintenance and afforestation. Such services are based on the principle of "self-help", whereby a certain proportion of the money, transport and labour is provided by the people in that area. Financial assistance is available for the erection of school buildings and tribal offices (Memorandum for the Guidance of Bantu Authorities, 1962-1963).

Each Tribal Authority then has councillors on the Regional Authority which is empowered to advise and make representations to the Government in connection with the area it controls. It is also concerned with matters pertaining to education, road and bridge construction and maintenance, provision of water supplies, anti-erosion measures, maintenance and operation of dipping tanks, the suppression of stock diseases, afforestation, hospitalisation, and the improvement of agriculture in general. The Regional Authority can make funds available, or delegate its authority, to the Tribal Authority (Memorandum as above, 1962/63).

It is usual for the Tribal Authority to work under the guidance of the District Agricultural Officer in matters pertaining to agriculture.

Representatives of each Regional Authority, attend the Ciskeian Territorial Authority's regular meetings where matters introduced as motions by the Regional Authorities, are discussed. Senior Agricultural Officials attend these meetings and are available for consultation, or to advise on the various motions concerning agriculture. The Territorial Authority is the government of the Bantu territory of the Ciskei, and as from October, 1968, became responsible for many of the departments previously in the hands of the South African Government, such as agriculture, education and public works.

1.4.5 Bantu Purchasing Power and Family Income:

The present purchasing power of the urban population is the subject of several investigations (Bureau of Market Research of the University of South Africa, 1965; Hellman, 1968). According to the National Development and Management Foundation (Hellman, 1968), the 3.4 million urban Bantu recorded in 1960, and who constituted 30 per cent of the total South African Bantu population, had 60 per cent of the purchasing power of the total Bantu population, in their hands. This was estimated to be approximately R1 200 million.

The inference can be drawn that the remaining 70 per cent of the Bantu population, presumably resident in the rural areas, had a purchasing power of R800 million or 40 per cent, and on a basis of there being about half a million Bantu in the Ciskei, the purchasing power of this Ciskei group could be in the region of R50 million. The potential purchasing power in the Ciskeian Homelands, must increase tremendously when the agricultural and industrial development envisaged over the next decade or so, is considered. The rural Bantu purchaser is today a fairly discriminating buyer, and with the increase in purchasing power, this sense of discrimination is bound to develop further in the future, and be applied when purchasing agricultural implements and machinery, household goods, food products, and other items.

Average family income has been obtained by surveys in the Ciskei. In the Keiskammahoek District, Hobart-Houghton & Walton (1952) arrived at a figure of 6.8 per cent of the total annual cash income being derived from farming activities, and estimated that the value of home-grown crops and produce grown by the family, amounted to R10.52 and a half cent in the 1948-1949 season. The 1949 year was a drought year. A research team, under the direction of De Vos (1968), arrived at the following average monthly figures for household income, from all sources, in the following districts and township:

(i)	Victoria East	R18.25
(ii)	Middledrift	R16.33
(iii)	Zwelitsha	R25.26

The overall average income for these areas was R19.14 per month. This team also established that income originating from (i) within and (ii) from outside the areas being studied, were as follows for the year 1966:

TABLE 13: INCOME SOURCES IN TWO DISTRICTS OF THE CISKEI [1)]

District	Number of Households Covered by Survey	Income from:	
		Within Area R	Outside Area R
Victoria East	1,051	10,701	8,483
Middledrift	1,031	8,068	8,770
Average per area		9,384	8,626
Average income per household (per month)		9.01	8.29

1) De Vos 1968).

The net average income of the farming family in the Bantu areas, is given as R80 per annum by the Tomlinson Commission (1955), and where income "in kind" and the value of the directly consumed items, is included, the overall figure is R194. The above average monthly income figure in Table 13 is much higher than that presented by the Commission.

In 1964-1965, out of a total of 41,008 Ciskeian work seekers, 22,498 were recruited for the mining industry, while the remainder were employed as follows:

Western Cape	-	5,517
East London	-	4,968
Port Elizabeth	-	2,305
Orange River Project	-	2,291
King William's Town	-	1,524
Witwatersrand	-	804
Other centres	-	1,101

(Chief Bantu Affairs Commissioner's Annual Report for the Ciskei, 1964-65).

1.4.6 Landholders and Farm Labour:

It was estimated in the Keiskammahoek Rural Survey, that only about one third of the total population in the District constituted the available, "farm labour" force, that is, able-bodied men and women, the remainder were either under 18 or over 60 years of age. Further, approximately 4,000 adult breadwinners of the 9,250 total adult population, were away working in the urban areas in the year 1946. The Bantu peasant population in this year, was made up of 6,760 males and 9,170 females (Hobart-Houghton & Walton, 1952). The occupations of the individual landowners are not mentioned in this report, but not all of the able-bodied labour force, resident in the District, were engaged in peasant farming. Substitution of the males, who are away, by the females; the able-bodied by the aged and infirm, and adults by children in the work of the land,

seems to be the normal course of events in peasant communities, based on the Keiskammahoek Rural Survey.

1.4.7 Xhosa Food Supplies and Dietary Taboos:

Historical: Being mainly a pastoral people, milk played a prominent part in the diet of the Xhosa (Paterson,1779). Fresh milk (u-bisi) was seldom used, except in the case of children, and the general diet consisted of sour milk or amasi. Sweetmilk was placed in skin bags, closely woven rush "bags" or baskets, or in calabashes and allowed to curdle. These were never washed out (Kay, 1833). Uncooked, sweetmilk was not used and the only explanation is that given by Soga (1931), who mentions a prejudice on the part of the people which has always been in existence. He maintains that grown-ups will not touch it, although, boiled sweet-milk is used in the preparation of some dishes.

With reference to meat in the diet, Paterson (1779) mentions that game played a large part as they, the Xhosa, were not "allowed to kill any of their cattle". Kay (1833) on the other hand, says "in summer, there is seldom much want as produce of the field, together with plenty of milk, keeps all in good humour. But about June or July their daily supply of the latter is greatly diminished in consequence of the cold; and this extraordinary supply of animal food (cattle killed in the winter) is then more particularly seasonable". This seasonal killing of cattle not only evened out the food supply, but also supplied hides and skins for the making of clothes for the family, which, incidentally, were usually made by the men (Kay, 1833). It is generally conceded that there was only an "occasional feast of animal food" (Kay, 1833; Moister, 1866). Theal (1916) refers to the fact that any cattle that died, were "eaten without hesitation".

Apart from the above, boiled sorghum and maize, pumpkins, imfê or sweetcane, edible roots, "the spontaneous production of the vegetable kingdom" that is, certain herbs or weeds, provided for the people (Kay, 1833). A "punch" called pombie, was made from grain (Paterson, 1779). Theal (1882) also refers to the Xhosa fermenting kaffircorn and making it into a popular, intoxicating beverage. Generally, two meals were eaten per day (Theal, 1882).

Boys, prior to being circumcised, were "permitted to eat any kind of meat, even that of wild cats and other carnivora," but, thereafter, no recourse to such "unclean" meat was permissible (Theal, 1882).

Pork was regarded with disgust by the Xhosa, although the bush-pig was killed and eaten without any revulsion. This is given as the reason why pigs were not kept by the Xhosa (Kay, 1833).

Kay (1833) further records that there was a strong prejudice against the eating of hen's eggs, which later appeared to be manifested as a self-imposed prohibition for women only (Soga, 1931). Soga (1931) also mentions that girls

were not supposed to eat poultry meat, nor were they allowed to eat kidneys and the rectums of animals and birds. Women did not eat marrows, while pumpkins were eaten by all, except the men, at the time of the "First Fruits". The boys did not partake of edible herbs cooked as vegetables (Soga, 1931).

Fish, referred to as "snakes" (nyoka), were not considered as a food source in the early days and, in fact, according to Kay (1833), the reason is that "they are not often driven to the necessity of trying any new experiment for the attainment of provisions. Having fine extensive pasture-grounds, and in many places a fertile soil, they are seldom wholly without milk, corn, or some kind of edible roots for any great length of time". On the other hand, Theal (1916), mentions that the shipwrecked sailors in 1589, were able to obtain "fish" from the coastal Xhosa tribes, and that they also ate "shellfish" (Theal, 1897).

Hunting: This was a favourite pastime of the Xhosa and is borne out by Kay (1833) who says that "in no part of Southern Africa, that I have seen, is the game so exceedingly scarce as in Kafferland. Scarcely can a buck or a hare start from their sylvan retreats without being immediately put to the chase". Dogs were trained to hunt. While elephants were hunted and slaughtered for their tusks, the meat was never eaten (Kay, 1833). However, the flesh of other species provided the main source of meat for the average Xhosa (Paterson, 1779). Although hunting was a favourite occupation of the men, recourse was also made to the setting of deep pit-traps, carefully concealed from view, and with a sharp-pointed stake in the middle of the floor (Kay, 1833).

Some Present Day Dietary Habits: Many Bantu still retain the traditional approaches in the eating of food, but these beliefs and customs are gradually being abandoned due to acculturation and the high demand for foodstuffs in the reserves. Pork, which was seldom eaten in former days, is today eaten by most Bantu with the exception of the Zionists. In some areas of the Middledrift District, it is apparently considered "unlucky" to carry pork, either cooked or to be cooked, during a journey, and pork, while eaten at home, is not considered the food to be given to visitors.

In the Glen Grey District, pork is eaten with the exception of the meat from the heads, which is given to the young boys prior to circumcision. These boys or kwedeni, according to informants, are considered "as being nothing" and can therefore, eat the part or parts, the head in this case, not considered "edible" by the men.

Horse meat is not considered of any value and severely scorned, and those that do eat it, the Basutos, are looked down upon by the ordinary Xhosa and Mfengu. However, the meat of horses and donkeys is eaten by the "Basutos" who work and reside in the Herschel District. In many cases, the meat is dried

and made into a type of "biltong" or "pemmican".

Poultry flesh is normally not eaten by the girls and women with traditional, rural backgrounds, only the men being allowed this meat. In the Glen Grey District, it is estimated that about 60 per cent of the "reds" or traditionalists no longer observe this custom, the flesh, when available, being eaten by all. This is most likely the position in other areas, especially when droughts take their toll of crops and livestock and food becomes at a premium, as is the case in the Victoria East Location of Rwarwa (Brown, 1968) and in the Stutterheim locations. As far as can be determined, poultry are a major source of meat in most areas.

Eggs, too, are supposed to be for men only as is the case in the Herschel and Alice areas, but in the Glen Grey District, an estimated 40 per cent of the female "reds" eat eggs, according to the Agricultural Extension Advisers of that District. In view of the fact that the Hut-fowls lay brown-tinted eggs, the preference is definitely for brown eggs, although in the Glen Grey District, the "people preference" seems to be in favour of white eggs. An innovation, in connection with the eating of eggs, was found in the Stutterheim locations, where it appears that the large eggs are reserved for the men while the very small eggs go to the children.

No taboos, apparently, are associated with the eating of meat from sheep, goats or cattle today, with the exception that the innards, such as kidneys, liver, intestines, are not eaten by the women in most, if not all, areas, being reserved for the men.

Fish, generally referred to as "nyoka" in past years, is eaten with relish in some districts such as King William's Town, where it is estimated that as many as 95 per cent and more of the people, eat fish at some time or another during the course of the year. This is due in no small measure to contact with the European and the acceptance of the fact that it is a tasty and relatively cheap article of diet. In the Victoria East Locations, near Alice, it seems to be the case that only the men eat fish, and it is emphasized that these are "big" - probably meaning that they must be like the ones caught in the sea.

Milk is a staple item of the diet in the soured form, known as "amasi", but as tea and coffee are now being consumed by a large cross-section of the population, sweetmilk, whole or separated, is fairly widely used - again a case of acculturation. In the areas where dairy schemes operate, the separated milk is taken back for family use. Whole, fresh milk is seldom drunk as such, as is the case in European society.

While the wild hare is eaten without any compunction, the idea of eating domesticated rabbits did not have much appeal in areas like Herschel and Stutter-

heim, although in other districts, as for example, Whittlesea, it was thought that the domesticated rabbit could play a definite rôle in providing protein in the diet of the Bantu. This topic is discussed in a later section on the Agro-potential.

Buck and wild-life generally, are considered to be the prey of the first comer and today are rarely found in the Bantu areas, except in those locations adjoining the afforested areas.

Green maize is eaten by all age and sex groups with the exception that it appears to be the common practice for the men to eat this first before the women, girls and boys can enjoy it, and this is the position in the Herschel District, and probably elsewhere. This custom most likely, has something to do with the custom known as "ulibo" or annual feast of the first fruits in former days, and which, according to Hammond-Tooke (1958), is no longer observed. Today it appears to be used more as a safeguard against theft. It is difficult to assess the quantity of maize eaten in the green state, but this must have a definite influence on indicated maize fields per morgen.

In the case of other vegetables, such as marrows and pumpkins, and the wild "veld-spinach" or "mfino", it appears that these are left for the womenfolk to eat, although in the Ncera Location in the Victoria East District, pumpkins are, apparently, eaten by all, as is the case with pumpkin shoots. Lewis (1968), averages four of these veld-plants out as having nearly five per cent crude protein in Zululand.

On discussing this reservation of certain foods for particular groups with the Bantu Agricultural Extension Advisers, the reply given, which sums up the situation, was that: "Educated men and women do not observe these beliefs and customs".

Present Methods of Storing Food: During the recent drought years, there has been hardly anything to store, but in years of good rains, the maize crop, on the cob, is stored in tanks and even in specially-made maize-cribs, as for example, seen at Wartburg (Stutterheim) and Mabandla (Victoria East) Locations. Smaller quantities are invariably stored in sacks in a hut, but the practice of digging "granaries" in the cattle-kraals, or else-where, no longer prevails due in part to the removal of existing residential sites to new sites in the Betterment Areas, and in part, to spoilage.

1.4.8 Education: Past and Present:

Early Agricultural Education: The early missionaries at the Chumie Mission Station, built a two-mile furrow and brought approximately 40 acres of land under irrigation, and a report written in 1880, and quoted by Shepherd (1940), tells us that the students were required to work on the land "partly for their sustenance, partly for their health while otherwise engaged in sedentary pursuits,

and more than either, that they might be afterwards able to instruct their countrymen in the art of cultivating their own soil as well as in the things of religion". The local Bantu chiefs would not believe that it was possible to grow crops by the process of applying water to roots only, without wetting the leaves and had to see this for themselves (Shepherd, 1940). Apart from the water furrow at Chumie, other furrows were opened up and land irrigated at Burnshill, Lovedale and other missionary institutions between 1820 and 1840. Lovedale, in 1871, also became one of the first centres to plant maize in rows instead of the usual method of broadcasting the seed (Shepherd, 1940).

Tree planting, according to Shepherd (1940), has been taught at Lovedale for almost a century, and the establishment and maintenance of an orchard was also carried out, but due to frost damage and the fruit ripening during the school vacation, apart from the local glut of fruit on the market, financially, the orchard was a failure. Training in bee-keeping and poultry-farming have also been taught at Lovedale in the past (Shepherd, 1940).

In 1870-1871, the Lovedale Missionary Institution endeavoured to include agriculture as one of the subjects in the four-year course for industrial apprentices, which would include such items as the advantages of manurial treatment, deep ploughing and crop rotation. Failure was due to the inability of being able to persuade the Bantu that agriculture was anything more than scratching the soil surface in spring and harvesting what providence had provided at the end of the season (Shepherd, 1940). "The idea that anything is to be learned or that anything can be taught to them in the art of agriculture seems to be utterly scouted by the Natives generally". (London Missionary Institution Report, 1873 quoted by Shepherd, 1940). Other attempts were made to introduce agriculture as a subject at Lovedale in 1884 and again in 1911, but these also were doomed to failure. The agricultural instructor on the High School staff at Lovedale, was eventually transferred to the staff of the South African Native College (Shepherd, 1940) and was responsible for the training of students studying for the Diploma in Agriculture.

Henderson, a former principal of Lovedale, appealed to the Bantu by saying that the man who counted most in the future, was the tiller of the soil, and that being the case, "agriculture should be made the study of the best minds among them". (London Missionary Institution Report, 1908, quoted by Shepherd, 1955).

Principal Kerr of the South African Native College, now the University College of Fort Hare, in his inaugural address in 1916, said "it is one of the main aims of this College to develop a strong school of agriculture" (Shepherd, 1955). In 1926, a further 1, 250 acres of land was purchased and stocked to

bring the total area up to 1, 600 acres, so that better training facilities would be available for the students following the Agricultural Diploma course. The agricultural lecturing staff remained at one, and then two for a number of years, and recently, has expanded to three degreed members of staff. Faculty status was accorded in the second half of 1966, and further expansions in staff and accommodation are expected in the near future. Mention should be made of the man who "founded" the agricultural section at Fort Hare, Paul Germond of Alice, who laid a most successful basis for the building of the recently created Faculty. He was appointed as lecturer, farm manager and head of this section in 1918, in which year there were no funds, buildings or students available. (Germond, 1968).

The Native Education Committee appointed in May, 1919, recommended that a practical agricultural training be given to the boys in all Bantu schools after reaching standard four (Shepherd, 1940). In October, 1958, Bantu education fell under the then, recently created Department of Bantu Education, and agricultural and closely allied subjects taught were as follows:

Lower Primary Education: Sub-standard A to standard two - gardening.

Higher Primary Education: Standards three to six - nature study, tree-planting and soil conservation for the boys.

Secondary Education: Standard six onwards - a certain choice of subjects exists and agriculture per se can be studied.

In 1961, there were 7, 991 Bantu schools with a total number of 1, 608, 028 pupils (De Vos, 1962).

The Fort Cox College of Agriculture, in the Middledrift District, commenced in 1930 and its purpose was to train practical agriculturalists who would fill the rôle of Agricultural Demonstrators in the Bantu areas.

Present Agricultural Education: In the schools, the position is much the same as mentioned above, except that "mother-tongue" language is used up to standard six. However, in the higher levels of agricultural training, as at Fort Cox, changes have recently been instituted, and the course extended to a three-year diploma course, in place of a two and a half year one. To gain acceptance to this course, it is necessary for the potential student to have passed his standard eight examination, which means that he has had two years of schooling being taught through the medium of English. The syllabus at Fort Cox is, briefly as follows:

First Semester: School subjects, which include arithmetic, general science, biology and scientific terminology. The student is required to write up practical reports on all the farm sections.

Second and Third Semesters: Agricultural subjects: Animal Husbandry, including Sheep and Wool, Poultry, Veterinary Science; Crop Husbandry; Horticulture-vegetable production mainly; Soil and Veld Conservation; Dairying; Bookkeeping.

Fourth and Fifth Semesters: Successful students move onto the Project Section which is described as being "an attempt to simulate on the College the conditions existing in the field, and is, therefore an endeavour to prepare the students for the conditions and problems they will encounter during their work as Agricultural Advisers or farmers. By doing practically all the work themselves they do not only learn the "why" and "when" of farming but also the "how" "(extract from College Brochure, 1967-1968).

Each project consists of four morgen of dry land and 19 mature large-stock units, which require, at eight morgen to each unit, 152 morgen of veld. Such a project is regarded as being an economic unit in the Ciskei. Four to five students work in a group on each project and resemble a "family unit" as found on the Bantu Ciskeian farms. Irrigation plots of one and a half morgen, of which there are five in number, also constitute independent economic units. The emphasis is on practical soil working, crop production and livestock handling, and includes bookkeeping aspects as well. Formal lecturing is at a minimum during this period.

Sixth Semester: This period is devoted to the theory and practice of Extension Work in the field and deals with extension methods, land planning, general administration and record-keeping, the operation of government departments, including the Territorial Authority.

An Assistant Stock Inspector's course is also offered by the College and a limited number of students who already hold a diploma, or who have successfully completed the first 18 months of the Diploma course, may follow this discipline, which is of a year's duration. The final six months is carried out under practical conditions in the field, and on completion of the course, a student is then employed by the Division of Veterinary Services.

It should be noted that the student pays R32 fees per annum and this includes school, book and sports fees and boarding. The cost to the Government is about R600 per student for the three year course.

(Information from the Principal of the Fort Cox College of Agriculture).

At a still higher level, the University College of Fort Hare offers the three-year Higher Diploma in Agriculture, which is really for the training of agricultural teachers. Also, a one-year Diploma for serving teachers is offered, and a Diploma in Agricultural Extension Work is proposed. Provision has already been made for a three-year B. Agric. degree and B. Sc. Agric.,

which is a four-year course, Honour's, Master's and Doctor's degrees. The basic degree courses commenced in 1969. However, the need for qualified Bantu agricultural scientists already exists.

An interesting point met with during the survey, was the fact that the Agricultural Demonstrators, as they were then called, and today's Agricultural Extension Advisers, emphasized that, in the past, they were not accorded much recognition by their people. However, today the position has completely, or almost so, reversed in that they are respected by the communities they serve, and that the young men are more enthusiastic than ever before to become Agricultural Advisers. The reason given is that, in the past, they had to perform much manual work and were little better than labourers, whereas today, the approach is a "collar and tie" one with little or no manual work involved, and their status is thus much higher.

Educational Level of the Rural Population: Preliminary surveys, made by the Extension Section at King William's Town, in the Middledrift and Herschel Districts in 1968, provided the information indicated in Table 14.

As seen in Table 14 the overall scholastic attainment of the adult rural community is low by European standards, although it appears that the majority have attended school in former years. The number of members comprising a family unit, varies from four to ten.

In the long experience of a Senior Agricultural Official, the average adult level of education for the Ciskei as a whole, could be between standards two to four. It is apparent that a large number have received little or no education. Few attained standard six, and a very small minority of those who progress beyond this stage, have any interest in agriculture (Jacob, 1968).

1.4.9 Home Industries and Trading:

Historical: Apart from the making of wooden "digging" spades, skin karosses and articles of clothing, usually made by the men, Kay (1833) makes reference to the women making baskets, "baking pots" or clay pots, mats - fine ones stitched with thread from the bark of trees, being well-finished and which "very nearly resemble many of the Indian mats". Wooden articles such as bowls, spoons, pipes, "fighting sticks" together with other items, were also manufactured, together with skin bags and rush bags, the latter capable of holding water, and ox-hide shields (Theal, 1882). The art of smelting was known to a few individuals, and assegais, hatchets, bangles, amongst others, were thus made of iron (Soga, 1931). Drums were made from skins and cut calabashes were made into scoops and dippers (Shepherd & Paver, 1947). "Whistles", for calling cattle, were made of bone or ivory (Paterson, 1779).

TABLE 14: POPULATION AND EDUCATIONAL STATISTICS FOR WARDS IN THE MIDDLEDRIFT AND HERSCHEL DISTRICTS, 1968 [1)]

District & Ward	Area in morgen	Total Population	Number of Families	Average No. per Family	Average Educational Level of the Adult Farming Community
Middledrift:					
Ward 1	7,929	4,514	647	7	Few achieved stds. 4 to 6
2	4,421	4,283	643	7	Standards 3 to 4
3	4,495	1,752	305	6	Standard 4
4	6,666	4,779	823	9	50% Read and write vernacular
5	3,755	5,296	547	9-10	60% Read and write vernacular
6	3,667	2,968	563	5	25% Up to std. six
8	3,274	1,158	229	5	Standard 4
9	5,704	2,864	571	5	Standards 4 to 5
10	9,000	3,222	879	4	35% Up to std. 4
12	9,096	3,102	707	4	5-10% Up to std. 6
13	7,570	2,605	467	6	Standard 3
Herschel:					
Tugela	7,975	4,600	920	5	20% Secondary; 50% Primary; 30% Illiterate
Esilindini and Bensonvale	6,220	3,339	579	6	7% Secondary; 63% Primary; 30% Illiterate

1) Based on information supplied by the Extension Section, King William's Town.

The earliest trading carried on was with the early Europeans who sought ivory, and hides and skins (Hobart-Houghton & Walton, 1952). Kay (1833) makes one of the earliest references to "trading" or bartering in the early Ciskei, when he mentions exchanging five or six buttons for a "basket or two of sour milk".

Present Position: It is not intended to say very much on this subject. Many of the above items are still made in the Ciskei today, although the tendency is for manufactured goods, such as pots, pans, buckets, blankets and plastic ware, to be used in the Bantu household, making the home manufacture of many items unnecessary. Apart from the making of clay figures by ama-kwedini (boys) and the making of rush and skin mats and tinware for sale, there is not a great deal of activity in the field of home industries.

Trading is on the increase in many fields especially butchering and as general dealers, apart from actual stock sales.

Brick-making concerns, Bantu-owned, are steadily increasing in number. In the Herschel District, one concern produces about 100, 000 bricks per annum, four average approximately 50, 000, while five concerns average 10, 000 bricks per annum. There are also 25 other small concerns producing bricks for local use.

1.4.10 Malnutrition, Internal Parasites, Tuberculosis and the Xhosa:

In a report, based on a tour of the Ciskei in May, 1965, during a severe drought period, the Chief Nutrition Adviser to the Department of Health, (J. M. Latsky), mentions the following:

In the King William's Town District, 10 to 16 per cent of all the sick people seen by the local Health Officer, suffer from Pellagra, and there is a high incidence of Kwashiokor. At Mount Coke Hospital, Pellagra normally reaches a peak in the month of September, but this point had already been reached in May, 1965 due to drought conditions. Of the 200 children admitted to this hospital in the first four to four and a half months of 1965, one-third suffered from Kwashiorkor. Both these nutritional diseases had a higher incidence than in the previous four years.

Cases of malnutrition in the Keiskammahoek area in 1965 were estimated by the local general practioner as the highest ever in the 13 years spent in medical practice there. There are fewer cases of malnutrition occurring among the over 16 years of age group compared with the under 16 years group.

At the Lovedale Hospital in the Victoria East District, during the year 1964-1965, Kwashiorkor was stated to be a major problem confronting the hospital doctors.

In the Glen Grey District near Lady Frere, there was a high incidence of Pellagra amongst adults, and Kwashiorkor in young children as well as almost

TABLE 15: INCIDENCE OF NUTRITIONAL DEFICIENCY DISEASES AT THE VICTORIA HOSPITAL, LOVEDALE, 1964-1967 [1]

Year	Pellagra Patients		Kwashiorkor Patients		Rickets		Other		Total In-patients	Number of Malnutrition Cases as a % of Total In-patients
	Number		Number		Number		Number			
	Treated	Died	Treated	Died	Treated	Died	Treated	Died		
1964	14	-	118	22	-	-	34	3	3,705	4.48
1965	18	1	156	29	1	-	22	1	3,787	5.20
1966	15	1	147	23	1	1	8	2	3,851	4.44
1967	22	-	101	16	-	-	7	-	3,993	3.26
Total	69	2	522	90	2	1	71	6	15,336	4.33

1) Extracted from Annual Reports.

total ignorance in baby-care displayed by the Bantu.

The Annual Reports of the Lovedale Hospitals for 1964 to 1967, provide the statistics as shown in Table 15.

The overall average for the four years under review, of 4.33 nutritional cases per 100 patients, is self-evident.

The estimated cost of hospitalising one Kwashiorkor patient is about R90, and this would be the cost of providing separated milk-powder to 12 children for a year (Verslag van die Interdepartementele Komitee van Ondersoek insake Gesondheidsdienste in Bantoetuislande, Deel I, Junie 1963). This report also mentions the fact that maize is the staple food and that this is notoriously deficient in protein and the vitamin, niacin and that during periods of poor crops, or when little money is available, protective foods are scarce. The Bantu are also inclined to sell their crops of beans and peas, which are rich in certain amino acids and niacin, and purchase refined maize meal, with all its deficiencies.

A minimum diet containing 2,400 calories per day and including 70 grams of protein, 20 grams of which, should be derived from animal sources, is needed for health and strength. North America averages 66 grams of animal protein per capita per day while Africa averages only 11 grams (Clarkson, 1967).

Human Diseases and Conditions Associated with Animals: Brief mention is made of some of those diseases or conditions whereby the animal is the intermediate host, for example, measles (Cysticercosis), or where the animal is a carrier, such as in the case of Tuberculosis. In the survey carried out at the abattoir in East London, it will be seen that measles and Tuberculosis in Bantu-owned livestock, are a somewhat disrupting influence in the production of meat. Cysticercus bovis, C. ovis and C. cellulosae, bladderworms in cattle, sheep and goats, and pigs respectively, as well as Echinococcus granulosus, bladderworm of the cat and dog, are the reasons why a great deal of valuable animal protein is rejected for human consumption purposes each year. No figures of the occurrence of these tapeworms in the Bantu areas of the Ciskei, are available.

Tuberculosis is caused by the bovine, human or avian strains of Mycobacterium tuberculosis, and is a chronic, contagious disease of man and the domesticated, and some wild, animals (Miller & West, 1953). The incidence of the various forms of Tuberculosis amongst the Xhosa are relatively high as reflected in the Lovedale Hospitals' Annual Reports. (See Table 16).

One of the contributary causes of the continued high incidence of Tuberculosis throughout the Ciskei "stems from the ignorance and reliance on witchcraft of a large sector of the population. Only when the witchdoctor has failed

TABLE 16: INCIDENCE OF TUBERCULOSIS AT THE VICTORIA HOSPITAL, LOVEDALE, 1964 TO 1967 [1)]

Year	T. B. of Respiratory System		T. B. - other Forms		Total In-patients	Number of T. B. Patients Expressed as a % of the Total In-patients
	Number of		Number of			
	Patients	Deaths	Patients	Deaths		
1964	60	5	73	6	3,705	3.60
1965	82	7	63	2	3,787	3.83
1966	85	7	82	12	3,851	4.34
1967	94	8	67	10	3,993	4.03
Total	321	27	285	30	15,336	3.95

1) Extracted from Annual Reports.

and the disease has become too advanced, is contact made for proper treatment". (Report by the Divisional Council's Medical Officer of Health - "Daily Dispatch", 14th October, 1968).

ANIMAL PRODUCTION : STATISTICS AND SYSTEMS

2.1 INTRODUCTION:

The Abe-Nguni tribe, in its southwards migration from North and Central Africa, was responsible for bringing Sanga cattle, the forbears of the present Nguni breed (Mason, 1951), to South Africa. Several writers, notably Epstein (1933), Curson & Thornton (1936), and Bisschop (1937), have advanced hypotheses in regard to the migration routes followed. The probable commencement of the tribal migration from North Africa involving Sanga cattle, was the year 1 B. C. (Curson & Thornton, 1936). Thus the cattle of the Xhosa prior to the advent of European cattle, were Ngunis, formerly referred to as Zulu or Swazi cattle, and frequently as "Native" cattle. A tremendous intermixing of the Nguni with European breeds has occurred subsequently, with the result that a fairly hardy, but low producing, type has been developed of variable sizes within the type.

When the early European travellers visited the Xhosas, they noted that, in addition to cattle, there were dogs, "an inferior breed of goats, the last not considered of much value", and "barnyard" fowls (Theal, 1882). However, Kay (1833) claims that the goat, along with sheep and horses, were "imported" by the Xhosa from the early Cape Colony, and that poultry were not in their possession. Lichtenstein, during travels in 1803 to 1806, reported that the "Koossa Caffres" situated in the present Eastern Cape Province, had no poultry, but that the "Northern tribes" kept a small type of fowl without combs (Gericke, 1952). Theal (1916) on the other hand, specifically mentions that the Portuguese sailors from the "Sao Thome", which was shipwrecked off the Wild Coast in 1589, exchanged nails for hens. An account left by shipwrecked Portuguese in 1593, refers to the coastal Xhosa tribes as having sheep (Theal, 1916). Schreiner, quoted by Pegler (no date), mentions that on the arrival of the first Europeans at the Cape, the "Natives", presumably Hottentots, were found to be in possession of a "short-haired variety of goats, practically indigenous to the country", while the first recorded instance of goats being in the possession of the Colonists, was only in 1691.

The early writers make no mention of pigs being in the hands of the Xhosa and all evidence points to these being obtained from the Portuguese sailors and later, the early Colonists. The present day African Hut-pig has a fairly close conformational resemblance to the scavenger-type pig of the Cape, the Kolbroek, which is a possible descendant of the Oriental pig, Sus vittatus. Bonsma & Joubert (1952) are somewhat sceptical of the theory advanced by Morkel in 1925 that these pigs are "positively indigenous".

The horse was also obtained from the early Cape Colonists and travellers (Kay, 1833).

To-day, the common cattle breeds or types are the Native and Brown Swiss types, with other breed types, such as the Afrikaner, Jersey, South Devon and Ayrshire, occurring irregularly throughout the Ciskei. Prevalent sheep are of the Merino type, being mainly of South African and Döhne Merino extraction, no non-woolled sheep being encountered. While the common African goat predominates, the Angora type occurs in fairly large numbers in certain districts or locations. The improved Boerbok is also beginning to play a limited rôle, and its popularity is expected to increase. Improved European pig breeds play a small part at present, the majority being of the African Hut-pig breed, which are allowed to scavenge around the huts and fields. Horses are of the Native horse type. A comparatively smaller number of donkeys and a small number of mules are encountered. Poultry generally, are of the African Hut-fowl type, with a small number of the improved American and English breeds being kept for egg production purposes.

2.2 SOME EXAMPLES OF XHOSA CHARMS CONCERNING ANIMALS OR ANIMAL PRODUCTS:

A necklace made of hairs from the switch of cattle, and worn round the neck, protected an unmarried girl from "heart soreness and hysteria", and in the case of a married woman, her children were protected from illness or evil influence. The animal, from which the hair had been removed, usually accompanied the bridal party, and this cow plus its progeny, remained the bride's property throughout her life (Soga, 1931).

A "battle charm", which was made from medicinal roots roasted, pounded and powdered and mixed with the gall of the cattle killed for the support of the army, was given to each man to swallow (Soga, 1931).

2.3 EXAMPLES OF MAGICAL, MEDICINAL AND EDIBLE PLANTS USED BY THE XHOSA IN THE TREATMENT OF STOCK DISEASES AND COMPLAINTS: (Based on Watt & Breyer-Brandwijk, 1962 except where otherwise stated).

Aloe ferox Mill - Bitter Aloe. The juice was applied to sheep in the treatment of scab.

Aloe tenuior Haw. - iKhalene. The Fingo use a root decoction for the treatment of tape-worm and as a purgative.

Bersama tysoniana Oliv. - Bastard Sneezewood. A decoction of the bark is used in the treatment of gallsickness in cattle.

Blepharis capensis Pers. - An anthrax remedy.

Bulbine asphodeloides - Balsem or Wilde Kapiva. A remedy for sick cattle and goats especially an infusion of the roots being given orally (Mzamane, 194[illegible].

Buphane or Boophane distichia (L. F.) Herb. - Cape Poison Bulb or Gifbol. A decoction of the boiled inner bulb is used as a cure for Red Water.

Calodendrum capense Thunb. - Cape Chestnut. The seeds were used as a charm to induce game to fall an easy prey to weapons.

Capparis citrifolia Lam. - Cape Caper or Wildelemoen. A gallsickness remedy.

Clausena anisata Hook f. - Lemoenhout. Used in the case of a sick calf especially when it has had more than sufficient milk.

Clematis brachiata Thunb. - Traveller's Joy or Klimop. Associated with other ingredients, a leaf and shoot infusion is used in the treatment of bots in horses.

Clutia hisuta Müll. Arg. - Lightening Shrub. Used in a gallsickness mixture.

Crassula lycopodioides Lam. - Little Fever Bush. A gallsickness remedy.

Dioscorea dregeana Dur. & Schinz. - The trunk is scooped out and water heated in it, this then being applied as a lotion to sores, cuts and wounds on man and animals.

Ehretia rigida Druce. - Cape Lilac. A browse plant which was also used for the treatment of gallsickness.

Elephantorrhiza elephantina Skeels. - Elands' bean. Used as a diarrhoea remedy in bovines and horses.

Emex spinosa Campd. - Dubbeltjiesblaar. A strong leaf decoction was made and used for threadworm of the horse.

Gasteria nitida Haw. var. grandipunctata Salm. Dyck. - Amongst other things, this was used as an anthrax protection plant when taken with infected meat.

Gunnera perpensa L. - River Pumpkin. Used as a drench, mixed with Clematis brachiata, for bots.

Heteromorpha arborescens Cham. & Schlect. - Live Long or Kraaibos. Used in the treatment of threadworm in horses.

Hippobromus pauciflorus Radlk. - Horse-wood. The juice of the leaf was applied directly to eye inflammations.

Lasiosiphon meisnerianus Endl. - a relative of Harpuisbos. Used as a remedy for an unspecified sheep disease.

Loranthus sp. - mistle-toe. Used as a cattle feed especially in the time of drought.

Monsonia ovata Cav. - Dysentery herb. Amongst other things, used in the treatment of anthrax and for stomach upsets in calves and lambs.

Noltia africana Reichb. - Soap bush. A decoction of the leaf or root was used as a Quarter-evil remedy in stock.

Olea capensis L. - Bastard Black Ironwood. Leaves reacted positively to anti-biotic tests. An infusion of the leaves was used for eye diseases, sores, and other such complaints.

Oxalis smithiana E. & Z. - Sorrel. The roots were dried and powdered and this used as a tapeworm remedy.

Pappea capensis E. & Z. - Bergpruim. Cattle browse this plant in the Eastern Province.

Pelargonium pulveratum Colv. ex Sweet. - Wild Geranium. Used as a "war" charm to ward off bullets. A piece of the root was also tied to the bit in the mouth of the horse and this was reputed to prevent the horse from purging while on the road.

Pelargonium reniforme Curt. - Rooi Rabas. A calf and sheep liver complaint remedy.

Phytolacca heptandra Retz. - Wild Sweet Potato. Used in the treatment of "lung sickness" in cattle.

Popowia caffra Baill. - Plant burnt before setting out to hunt game and the ash was then sprinkled around the first animal killed "to charm more game to the hunters".

Ptaeroxylon obliquum Radlk. - Powdered wood infusions were used as a cattle tick-wash and an anthrax remedy.

Rhamnus prinoides l' Hér. - Dogwood. A hunting charm.

Rumex spp. - Dock or Tongblaar. Used in the treatment of horse sores as well as for anthrax, purgative for animals and a cure for tapeworm. Fresh green leaves were made into a wet dough and smeared on sores on the horse. A boiled extract of roots, approximately one pint or more, was used in anthrax treatment (Mzamane, 1945).

Salix mucrinata Thunb. - Cape Willow. Although bitter-tasting, it is a good stock feed.

Sarcostemma viminale RB. - Caustic Bush or Vine. The plant was used as a galactagogue in the cow.

Scilla lanceofolia Bak. - Wild Squill. A leaf decoction was used in the treatment of gallsickness.

Sideroxylon inerme L. - Milkweed or White Milkwood. A gallsickness remedy for stock, a bark decoction being used.

Solanum nigrum L. - Deadly Nightshade. Used in the disinfecting of anthrax infected meat.

Solanum sodomeum L. - Apple of Sodom. A leaf paste was applied to scab on sheep, and was also used for the treatment of harness sores.

Solanum capense. - Nightshade. The fruit pulp was used in the treatment of warts on animals. The fruit juice or root was used in the treatment of distemper or biliary fever in dogs.

Teucruim africanum Thunb. - Bitterbossie. Used by the Fingos as an anthrax-infected meat sterilant.

Typha capensis Rohrb. - Bullrush. A root decoction was used to aid the expulsion of the placenta in animals.

Urtica dioica L. - Stinging Nettle. Used as a cow and pig fodder.

Withania somniflora Dun. - Meidjieblaar. Used as an anthrax-infected meat disinfectant.

Xysmalobium undulatum RB. - Milk Bush or Wild Cotton. This has been used to treat lumpy skin.

The efficacy of the majority of these plant remedies can possibly be regarded with scepticism. When the large number of plants, shrubs, trees and seeds used for medicinal purposes, food, the making of baskets, mats and charms, and used as fuel, amongst other uses, are considered, the total number of plants destroyed annually must have been astronomical.

2.4 DISTRIBUTION OF THE LIVESTOCK POPULATION IN THE VARIOUS DISTRICTS OF THE CISKEI:

The numbers of each of the various species of farm animals occurring in the districts of the Ciskei, are reflected in Table 17 for the year 1967.

The cattle population of the Ciskei constituted about 12 per cent of all Bantu owned cattle in locations and reserves in the Cape Province in 1952, while the corresponding figure for sheep was 15 per cent and for goats 13 per cent (Agricultural Census No. 36, 1961/62).

The districts with the largest number of cattle are Glen Grey with 22.2 per cent of the total; Herschel with 18.1 per cent; King William's Town with 15.0 per cent; Peddie with 10.5 per cent; East London with 9.6 per cent and Middledrift with 8.9 per cent, the remaining districts having six per cent or less.

The areas with the largest number of sheep are Glen Grey with 41.1 per cent; Middledrift 11.9 per cent; Whittlesea 11.3 per cent; Herschel 10.7 per cent; Peddie 7.1 per cent and the remaining districts five per cent and less.

Herschel District has the largest number of goats, 26.4 per cent, followed by Glen Grey with 21.6 per cent; Peddie 15.3 per cent; Middledrift 14.6 per cent, with the remaining areas having five per cent or less of the total goat population.

Expressing sheep, goats and sheep/goats as ratios of cattle, wide variations are noted from district to district, as seen in Table 18.

In Whittlesea, for example, there are 5.80 sheep to each beast or cattle unit, with Glen Grey and Stutterheim, with one to 4.04, next, and with East London having only 0.09 of a sheep for each cattle unit, that is, one sheep for every 11 head of cattle. The predominantly sheep areas are clearly shown up by this table.

TABLE 17: TOTAL LIVESTOCK NUMBERS IN THE CISKEI ACCORDING TO DISTRICTS : 1967 [1)]

District	Cattle	Sheep	Goats	Pigs	Horses	Mules	Donkeys	Poultry
Herschel	37,137	48,000	60,740	2,599	1,945	1	1,941	23,000
Glen Grey	45,569	184,274	49,886	18,000	1,413	8	1,503	56,000
Whittlesea	8,768	50,893	11,256	1,432	1,111	8	-	8,597
Cathcart	250	778	418	50	2	-	-	250
Fort Beaufort	1,924	4,876	5,456	750	580	9	10	3,768
Victoria East	6,357	23,709	12,121	1,016	401	12	14	12,789
Middledrift	18,203	53,549	33,671	2,400	900	20	160	30,000
Keiskammahoek	12,965	16,730	10,359	1,045	736	-	66	12,540
Stutterheim	2,084	8,422	264	421	47	-	17	2,700
King William's Town	30,670	23,883	7,124	1,400	1,541	80	7	12,186
Peddie	21,639	32,070	35,352	6,367	383	18	524	25,500
East London	19,666	1,762	3,909	2,796	529	8	-	45,000
Ciskei Total	205,232	448,946	230,556	38,276	9,588	164	4,242	232,330

1) Extracted from Annual Agricultural Reports.

TABLE 18: CATTLE TO SHEEP TO GOAT RATIO AND TO SMALL STOCK 1967

District	One cattle unit to:		
	Sheep	Goats	Sheep/Goats
Herschel	1.29	1.64	2.93
Glen Grey	4.04	1.09	5.13
Whittlesea	5.80	1.28	7.08
Cathcart	3.11	1.67	4.78
Fort Beaufort	2.53	2.84	5.37
Victoria East	3.73	1.91	5.64
Middledrift	2.94	1.85	4.79
Keiskammahoek	1.29	0.80	2.09
Stutterheim	4.04	0.13	4.17
King William's Town	0.78	0.23	1.01
Peddie	1.48	1.63	3.11
East London	0.09	0.20	0.29
Ciskei	2.19	1.12	3.31

In the case of goats, the existing ratios have a wide district "spread" but not to the same extent as sheep. In Fort Beaufort locations, the ratio is one cattle unit to every 2.84 goats, with Stutterheim, East London and King William's Town having the widest ratios, the former having nearly eight cattle to each goat and the latter two districts, approximately five cattle to each goat.

Where these small stock are combined, ratios vary from one cattle unit to 7.08 small stock for Whittlesea, to approximately 3.5 cattle units to each small stock unit in the case of East London. The predominantly small stock areas are consequently Whittlesea, Victoria East, Glen Grey, Middledrift, Cathcart and Stutterheim, followed by Peddie and Herschel. The only district, where cattle are more numerous than small stock, is East London, followed by King William's Town where there are slightly more small stock units than cattle.

The overall Ciskei ratio is one cattle unit to approximately two sheep and one goat, or just over three small stock units.

Glen Grey, with 47 per cent of the total estimated pig population, is the leading pig area due mainly to the size of the area involved and a denser pig population per unit area. Peddie is next in importance with 16.6 per cent and has one of the highest pig populations per unit area. The remaining districts have comparatively small numbers.

The equine population, amounting to a total of 13,994 in 1967, has over 48 per cent of the total number occurring in the Herschel (27.8 per cent) and Glen Grey (20.9 per cent) Districts, with 11.6 per cent in the King William's Town District, eight per cent in Whittlesea, and 7.7 per cent in the Middledrift

District. Herschel District being of an undulating and mountainous nature, has the higher horse and donkey population to cope with transport in the difficult terrain. This applies in general terms to the larger and/or less developed districts.

While the poultry numbers, in most districts, cannot be considered to be strictly accurate, the largest estimated numbers occur in Glen Grey with 24.1 per cent, East London with 19.4 per cent, Middledrift with 12.9 per cent, and Peddie with 11.0 per cent of the total number.

2.5 LIVESTOCK TRENDS IN THE CISKEI:

Livestock play a significant rôle in the economics of all areas, apart from the social and ritual side, and in terms of capital invested in livestock, this represents a substantial outlay.

Figures 12A and B show the trend in Ciskei livestock populations for the period 1958 to 1967. Over this ten-year period, cattle and sheep numbers have declined in the Ciskei, more especially in the Betterment Areas, and wide fluctuations occur in some districts even from year to year. In some cases, these wide, short term fluctuations can be attributed to drought, although at times, it appears that the records themselves are at fault. King William's Town and particularly Whittlesea, showed a large decrease in sheep numbers between the end of 1965 and the end of 1966, due, apparently, to the ravaging effect of both the drought and extremely cold conditions experienced over this period, as well as to the stricter culling of stock in the rehabilitated areas.

While the Ciskei goat population shows a steady decrease over the years, Herschel District had an increase of about 10,000 goats between 1966 and 1967, and while goats are recognised for their breeding and survival rate, the 1967 figure is, without much doubt, erroneous. Unexpected drops of over 25,000 goats between the 1966 and 1967 stock assessments cannot entirely be due to drought or other conditions. It is well known that the goat is the first source of funds in time of need, and in a severe drought period, apart from high natural losses, the selling rate is, no doubt, increased. This could account in some measure for fairly wide fluctuations between years in the case of "stress" years only.

While the trends, as indicated in Figures 12 A and B, present a fairly accurate overall picture, some of the stock figures need to be treated with circumspection. In the first place, Bantu stock owners are liable to move some of their stock over to the next district or location prior to a count being made, or they can be hidden in bush or forest areas in the vicinity, as for example, could be the case in the Keiskammahoek District. These possibilities cannot be ruled out by the census-taking officers. Some of the older Annual Agricultural

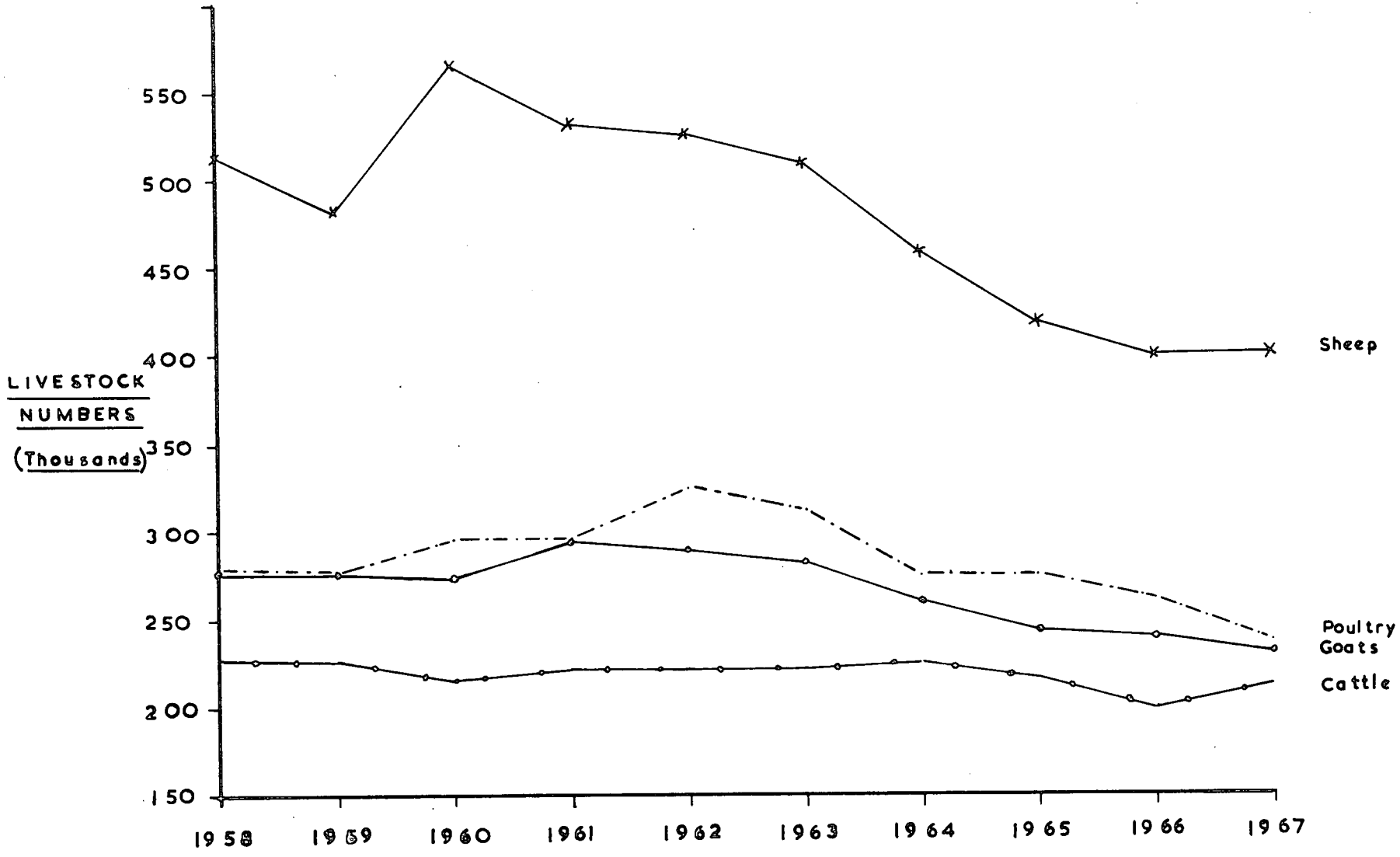


FIGURE: 12 A : LIVESTOCK TRENDS IN THE CISKEI
(EXTRACTED FROM ANNUAL AGRIC. REPORTS)

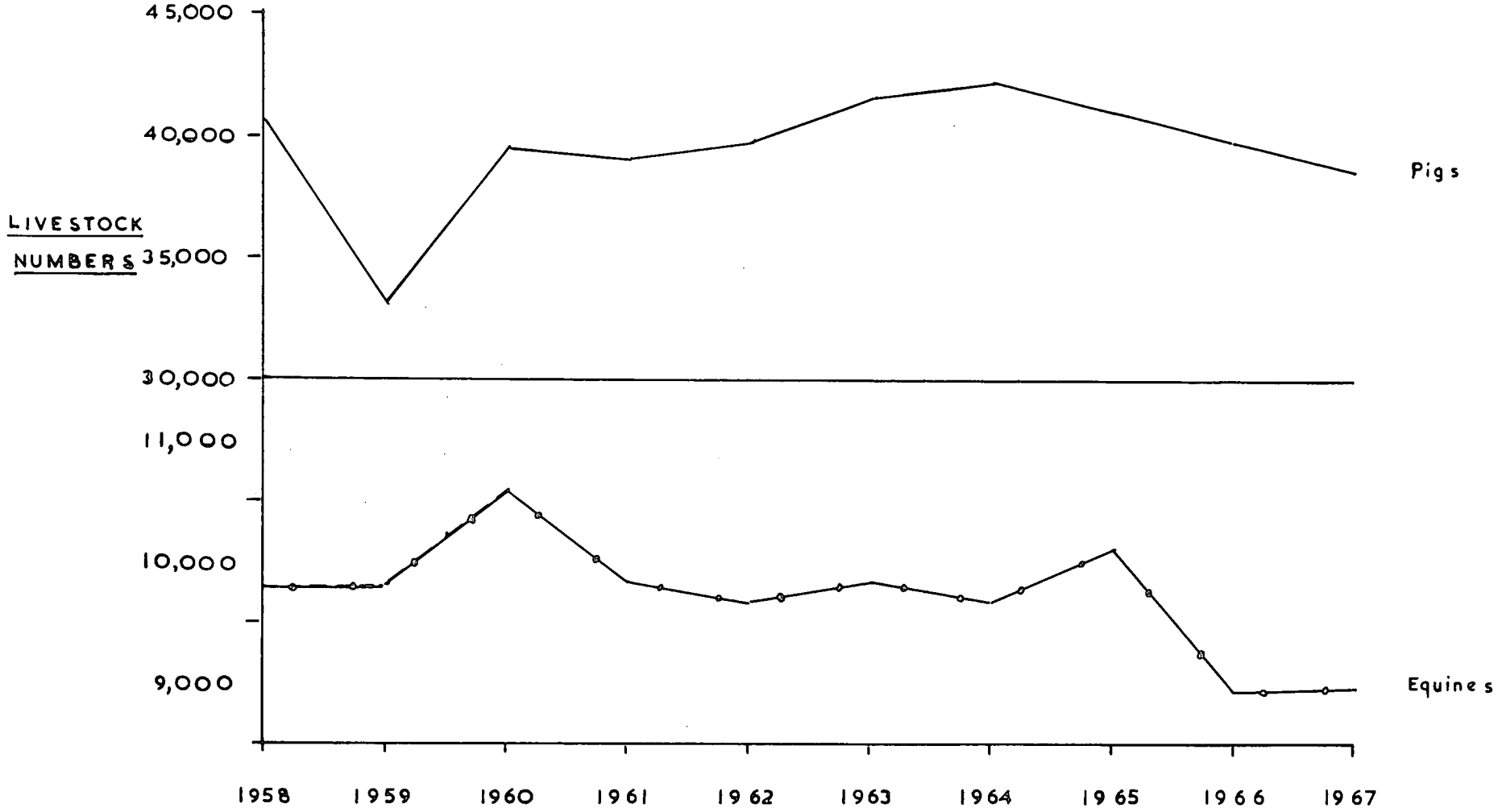


FIGURE: 12 B : LIVESTOCK TRENDS IN THE CISKEI

Reports have the same, or nearly similar, figure indicated for two or more years, and in the case of pigs and poultry in most areas, an estimate is made, rather than an actual count being undertaken. It should also be noted that lambs, kids, calves and foals have not been included in the annual counts, except in some districts in recent years. In the past, these young animals have only been included in the annual census when they are considered to be big enough. Usually lambs and kids over three months of age, and foals and calves with an apparent age of one year, are reflected in the stock reports for each location, and thus the stock statistics do not include young stock, other than defined above.

Fluctuations in district pig numbers commonly occur, with the total Ciskei number showing a decline in recent years. The reason for the decline is two-fold, in that, in some of the new residential areas, pig owners are required to keep pigs in sties owing to their nuisance value, and the tendency is to restrict numbers or to dispose of the pigs. Secondly, outside a somewhat limited internal market, the African Hut-pig is treated with great reserve on the auction sales due to the comparatively high incidence of cysticercosis and other infections.

Horse numbers have also shown a tendency to decrease, as is the case for the Ciskei in toto, as well as in individual districts like Herschel, King William's Town and Whittlesea, while in Glen Grey and Peddie, in particular, a recent upsurge in numbers is indicated. Stock limitation, which makes no distinction between the relative grazing capacities of the horse and cow, or for that matter, between the horse, donkey and cow, together with improved bus transport facilities and increasing mechanisation in the form of cars and tractors, have played, and are playing a rôle in the reduction of equine numbers. Donkeys, the equivalent of a mature large stock unit, have dropped fairly sharply in numbers over the past two years, while the overall tendency is for the mules to increase, but these total only 164 for the whole Ciskei.

Poultry, which include the African Hut-fowl, improved laying and table bird strains, ducks and geese, show a decline in the overall estimated number, due mainly to a sharp drop in the poultry number in the King William's Town District. This drops represents nearly 30, 000 poultry and possibly reflects an error in the Agricultural Report.

2.6 DISTRICT LIVESTOCK EQUIVALENTS:

The livestock equivalent system used by the Agricultural Section of the Department of Bantu Administration and Development for the Ciskei, is that one mature largestock unit (M. L. U.) or cattle unit is equivalent to one bovine or equine of about one year old and older, or five sheep or goats over the age of about three months. Young calves, foals, lambs and kids have no rating and the age at which they are considered for inclusion in the annual census is decided

in an arbitary way using size as the criterion. No recognition is given to pigs and poultry in this system, and the weight of the Department's cattle unit is taken as being between 800 and 1, 000 pounds.

Bisschop & Groenewald (1962) accept that a mature large stock unit is equivalent to one bovine or two calves or foals, or five sheep or goats, and the unit is based on a weight of 800 pounds. Clarke (1940) accepts an average of 1, 120 pounds live weight as being the weight of a mature largestock unit. The approximate equivalents used are: 2. 90 donkeys or a donkey is 0. 345 of an unit, 1. 34 horses or 2. 90 foals, 7. 76 sheep (0. 129 of an unit) and 7. 58 goats (0. 132 of an unit). Davies (1960) assumes a mature largestock unit to be 1, 000 pounds in weight and equivalent to 0. 75 of a horse or beast of any age, or six sheep or eight goats. Helberg (1962) arrives at the following equivalents: eight sheep or goats inclusive of lambs and kids, 1. 34 equines, 0. 80 oxen and 1. 25 cows over two years of age. Talbot & Talbot (1960) take as their equivalents one bovine, or one horse or mule, or two donkeys, or four pigs, or seven sheep and goats, or 100 head of poultry, presumably the unit being based on 1, 000 to 1, 100 pounds live weight. It is interesting to see that pigs and poultry have been included in this system of livestock grazing equivalents, since, in Bantu peasant farming, both the pig and fowl obtain a significant amount of food from the veld in terms of green herbage and roots, apart from the mechanical effect of rooting and scratching. The adoption of this system, with one modification is justified. The change is made in the number of sheep or goats equivalent to a mature largestock unit - in this case, a reduction to six. The average liveweight of Bantu cattle is in the region of 825 pounds with maximums in the vicinity of 1, 000 pounds and more in the case of the Brown Swiss crossbreds.

Table 19 gives details of the number of units in each district, and the two systems used, Department of Bantu Administration and Development system (D. B. A. system) and the modified Talbot system, are shown side by side so that comparisons can be made. In terms of mature largestock units, Glen Grey carries nearly 27 per cent followed by Herschel District with 17 per cent using the Talbot system. As is to be expected, cattle comprise nearly 60 per cent of the total Ciskei grazing strength, with sheep next at nearly 22 per cent, goats at 11 per cent, pigs and horses at 2. 8 per cent each, and the other categories having a relatively minor position.

Poultry amount to an equivalent of 2, 324 largestock units and, although only consisting of 0. 68 per cent of the total units, should not have its minor significance lost sight of until such time as poultry are kept predominantly on an intensive or semi-intensive basis. Morrison (1956) points out that 100 hens on an intensive system and given green feeds ad lib, could consume up to 12 pounds daily.

TABLE 19: TOTAL LIVESTOCK IN VARIOUS DISTRICTS IN TERMS OF MATURE LARGE STOCK UNITS (M. L. U.) USING TWO METHODS OF CALCULATION [1]

District	Cattle - MLU		Sheep - MLU		Goats - MLU		Pigs - MLU		Horses - MLU		Mules - MLU		Donkeys - MLU		Poultry - MLU		Total - MLU	
	DBA[2]	Talbot[3]	DBA	Talbot	DBA	Talbot	DBA	Talbot	DBA	Talbot	DBA	Talbot	DBA	Talbot	DBA	Talbot	DBA	Talbot
Herschel	37,137	37,137	9,600	8,000	12,148	10,124	-	650	1,945	1,945	1	1	1,941	971	-	230	62,772	59,058
Glen Grey	45,569	45,569	36,855	30,712	9,977	8,314	-	4,500	1,413	1,413	8	8	1,503	752	-	560	95,325	91,828
Whittlesea	8,768	8,768	10,179	8,482	2,251	1,876	-	358	1,111	1,111	8	8	-	-	-	86	22,317	20,689
Cathcart	250	250	156	130	84	70	-	13	2	2	-	-	-	-	-	3	492	468
Fort Beaufort	1,924	1,924	975	813	1,091	909	-	188	580	580	9	9	10	5	-	38	4,589	4,466
Victoria East	6,357	6,357	4,742	3,952	2,424	2,020	-	254	401	401	12	12	14	7	-	128	13,950	13,131
Middledrift	18,203	18,203	10,710	8,925	6,734	5,612	-	600	900	900	20	20	160	80	-	300	36,727	34,640
Keiskammahoek	12,965	12,965	3,346	2,788	2,072	1,727	-	261	736	736	-	-	66	33	-	125	19,185	18,635
Stutterheim	2,084	2,084	1,684	1,404	53	44	-	105	47	47	-	-	17	8	-	27	3,885	3,719
King W. Town	30,670	30,670	4,777	3,981	1,425	1,188	-	350	1,541	1,541	80	80	7	3	-	122	38,500	37,935
Peddie	21,639	21,639	6,414	5,345	7,070	5,892	-	1,592	383	383	18	18	524	262	-	255	36,048	35,386
East London	19,666	19,666	352	294	782	652	-	699	529	529	8	8	-	-	-	450	21,337	22,298
Ciskei	205,232	205,232	89,790	74,826	46,111	38,428	-	9,570	9,588	9,588	164	164	4,242	2,121	-	2,324	355,127	342,253

1) Based on livestock figures from 1967, Annual Agricultural Report.

2) Department of Bantu Administration and Development System.

3) Modified Talbot System.

To what extent the African Hut-fowl utilises green material is unknown, but it is doubtful if 100 hens could consume more than 25 pounds of green material per day, and hence the figure of 100 fowls to a largestock unit is probably on the low side. However, if the damaging effect of soil scratching and trampling, the latter of lesser importance, is taken into consideration, Talbot & Talbot's (1960) figure might be nearer to the truth in practice than it appears to be in theory.

In terms of grazing pressure in morgen per largestock unit, Table 20 should be consulted.

The average Ciskei figure for grazing pressure, is 2.51 morgen per unit, with the districts of Whittlesea, Cathcart, Herschel and King William's Town having three morgen or more per livestock unit; Glen Grey, Victoria East, Peddie and East London having between two to 2.6 morgen per unit; Middledrift, Stutterheim and Keiskammahoek ranging between 1.39 and 1.89 morgen per unit; with the remaining district of Fort Beaufort having 0.82 morgen per unit. The arable lands and residential sites, together with roadways, are used also for grazing purposes when the crops, in the case of lands, have been harvested. Increasing use is being made of winter-grown green feeds and supplementary roughage feeding in the dry months, the latter consisting of crop residues, such as maize stalks and pea plants.

Equating the mature largestock units for each district with the estimated available roughage supply, that is, veld, based on Clarke's (1940) work, the dry matter, digestible protein and net energy are apparently below the level where the existing livestock population can be maintained in good condition. Refer to Table 21.

However, the estimated annual production figures, based on generalisations, need to be treated with reserve, although these figures do serve a useful purpose in indicating to what extent the deficiencies occur. In a "good" rainfall year it becomes obvious visually that the livestock populations have more roughage available than is required for basic maintenance, but to what degree cannot be determined due to paucity of data.

Table 22 serves to indicate, on a general basis for the Ciskei, the monthly changes that can be expected in veld in terms of crude protein and phosphorus. Figure 13 also indicates the seasonal changes for Herschel District and the remaining areas of the Ciskei.

As can be seen from Table 22 there is a marked variation in intake of crude protein and phosphorus from month to month, and the inability of the natural pasture to meet the animal's requirements, is patently clear.

According to Du Toit, Louw and Malan's (1940) work, crude protein is only deficient in the veld in the Herschel District for a period of about four months.

TABLE 20: GRAZING PRESSURE AND ESTIMATED TOTAL EXISTING CARRYING CAPACITY ASSESSMENT (1967 - 1968)

District	Total area morgen	Total grazing area morgen	% Grazing area under grazing system	1) MLU per District		Grazing pressure morgen per MLU		Estimated present carrying capacity morg./MLU	Total carrying capacity MLU	Carrying capacity based on Clarke 2)	
				DBA	Talbot	DBA	Talbot			Morg. per MLU	Total MLU
Herschel	201,150	181,700	56.5	62,772	59,058	2.89	3.08	3.5	51,914	2.5	72,680
Glen Grey	289,771	240,000	21.2	95,325	91,828	2.52	2.61	4.5	53,333	3.5	68,571
Whittlesea	82,325	74,300	100.0	22,317	20,689	3.33	3.59	4.0	18,575	3.5	21,229
Cathcart	2,137	1,515	100.0	492	468	3.08	2.24	4.0	379	3.5	433
Fort Beaufort	8,132	3,684	0	4,589	4,466	0.80	0.82	4.5	819	3.5	1,053
Victoria East	36,514	28,400	54.9	13,950	13,131	2.04	2.16	4.5	6,311	3.5	8,114
Middledrift	81,090	65,400	30.0	36,727	34,640	1.78	1.89	4.5	14,533	3.5	18,686
Keiskammahoek	38,855	25,900	71.2	19,185	18,635	1.35	1.39	4.5	5,755	3.5	7,400
Stutterheim	15,078	7,037	100.0	3,885	3,719	1.81	1.89	3.5	2,011	3.5	2,011
King William's Town	146,742	113,637	93.0	38,500	37,935	2.95	3.00	4.0	28,409	3.5	32,468
Peddie	84,313	71,400	13.3	36,048	35,386	1.98	2.02	4.0	17,850	3.5	20,400
East London	71,807	46,717	91.0	21,337	22,298	2.19	2.10	4.0	11,679	4.0	11,679
Ciskei	1,057,914	859,690	52.12	355,127	342,253	2.42	2.51		211,568		264,724

1) MLU = Mature Largestock Units

2) Clarke (1940)

TABLE 21: APPROXIMATE ANNUAL REQUIREMENTS AND PRODUCTION OF DRY MATTER (D. M.), DIGESTIBLE PROTEIN (D. P.) AND NET ENERGY (N. E.) PER VELD AREA AND PER MORGEN BASED ON THE MAINTENANCE, FOR ONE YEAR, OF ALL GRAZING STOCK EXPRESSED AS MATURE LARGE STOCK UNITS [1]

District	Requirements per area			Requirements per morgen			Estimated Annual Production per Morgen [2]		
	D. M. Tons	D. P. Tons	N. E. Megatherms.	D. M. lbs.	D. P. lbs.	N. E. Therms.	D. M. lbs.	D. P. lbs.	N. E. Therms.
Herschel	237, 024	15, 458	144	2, 610	170	793	3, 000-5, 800	250-300	1, 500-3, 300
Glen Grey	362, 051	23, 612	220	3, 018	197	821	1, 500-2, 000	110	600
Whittlesea	80, 629	5, 258	49	2, 170	142	659	2, 000	110	600
Cathcart	1, 843	120	1	2, 434	158	660	2, 000	110	600
Fort Beaufort	17, 713	1, 155	11	9, 616	627	2, 986	1, 500-2, 000	110	600
Victoria East	51, 534	3, 361	31	3, 630	237	1, 092	2, 000	110	600
Middledrift	136, 682	8, 914	83	4, 180	273	1, 269	2, 000	110	600
Keiskammahoek	75, 515	4, 925	46	5, 832	380	1, 776	2, 000-2, 500	110	600
Stutterheim	14, 743	961	9	4, 190	273	1, 279	2, 000-2, 500	110	600
King William's Town	156, 129	10, 182	95	2, 748	179	836	2, 000	110	600
Peddie	141, 792	9, 247	86	3, 972	259	1, 204	2, 000	110	600
East London	93, 024	6, 067	57	3, 982	260	1, 220	3, 000	120	±900
Ciskei	1, 368, 679	89, 260	832	3, 184	208	968			

1) Adapted from Clarke, 1940.

2) In a "normal" year, i. e. no drought or excessive rain with average rainfall fairly well spaced.

TABLE 22: ESTIMATED CRUDE PROTEIN (C. P.) AND PHOSPHORUS (P.) MONTHLY VELD VARIATION, AND CRUDE PROTEIN, DIGESTIBLE PROTEIN (D. P.) AND PHOSPHORUS INTAKE BY LIVESTOCK IN THE CISKEI [1]

Month	Veld Composition		Av. Daily Intake per Animal			
	C. P. grams	P. grams	C. P. grams	D. P. grams	P. grams	
January	567	9.6	528	258	16.2	Based on requirements of a growing, non-producing beast of 800 lbs. live weight eating 6,272 grams dry matter (or 14 lbs.) per day and requiring 500 grams crude protein and 10 grams phosphorus daily. (Du Toit et al, 1940, quoted by Bisschop & Groenewald, 1963).
February	492	8.8	366	204	15.3	
March	451	8.0	502	213	17.0	
April	441	8.0	409	128	13.6	
May	359	6.7	400	119	14.5	
June	332	6.2	306	8.5	11.1	
July	331	5.7	306	8.5	9.3	
August	295	5.3	289	8.5	8.5	
September	408	6.1	306	8.5	10.2	
October	455	7.5	392	42.6	9.4	
November	606	9.3	613	255	14.5	
December	637	10.6	587	255	17.9	

1) After Du Toit et al, 1940, adapted by Bisschop & Groenewald, 1963.

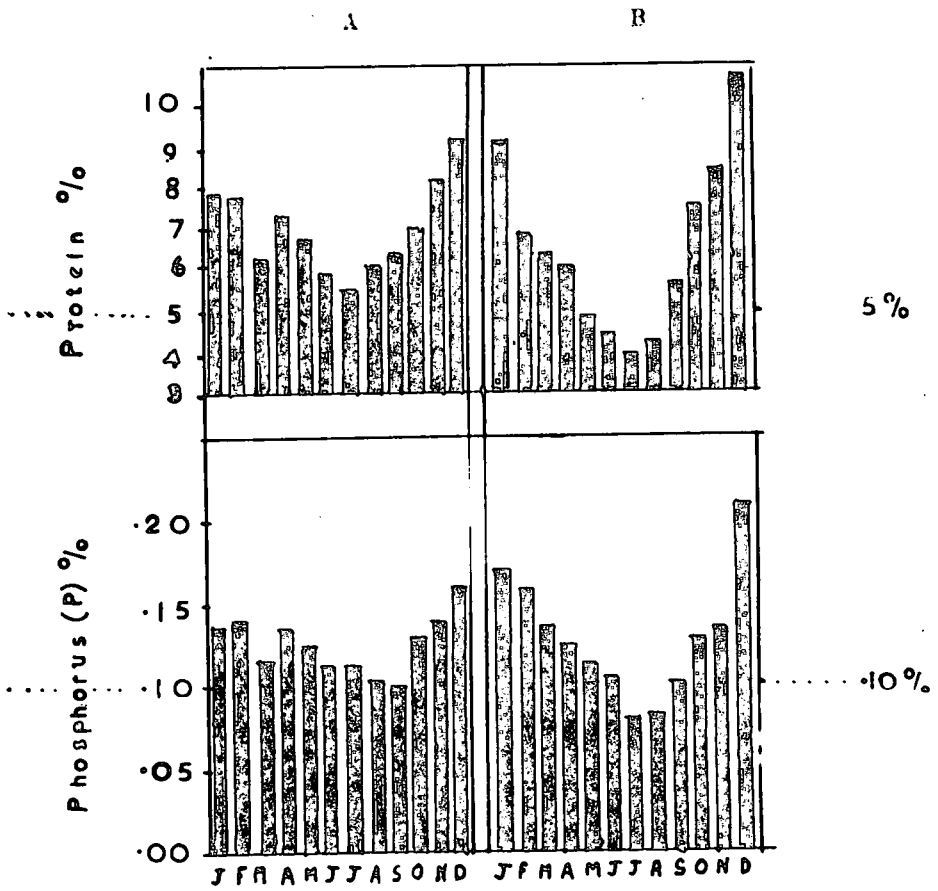


FIGURE 13 SHOWING SEASONAL VARIATIONS IN THE PHOSPHORUS AND CRUDE PROTEIN CONTENTS OF VELD IN AREAS OF THE CISKEI (After du Toit et al, 1940).

A. Representative of Glen Grey, Queenstown, Cathcart, Coastal Plateau and Belt.
B. Representative of Herschel District.

This is based on the intake of 16 pounds of dry matter for a 1,000 pound cow producing less than two gallons of milk per day. Phosphorus is also insufficient over three winter months to meet the needs of lactating cows in the Herschel District.

Cattle and sheep are most unlikely to suffer from a deficiency of calcium providing milk production is moderate, that is, two gallons and less. Where more than two gallons are produced, then a deficiency in the diet is possible (Du Toit et al, 1940).

The possibility of magnesium and potassium deficiencies in the natural pastures of the Ciskei, are remote, while a sodium deficiency occurs in the Herschel area throughout the year, the remaining veld areas of the Ciskei apparently do not suffer from a deficiency of this mineral (Du Toit et al, 1940).

In reference to the bush areas, for example Keiskammahoek District, Du Toit et al (1940) state that "provided sufficient food is available an intake of phosphorus, crude protein or sodium below the optimum requirements for growth will seldom occur on pastures composed mainly of bushes".

The over riding problem in terms of meeting growth and production requirements in the Bantu areas, is that there is an insufficient quantity of grass produced annually. This is due to overstocking and the consequent problems associated with an excessive livestock population, lack of grazing management schemes in the unplanned areas especially, and drought.

2.7 STOCK LIMITATION:

In the Annual Agricultural Report of 1956/1957, the following remarks and suggestions were made:

"The basic principle in encouraging livestock reduction is the placing of emphasis on the revenue - earning capacity of the animal. A list of projects and practices is appended:

1. Development of Dairy Schemes.
2. Provision for facilities for:
   (a) Purchasing good dairy animals, and
   (b) for breeding good animals by providing good bulls and rams at a subsidised price. Approximately 1,600 bulls and 8,000 sheep rams are necessary to meet the Ciskeian requirements.
3. Provision of fattening camps and arranging organised avenues of sale through the abattoirs or stock sales.
4. Scheming for the erection of silos and establishment of fodder plots, hay-making projects and production of winter stock feeds.
5. Limitation of the ownership of stock to an economic unit basis.

6. Making of constant propaganda for improvement of breeding and maintenance methods".

Items 1, 3 and 5 have been largely met, while items 2(a) and (b) are in the process of being executed, together with item 6 which is, in 1968, and 1969 being emphasized with the establishment of a new Agricultural Extension Section of the Ciskeian Department of Agriculture.

An annual stock census is carried out by the agricultural staff, usually in the early part of the year, and each individual owner or his representative, is required to be present with his stock on a day and at a time appointed by the local Bantu Affairs Commissioner. All stock are counted, although calves under the age of 10 to 12 months, and young lambs and kids under three months of age, are not required to be included in the census. Most Agricultural Officers include these presumably as a check on the following year's count. All stock are then reduced to a livestock equivalent basis, and where they exceed the assessed total carrying capacity, a percentage reduction took place in the early stages of rehabilitation. Today, most owners are aware of the number of cattle units they are allowed to have, based on whether they farm on a full or sub-economic holding or not. Surplus stock are required to be disposed of within a specified time. In most areas, a number of landless or squatter livestock owners exist and the policy is to gradually reduce the number of stock owned by these people until such time as they are able to find permanent employment.

One aspect of this culling became apparent, and that was the possibility of stock being secreted in the bush, forest or mountainous areas in some districts as previously mentioned. The possibility certainly exists but the extent to which such evasion is carried out, is not accurately determinable, but appears to be of the order of 10 to 20 per cent in some locations or districts.

In some locations, for example Sheshegu in the Victoria East District, which until recently resisted efforts aimed at getting this location declared a Betterment Area, the majority turned out to be stockowners who owned no land, and it was the resistance of these people which delayed the planning of this area. These squatters feared, and rightly so, that their stock would be the first to be culled.

2.8 LIVESTOCK REGIONALISATION:

According to Bonsma & Joubert (1957), the Ciskei Districts could be grouped generally as follows in terms of livestock production:

Herschel, Glen Grey, Whittlesea, Keiskammahoek, Stutterheim and Cathcart: These fall in the semi-intensive sourveld region. These areas are suitable for industrial milk production with the Brown Swiss breed being well suited to the higher lying regions. In the case of sheep production, the higher

rainfall regions at higher altitudes are best suited to farming with the long-woolled British breeds, such as the Romney Marsh, while in the lower areas, the mutton Merino breeds would be more suitable.

Communal dairy schemes have been started in most districts to supply cream to local creameries, and while the Brown Swiss is the favoured breed, most of the cows which supply these schemes with milk, are of the Native type. While the mutton Merino breeds are favoured through out these areas, no long-woolled British breeds as yet, have been introduced.

King William's Town, Peddie, Middledrift, Fort Beaufort, and Victoria East: These districts are considered to be semi-intensive mixed farming areas. Cattle are most suited to the sweeter, lower lying areas, and sheep to the relatively sour highlands. Again the British sheep breeds and Merino types are recommended, and apart from the fattening of stores, the raising of crossbred slaughter calves from dairy herds, is suggested as being a sound farming system.

In the Bantu areas, this is certainly by no means the position in that sheep occur in large numbers in the lower lying areas, and no raising of crossbred slaughter calves as such, is undertaken.

East London and Peddie Coastal Areas: This is indicated as an intensive mixed farming region, where dairying and pigs are recommended as the main livestock activities. "Sheep can hardly play any rôle due primarily to the lack of suitable grazing".

While sheep play a comparatively minor rôle in the East London area, this is not the case in the Peddie District. Also, very little serious dairying or pig farming is carried out in these Bantu regions.

2.9 CATTLE:

2.9.1 Introduction:

Traditionally, the ownership of stock played the major part in the spiritual, economic and social life of the Xhosa, while the cultivation of the soil was only of secondary importance (Hobart-Houghton & Walton, 1952). Theal (1882) indicated that "the care of cattle is considered the most honourable employment, and falls entirely to the men. They milk the cows, take charge of the dairy, and will not permit a woman even to touch a milksack". He emphasises that "the men are far from industrious" and that a good deal of time is spent in visiting and gossiping, and adds "according to their ideas, stealing cattle is not a crime; it is a civil offence, and a thief when detected is compelled to make ample restitution but no disgrace attaches to it . . . ."

Numerous authors, notably Kay (1833), Theal (1882) and Soga (1931), refer to the high regard that the Xhosa have for their cattle, and to the fact that cattle are considered the most valuable of all the earthly treasures (Kay, 1833). Accor-

ding to Kay (1833), "the increase of his (the Xhosa's) stock, together with the various means by which the increase may be most fully ensured, is the subject of daily study" throughout his useful life, and Kay further illustrates to what extent cattle are revered by the Xhosa when he writes: "He is scarcely ever seen shedding tears, excepting when the Chief lays violent hands upon some part of his horned family; this pierces him to the heart, and produces more real grief than would be evinced over the loss either of wife or child!" Considering that livestock were looked upon as being the family or tribal bank, and that they supplied food in the form of milk and meat, skins for garments, utensils, and other items, and were used for the bride's dowry or ulobola, where five to ten head are handed over in a normal marriage and 25 to 60 head for a bride of high lineage, it is surprising that no systematic breeding methods were employed (Kay, 1833), (Soga, 1931). Functional efficiency, in terms of food production, had little place in the breeding of cattle, the bulls running with the cows throughout the year resulting in haphazard mating. Soga (1931) points out that "some individuals had fancies of their own and bred accordingly in a perfunctory way. They fancied the form and general appearance of a certain bull; they noted the character of its progeny, and either secured it by barter, or at least, one of its offspring". Selective mating was unknown, since, while the bulls might be "superior", the criterion as far as the cows were concerned, was that they should be capable of reproduction, and such a female was then rated as "good", since the principle of quantity and not quality was applied (Soga, 1931). However, the outcome of this lack of breeding, has some compensations, in that nature has evolved "a type of cattle which is best adapted to meet the conditions prevailing in the country, such as droughts, heat and sudden changes of temperature. These cattle are much hardier than the imported breeds of the farmers, as well as being the best of all for transport purposes" (Soga, 1931). The principle of quantity and not quality has universal appeal amongst the tribes in Africa (Phillips, 1959).

The training of the horns into weird and "fantastical" shapes was also carried out (Paterson, 1779; Kay, 1833) and Kay (1833) further remarks on the ability of the herdsman to identify any one of his numerous charges. The practice of lending stock to poorer members of the tribe by well-to-do owners, has been recorded (Commission, 1955). Kay (1833) specifically indicates how difficult it was for a man to part with even one of his herd, so ardent was the attachment.

Milk production levels, were reported to be on the poor side in 1918 (Christian Express quoted by Shepherd, 1940) and this appears to be applicable to Bantu cows prior to the 20th Century.

Cattle were very seldom slaughtered (Paterson, 1779; Soga, 1931; Commission, 1955), except for festivities such as marriages and deaths, or for religious rites (Soga, 1931), and Kay's (1833) vivid description of the slaughter of a "fat cow" is gory to say the least! Strong thongs were cast about the legs of the animal, and were then drawn together, so that the animal collapsed. After binding the legs, a spear (umkonto) was used to make an incision just below the breast through which a hand was inserted to "savagely" grasp and break the blood vessels leading to the heart. The restraining thongs were removed and the animal "left fully at liberty to struggle in agony the most dreadful". The contents of the gall bladder were "eagerly drunk by the individual who first gets hold of it". Hygiene was of no consequence, since pieces of meat were deliberately rolled on the floor of the cattle kraal prior to cooking. The significance of this act is not mentioned.

It is interesting to note that the dog was held in high regard by the Xhosa in the early days, and one which took his fancy, would be eagerly exchanged for as many as two "bullocks" (Paterson, 1779). It appears that the Xhosa in the Ciskei were not in possession of dogs prior to the advent of the Colonists, while the Xhosa on the Wild Coast were reported as being in possession of dogs in the year 1593 (Theal, 1916).

It appears that prior to the general use of the horse, the racing of young oxen was one of the Xhosa's favourite amusements (Kay, 1833). This ulego invariably covered a distance of between five to 12 miles, although a distance in excess of 20 miles is on record (Soga, 1931; Shepherd & Paver, 1947). These oxen were trained to cover distances swiftly and Kay (1833), remarking on their ability to travel at "an astonishing rate", says that "on these occasions a native, on horseback and at full gallop, frequently leads the van. The winning ox is lauded to the very skies, and the praises of the multitude pronounced upon it in the most vociferous manner". Shepherd & Paver (1947) report that "selected oxen were trained to follow men who ran before them in relays, to the accompaniment of shrill whistles". These races were connected with festivities of all sorts, and "every man of note had his racing oxen, and prided himself upon their good qualities as much as an English squire does upon his blood horses" (Theal, 1882).

Early Cattle Management: As previously mentioned, the work concerning all aspects of cattle care and the construction of kraals, was carried out by the Xhosa males (Kay, 1833; Theal, 1882). The cattle were kept at nights in a well-sited, thorn-hedge enclosure (ubuhlanti), although some owners made a kind of lattice-work fence, which, during the cold weather, was packed to reduce "the wintry blast" (Kay, 1833). The night kraaling of stock was necessary because

of the existence of numerous predatory animals. Cattle kraals were situated on slopes and faced the morning sun. The ubuhlanti was also the tribal meeting place. The cattle were allowed out after milking in the mornings at a "late hour" and were attended by the "village boys" (Kay, 1833).

The first mention of "native made butter" is in 1885 (Brookes, 1924 quoting from Cape Native Blue Book, 1886) but this must refer only to Bantu in close contact with the Europeans, and is due to knowledge acquired from the latter. Abbott (1949) mentions that Casalis described buttermaking in Basutoland in 1861 and that the fat was used for anointing the body.

Theal (1882) makes reference to cattle being taught to respond to a certain call or whistle and "to run home" on being given this signal. Theal (1910) reports that the boys trained the calves to run and that later training involving riding on the backs of the oxen, commenced when the oxen were between 18 to 24 months of age. Paterson (1779) mentions that the "whistle" or instrument for calling the cattle, was made of bone or ivory and resembled a "boatswain's pipe", and could be heard at a great distance. Kay (1833) suggests that this training of cattle to move rapidly also allowed members of the tribe to steal away with the cattle in the event of an attack by a marauding tribe.

On death by drowning in a river, the next of kin would drive cattle into the water at the scene of the tragedy and the water spirits would be implored to return the relative in exchange for one of the cattle (Theal, 1910).

At this stage, it will be noted that no reference has been made to the use of oxen for ploughing or the drawing of sledges. One of the earliest reports of the use of oxen and implements for cultivation is by Moister (1866) who records the descriptive exclamation made by an old chief on being shown a plough in operation; "See how the thing tears up the ground with its mouth: it is of more value than five wives!" The ox-drawn plough is reported as having emancipated the Bantu woman compared with her position before its general introduction (Brookes, 1924).

The Lovedale Missionary Institution, in their report of 1872 in connection with oxen and tillage implements, came to the conclusion that the Xhosa apprentices "distinguished themselves more by destroying the implements and injuring the animals entrusted to their care than by any other praiseworthy result". Available literature makes no reference as to when the sledge or sleigh was first introduced, although it is probable that it began to be used, at a guess, between 1890 and 1910. The pack-ox was the only beast of burden in general use up until the introduction of the horse (Kay, 1833).

2.9.2 A Calendar of Stock Disasters as Chronicled by the Xhosa: (According to Soga, 1931).

(i)	Great rain and death of cattle	-	Ingxokolo 1836.
(ii)	Lung sickness (first appearance) or cattle catarrh introduced by an infected bull from Holland. Approximately 64, 850 cattle died in the "Eastern Province" alone.	-	Imofu, ukufika kwayo 1855. Cory (1930) says 1854.
(iii)	Cattle-killing delusion	-	U- Nongqause Ingqaule 1856-1857.
(iv)	Great drought	-	Ilanga lika - Qila 1860-1863.
(v)	Red Water in cattle	-	u - Mbendeni 1885.
(vi)	Tick epidemic in cattle	-	Isitwayi 1885-1886.
(vii)	Rinderpest disease	-	U - Landipasi 1897.
(viii)	East Coast Fever	-	- 1910.

Gall-sickness (inyongo) and Quarter-evil (idila or ububende) were known from the earliest times. With the introduction of universal dipping, the incidence of tick-borne diseases has decreased considerably "in consequence of which, cattle are more numerous than ever before". (Soga, 1931).

2.9.3. Sacrificial Animals:

Shepherd & Paver (1947), dealing with Bantu religion, point out that the Bantu "carried a haunting sense that men, animals, trees, and all the forces of nature were the abodes of spirits requiring worship and more especially to be appeased by animal sacrifice". Each family endeavoured to build up a select strain of cattle, regarded as a sacred possession, from which the sacrificial ox was chosen. Goats were also used for sacrificial purposes, but not other animals.

More often than not, a diviner would be used to "smell out" the guilty person who had caused the illness, and invariably an unpopular member of the tribe, or a wealthy man in terms of livestock, would be named. This resulted in the confiscation of all stock, which were shared between the diviner and the chief (Steedman, 1835; Shepherd & Paver, 1947). Such methods were most certainly not conducive to improving the quality of the livestock concerned.

2.9.4 The present rôle of Cattle in Family and Tribal Life:

Cattle are still considered by the Bantu to be their most important possessions and rank highest of all stock. They play an important rôle in all phases of social, economic, spiritual and ritual life. They are used as a medium by which the living can contact the ancestral spirits, and often the best breeding cows or fattest oxen are sacrificed for this purpose. A case in the East London District recently involved the slaughter of an outstanding cow by a recently widowed woman so that her husband's spirit would be propitiated; nor would she move from the area until the slaughter had been carried out at a specified time

after the death of her husband.

Bride-price (ulobola) is still paid in cattle or in terms of cattle equivalents, although there is a decided change in that a token beast is handed over and the balance paid out in cash to the parents of the bride. It appears that the young man, working outside his district, now deposits his spare money in a saving's account, rather than send money home to purchase cattle which are liable to die due to drought or disease. An estimate for the Glen Grey District, and other districts are expected to be similar, places the number of cases of lobola on a cash basis at 60 to 70 per cent (Schulze, 1968).

A man's status is till gauged by the number, and not quality, of cattle he owns, although it appears that sheep also have a rating in today's social order. Other status symbols, such as cars, tractors and radios, are now in evidence in the Ciskei.

2.9.5 Average Cattle Number per Stockowner:

Using the 1968, 1965 in the case of Peddie, district census cattle figures for two to three locations in each district, excluding Glen Grey and Fort Beaufort, the average number of cattle owned by each stock owner is indicated in Table 23.

In some districts, for example Victoria East, Peddie and Middledrift, up to 30 per cent of the stockowners have no cattle, but are owners of small stock. Isolated cases occur where a stockowner owns no cattle or small stock, but has several horses or donkeys. Approximately 12.5 per cent of the 3,758 stockowners in the various districts, own no cattle, while 62 per cent have from one to five head, 20 per cent from six to 10 head, four per cent from 11 to 15 head and 1.5 per cent from 16 to 40 head. The districts with a greater frequency of stockowners with 16 or more cattle per owner, are Stutterheim, Herschel and Whittlesea.

Examples of the differing combinations of livestock owned by the more affluent individual stockowners are presented in Table 24.

These are the wealthier owners in these districts and they represent a small percentage of the total owners.

Using the same locations as mentioned in Table 24, with a total cattle population of 73,047, nearly 31 per cent are cows, 17 per cent heifers over about 10 months and up to first calving, 38 per cent oxen, 3.25 per cent bulls, and 10.5 per cent calves. Corresponding figures for European-owned stock in 1961-1962 are: cows about 46 per cent, heifers one to two years 15 per cent, oxen 19 per cent, bulls 1.8 per cent and calves nearly 18 per cent, (S. van Wyk, 1967). There is thus, a higher percentage of female breeding stock carried on the European farms compared with the Bantu farms, and far fewer oxen. In the

TABLE 23: NUMBER OF STOCKOWNERS ON A PERCENTAGE BASIS, OWNING NO CATTLE AND UP TO 31 TO 40 CATTLE

District	No. of locations	Percentage stockowners owning cattle							No. of Stock-owners
		nil	1 - 5	6 - 10	11 - 15	16 - 20	21 - 30	31 - 40	
Herschel	2	7	54	23	10	4	2	-	353
Whittlesea	3	11	50	29	8	2	-	-	289
Victoria East	3	30	53	16	1	-	-	-	263
Middledrift	3	21	67	11	1	-	-	-	513
Keiskammahoek	2	13	69	16	1	1	-	-	421
Stutterheim	2	1	41	33	15	6	4		223
King William's Town	3	9	68	19	4	-	-	-	579
Peddie	2	24	50	21	4	1	-	-	352
East London	3	5	73	21	1	-	-	-	765
Ciskei mean		12.5	62	20	4	-	1.5	-	3,758

TABLE 24: EXAMPLES OF COMBINATIONS OF LIVESTOCK OWNED BY THE LEADING OWNERS IN THREE DISTRICTS [1)]

District	Cows	Heifers	Oxen	Bulls	Calves	Equines	Sheep	Lambs	Goats	Kids
Herschel	6	4	10	1	5	3	203	10	48	2
	13	4	13	-	4	2	108	some	-	-
Whittlesea	5	-	10	-	2	3	273	-	-	-
	5	5	8	-	2	2	288	-	53	-
	3	6	9	-	-	1	805	-	-	-
	7	3	22	-	-	3	565	-	86	-
Keiskammahoek	1	2	1	-	1	2	58	28	5	1
	2	5	4	1	-	-	115	3	-	-
	2	-	5	1	-	2	143	-	-	-
	1	-	2	2	-	1	183	-	-	-

1) According to the 1968 Census.

Native areas of Southern Rhodesia in 1948, cows were 29.4 per cent; heifers 15 per cent, oxen 37 per cent, bulls 3.3 per cent and calves 15.3 per cent (Robinson, 1957). With the exception of the higher percentage of calves under one year of age, the other figures mentioned for Rhodesia are similar to those occurring in the Bantu areas of the Ciskei. The Botswana cattle population consisted of three per cent bulls, nearly 37 per cent cows and 18 per cent heifers, 25.4 per cent oxen and 16.6 per cent calves in 1967 (Bonsma & Van Marle, 1967). The reason for the higher number of oxen in the Ciskei compared with Botswana, appears to be due to the difference in the arable areas worked.

Cows, expressed as a percentage of total females excluding calves, average 64 per cent, while oxen are nearly 80 per cent, indicating that for every 100 heifers and cows there are 80 oxen, or 1.25 females for every Ciskeian ox.

In the irrigation areas, Keiskammahoek, Shiloh and Jan Tshatshu, with a total population of 1,057 cattle, there are 40 per cent cows, 18 per cent heifers, 28 per cent oxen, 0.95 per cent bulls, and nearly 13 per cent calves. The bulls referred to are Bantu-owned and do not include the Trust bulls. The main difference between the dryland and irrigation areas, is that there are approximately 10 per cent more cows and 10 per cent less oxen in the irrigation areas, as well as fewer bulls and more calves. As previously mentioned, one of the general requirements of the irrigation areas is that female stock should be kept, and this no doubt, influences the numbers and proportions kept. Oxen, expressed as a percentage of females, are nearly 49 per cent, or for every ox there are 2.04 females.

2.9.6 Breeds:

Of the 205,232 head of cattle, aged approximately one year and over, recorded in the Ciskei in 1967, a high percentage are of the nondescript type, commonly referred to as "Native Cattle". The locations lying on the peripheries of the districts adjacent to White areas, fall under the influence of the local European farmers to a marked extent, the effect being less pronounced further away from these White areas. The policy of the former Department of Native Affairs up to 1948-1949 was clearly defined, and the local Departmental officials applied their own preferences in the choice of a breed or breeds. After 1949, the policy was to favour the dual-purpose breeds, especially the Brown Swiss, in the mixed farming areas, with the Jersey for the irrigation areas and the Afrikaner for the ranching areas. In some districts, if not all, due to Departmental policy or local choice, the Shorthorn breed has been succeeded by the Afrikaner, Ayrshire and Jersey breeds and, latterly, the Brown Swiss, and a certain amount of confusion and suspicion has been created in the Bantu mind. With the exception of two small, relatively isolated areas, Heckel Trust

Farm, Stutterheim, and Lesseyton Location near Queenstown, with South Devons, the policy of the Department of Bantu Administration and Development, is to introduce Brown Swiss sires throughout the Ciskei in order to obtain a homogeneous cattle population. The reasons behind the choice are based on the fact that it is a dual-purpose breed with proven adaptability to a fairly wide range of South African conditions, is highly prepotent, and is of good size, but possibly more to the point is the fact that fairly good to good sires are available in sufficiently large numbers at reasonable prices, which apparently, is not the case with other dual-purpose breeds. The Bantu stockowner has many objections to the Brown Swiss and these are primarily due to conservatism, tradition, and possibly to loss of confidence in the Department's ability to pick yet another breed. The general advocation of the Jersey in some Bantu areas, as far as can be ascertained, was not a success, while the Afrikaner was looked upon by the Bantu as being "the" breed. The fact that it is hardy and a good draught animal and red in colour, seems to have made an indelible impression on the Bantu mind. Today, the preference for red cattle is still in the forefront of Bantu thinking when cattle are considered, and this is the position even amongst the better educated people, agriculturalists included.

The arguments raised against the Brown Swiss are that it is brown in colour, not red, (a myth apparently exists in Xhosa folk-lore that brown coloured cattle were or are owned by the "water spirits"); it does not bellow when slaughtered; it is lazy when ploughing; the calves are susceptible to diseases, sore eyes and other complaints; dystokia is more frequent, and it is hinted at that the meat is of a darker colour than normal. While many of these points raised are, no doubt, true, Brown Swiss offspring command good prices, while the bulls when old, are still sold readily at reasonable prices and there are indications that it is slowly being accepted. This acceptance is made easier by the subsidy available when purchasing Brown Swiss bulls, which reduces the price to the cattle-owner. The purchase price, plus a five per cent handling charge, has a subsidy of R25.00 deducted. Improved sires are purchased communally, the money being raised by the stockowners in each location or sub-location, and all other sires are castrated. Improved bulls have been introduced into the various planned locations, and the total number sold in Bantu areas of the Ciskei is indicated in Table 25.

The F 1 to F 3 generations are a decided improvement on their maternal parent stock, from the conformational view point, when using Brown Swiss bulls, but the degree of functional hardiness in the graded-up animals, must decrease as relative purity is reached. The recent drought will certainly give a reliable indication of how hardy the grades are.

TABLE 25: IMPROVED BULLS SOLD TO BANTU 1958 TO 1967 [1]

Year	Jersey	South Devon	Ayrshire	Brown Swiss	Total
1958	-	-	-	-	28
1959	-	-	-	-	47
1960	-	-	-	-	9
1961	-	-	-	-	96 [2]
1962	-	-	-	-	26
1963	-	-	-	-	25
1964	4	2	6	133	145
1965	-	3	-	95	98
1966	-	6	-	112	118
1967	-	4	-	108	112
Total	4	15	6	448	704

1) Extracted from Annual Agricultural Reports.
1958 to 1963 - mostly Brown Swiss sold.
2) 14 Were also on loan to Bantu co-operative breeding schemes.

In 1967, two co-operative breeding schemes were in operation. Once these co-operatives begin producing sires of approved quality, then these can be sold to Bantu farmers on a subsidy basis. Only one of these breeding schemes concerned the breeding of bulls, and this operated on a Trust Farm in the Victoria East District. This latter scheme had 26 Brown Swiss type breeding cows and heifers which were Bantu-owned and the best available amongst the interested farmers. This scheme is Bantu financed and operated and is under the direction of the local agricultural officials.

2.9.7 Breeding Data:

It was not possible to obtain actual information on oestrus cycles, calving percentages, mortality, but an attempt has been made to give an indication of the position in the various districts. This data is based on information supplied by the District Agricultural Officials.

In the majority of cases, there is close agreement. The age at which a heifer first comes into oestrus appears to range from 15 to 27 months based on the age at first calving of between two to three years. An observation made in the Whittlesea District, is that oestrum occurs mainly in spring due possibly to better nutrition and warmer conditions prevailing. While calving occurs throughout the year, there is a tendency for a winter-period calving peak. Calving intervals vary from 15 to 24 months during a breeding life of five and a half years to nine years. The number of bulls used per 100 cows, varies from two to three on the average, and they most usually run with the cows throughout the year in the unimproved areas. In the Herschel District in particular, along with other Betterment Areas, the bulls run with the females from September until the end

TABLE 26: ESTIMATED CATTLE BREEDING DATA, CASTRATION AGES AND METHODS AND MORTALITY IN SOME BANTU DISTRICTS [1)]

District	Age at first calving	Calving frequency - months	Bulls per 100 Females	Calving %	Breeding life of cows - years	Longevity of cows - years	Weaning Age - Months	No. of calves in life-time	Castration		Mortality %	
									Age - Months	Method commonly used	Under Six Months	Six Months & Over
Herschel	2½	20 - 24	2½	20 - 25	9	12	9 - 12	5	12 - 18	Burdizzo & Knife	15	5
Glen Grey	2½	24	-	30 [2)]	5½	8	8	4	3 - 30	Knife	20	3 - 4
Whittlesea	2½ - 3	20 - 24	2	-	6	7 - 8	9	4 - 5	5 - 6	Burdizzo & Knife	6 - 7	
Victoria East	2 - 2½	20	2	30	6	8	10 - 12	4 - 5	± 4	Burdizzo	20	4 - 5
Middledrift	3 - 3½	18	2½ - 3	-	-	10 - 12	9	4 - 5	6 - 18	-	30	10
Keiskammahoek	-	-	-	-	-	-	8 - 9	-	-	Knife	-	-
Stutterheim	2½ - 3	-	-	60 [3)]	-	8 - 10	9 - 10	5	-	-	15	3
King W. Town	3 +	18	Low	Up to 40	5	8	9 - 10	4	Up to 12	Burdizzo	-	-
Peddie	-	-	2½	50 - 60	-	-	9 - 10	-	Any Age	-	-	-
East London	2½ - 3	15	-	-	6½	10	10	6	3 - 9	Burdizzo & Knife	20	5

1) Based on information supplied by District Agricultural Officers.

2) Up to 70% in rehabilitated areas.

3) Up to 95% on Heckel Trust Farm (39 cows).

of April only, when they are removed and fed separately during the winter months.

Calving percentages vary considerably depending largely on the nutritional level, prior to, and at the time of conception and throughout the gestation period. The apparent number of calves born to 100 cows lies between 20 to 60 with an average of about 30 to 35. Under improved veld conditions, such as exist at Stutterheim especially on the Heckel Trust Farm, which is directly under European supervision, the calving percentage can be as high as 60 to 95 per cent. The age at which young bulls are castrated also varies widely from three to 30 months, and it is estimated that approximately 75 per cent are castrated by means of the burdizzo, a charge being made of 10 cents per animal when carried out by the Agricultural Extension Advisers. The late castrated bulls are, in the meantime, used to cover the cows and a certain degree of inbreeding results, which is offset to some extent, by the continuous introduction of breeding females into the locations to replace those that die or are sold. Bulls commence serving between the ages of 15 to 18 months, under conditions existing in the locations. Hamburger & Waugh (1968) point out that tribes in the Caprivi Strip, also leave the young bulls intact until the cows and heifers have been served.

Using the 1968 stock count figures, which were obtained by the District Agricultural Officers and their staff during late 1967 to March, 1968, the apparent calving percentages vary between 29 to 62 per cent, with East London 62 per cent, Victoria East and Stutterheim 49 to 53 per cent, and the other districts being below 40 per cent. An overall average calving percentage of approximately 34 per cent exists for the locations mentioned previously. As no record is available of the number of calves born alive and subsequently dying prior to the annual census, the word "apparent" is used to denote this lack of information. Robinson (1957) reports that in Southern Rhodesian Native areas, calving percentages varied from 36 to 67 in the various provinces, and averaged 50 to 55 per cent.

Culling of cattle is carried out by the farmers under pressure from the Agricultural Officials. Culling is based mainly on age and not on performance with the exception that a cow which has not reproduced for some years, is culled. In the King William's Town District for example, culling is today done on fixed numbers, in that, if there are less than five mature livestock units, no culling need take place. However, the number varies according to the size of the holding, whether economic or sub-economic.

2.9.8 Nutrition and Management of Cattle:

Nutrition: Veld grazing, together with bush-browse in some districts, forms nearly 99 per cent of the diet of cattle. Crop residues such as maize and sorghum stover, are grazed during autumn and early winter, and green pea-plants

are either grazed or fed as a form of hay as late as December. Practically all maize is stooked in the Glen Grey and Whittlesea Districts, and is mostly the position in other areas. Wheat straw is also fed when available, although this is seldom stacked for future use. The writer has observed the feeding of wheat straw in crudely made hayracks in the Swartwater area of Glen Grey, considered one of the prosperous areas, during the winter of 1968. This straw was apparently purchased from the European farmers in the neighbourhood. While green oats are utilised for grazing in a few areas, as for example, in the Whittlesea District in 1967, very little, if any, is fed to cattle, being fed mainly to sheep.

In the irrigation areas, with the exception of Middledrift, very little of the lucerne produced is fed to livestock as it is sold co-operatively. Some 696 tons of lucerne hay were produced in the Keiskammahoek and Whittlesea areas and practically all of this was sold during 1967 and 1968, only approximately 46 tons or 6.6 per cent, being used for animal feeding in the Middledrift District. Jan Tshatshu is one of the exceptions to the above in that the product of irrigation, kikuyu grass, is grown solely for the grazing of lactating cows and heifers. It is a peculiar characteristic of the average Xhosa farmer that his oxen mean more to him than his cows, and the former are given preferential nutritional treatment.

Concentrates are rarely fed to cattle and only two cases were noted by the writer, where dairy meal was fed on a restricted basis, to milk cows in the Glen Grey and Stutterheim Districts. The two largest milling concerns in East London could only confirm that the direct sales to Bantu were in the order of 0.02 per cent of the total sales, amounting to approximately five to six bags of poultry meal and horse-cubes per month, but not dairy meal. What amount the traders supply to Bantu livestock owners is not certain, but judging from the mill sales to traders, estimated at about 10 per cent of output or approximately 300 bags per month to all Ciskei traders, the actual quantity of dairy meal purchased by Bantu farmers each month, can amount to only a small number of bags.

Management: Cattle management is at a low level generally in spite of the fact that the Xhosa can claim to having a long association with animals and pastoralism. Being confined to a given area and not being able to move his stock as in former centuries, the problems brought about by such confinement, have not been overcome by the Bantu, with the result that today, they are paying for all the mismanagement of former years. Management is simple and reflects the traditional approach in that in the majority of areas, including some of the rehabilitated locations, cattle are kraaled at night, what calves there are being separated from their dams until the following morning, when milking occurs. Livestock are allowed out to graze usually between 8 to 9 a.m. and sometimes later, the calves, up to about three months of age being separately grazed near

the kraal sites. The cattle return in the late afternoon between four to six, the time largely depending on the season of the year, and the cows with calves under three months of age, are once more milked. Thus cattle have a grazing-day consisting of approximately eight hours, and during this time need to satisfy their appetites from mostly overgrazed and sparse, short veld. When the fencing programmes have been completed in the rehabilitated areas, cattle remain out during the nights, but this is by no means universal or accepted as being advantageous in terms of cattle welfare. It is estimated that perhaps 60 per cent of the adult cattle population graze out at nights, and near the big towns, with thieving increasing in incidence, there is a tendency to kraal at nights to overcome this potential danger. Livestock are taken to and fro to the grazing areas mainly by the "kwedini" or young Xhosa boys, who, in the unfenced areas or where crops are growing in the vicinity, are required to be in attendance during the day. In the Herschel District in the mountainous regions, "gcamise" or herd-boy kraals are built in the mountains for the use of the herd-boys and their charges while the latter graze in that area. Cattle-kraals (ubuhlanti) are constructed of thorn thickets packed together to form an effective barrier fence, and are situated on sloping land, near the owner's hut site. Some kraals are constructed of timber offcuts or poles planted in the ground, especially where there is a timber mill in the area. One kraal is for cattle and another for small stock including calves and, where goats are milked, such as at Tyefu's Location, Peddie District, it is usual to find a third, but smaller, enclosure to hold the kids overnight.

In the overgrazed and more sandy areas, especially where earthworm casts and termite nests abound, excessive teeth wear occurs, such as is found in Whittlesea, some parts of Glen Grey, and the high lying areas of Victoria East, and is a factor to be taken into account when stock are to be culled.

Calf Feeding and Milking Procedure:

The calf is entirely dependent upon milk in its initial growth phase, prior to its being able to utilise veld grazing. The amount of milk each calf receives, varies daily being primarily dependent on the dam's milk yield and on the whims of the milker. The general practice is for the Xhosa youths, and the men on occasion, to milk the cows. Milking takes place between six to 10 a.m. daily for all cows, and again in the late afternoon, when only the recently calved cows are milked. Twice a day milking is dependent on the grazing available, and where this is in short supply, only one milking per day is undertaken and that in the morning. One quarter is most commonly reserved for the calf, but there is no infallible rule in this connection. Should the "kwedini" be hungry, bearing in mind the social standing of these boys prior to circumcision, it is by

no means out of the question that some of the calf's milk will not be diverted. Generally, the calf is said to be fairly treated up to three months of age, although the 1966 Annual Agricultural Report makes specific mention of the high number of calf deaths due to overmilking of the mothers. During the course of the survey, it was noted that calves of all ages, were inclined to be stunted and it can thus be assumed that malnutrition is one of the main reasons why heifers become sexually mature at a comparatively late age. During periods of severe drought, the nutritional stress on both dam and calf becomes such that a large number succumb, as has been the case in 1968, although, as previously mentioned, the tendency is being reduced as rehabilitatory practices become more widely applied.

Milk-flow is stimulated by allowing the calf to suckle initially, after which it is made to keep its distance, and milking commences using the "stripping" method. In the majority of cases, it is necessary to tie the cow's legs together with a riem or thong. Milk-froth is used as a lubricant during the milking process, and hygiene varies from good to poor, although in the districts where dairy schemes are in operation, the standard of hygiene can be termed "reasonable", an awareness having been created through the sale of cream. The average farmer finds it difficult to grasp the significance of the presence of the unseen micro-organisms or pathogens.

At the completion of milking of the three quarters, the calf is allowed to suckle the remaining, generally unmilked, quarter. The larger calves usually have access to the dams during the day while out on the veld, but this too, is dependent on the individual farmer and on the amount of milk available from other cows.

Cattle Rearing: No special provision is made for the rearing of young stock, the calves going out to "graze" from the time they are sufficiently strong enough to walk. Weaning normally ensues when the dams dry-off, and the length of the lactation periods are determined chiefly by the prevailing nutritional conditions, being as much as 12 months for exceptional cows in a good rainfall year, and as little as four months and even less, in a drought year. The average natural weaning age lies between eight to 10 months.

The Xhosa farmer follows a system closely resembling that of dairy-ranching, and makes no provision, with few exceptions, for the feeding of young stock, which are dependent, like the adult stock, on veld grazing and crop residues. In the case of heifers, when they display signs of oestrus, coitus occurs, and in those locations where late castration takes place, a certain degree of in-breeding results.

Dipping: This occurs weekly in summer and every two weeks in winter in the East London District; at two-weekly (summer) and four-weekly

(winter) intervals in the Middledrift, Keiskammahoek and Victoria East Districts; once every two weeks throughout the year in Peddie District; once every two weeks in summer only in Stutterheim District, while the remaining districts of King William's Town, Herschel and Glen Grey are non-compulsory dipping areas, where little, if any, dipping ensues. The tick activity in each district can be gauged from the lack of dipping or the dipping frequency employed. However, it is a well known fact that long grass harbours more ticks with a resultant possible increase in tick-borne diseases in some areas, and once grazing management schemes are universally in operation, the dipping frequency might well have to be increased in some of these districts.

Regional Authorities have taken over the operation and maintenance of dip tanks in most areas, and each cattle owner is required to pay a dip-levy direct to the local Authority. While this is the position in the King William's Town District, very few cattle owners dip their cattle regularly with the result that the tick-borne diseases assumed serious proportions in 1966, according to the Agricultural Officer. Hand-dressing is seldom carried out at any of the 159 cattle dips situated throughout the Ciskei.

Internal Parasites: While internal parasites certainly do exist, especially in the high rainfall areas or during peak seasonal periods, no dosing is undertaken in the case of adult stock. In calves, tapeworm and roundworms would appear to be frequent in the wetter zones but little or no dosing is practised, with the exception of a few Trust Farms directly under White supervision. Under these high rainfall conditions, especially where long grass occurs, cattle would do much better than small stock due to the somewhat better tolerance of cattle to parasites than sheep, and to their ability to make better use of long grass. Due to overgrazing and droughts, only short grass is apparent and hence the internal parasite build-up in the grazing and stock is not as serious as could be the position under normal conditions.

2.9.9 Prevalent Cattle Diseases, Prevention and Treatment, and Cattle Mortality:

While diseases are fairly numerous, available statistics are difficult to obtain, and it is to be regretted that complete lack of co-operation with the Veterinary Department in this respect, has to be acknowledged.

White Scours, usually caused by Bacillus coli, in calves and older animals, together with an annual incidence of Red Water (Piroplasmosis), Gallsickness (Anaplasmosis), Botulism or Lamsiekte, and Heartwater (Rickettsioses) occur in the East London District. The incidence, regularity and total annual losses from each disease, have not been recorded. The tick-borne diseases occur every summer in the coastal belt area of the Ciskei. Quarter-evil outbreaks,

caused by Clostridium chauvoei, are found in non-vaccinated stock, but these are few in number today as most of the young animals are vaccinated annually in the East London District. Heartwater, Redwater, Gallsickness and Quarter-evil occur in cattle in practically all areas with the exception of Herschel and Glen Grey Districts where Heartwater is not prevalent. The incidence of Contagious Abortion (Brucellosis) has not been determined accurately but it occurs to a limited degree in the Herschel District, and judging from apparent calving percentages, to a greater degree in other regions. A Senior Agricultural Official estimates the incidence to be of the order of 10 to 15 per cent.

Calf-paratyphoid (Salmonella infection) occurs in some districts but to an undetermined degree.

Apart from the annual Anthrax inoculation, which is compulsory at present, Quarter-evil vaccine is used by small numbers of stockowners in each district. In the Whittlesea District it has become accepted practice in four locations and is in the process of being adopted in other contiguous locations. Approximately five per cent of the Bantu farmers immunise their stock annually in the Peddie and King William's Town Districts.

Milk-fever (Hypocalcaemia) has been observed in a cow in the Victoria East District, while mastitis (Mammitis) possibly does occur in most districts but is not generally recognised as such, based on the Agricultural Officer's observations in the Herschel District, where it occurs in about one per cent of all milking cows.

Treatment of the above diseases is seldom carried out, and where an attempt is made to combat a disease or complaint, the treatment is invariably applied too late to be effective. To what extent the traditional tribal remedies are still in use, has not been determined.

Mortality: The number of stock, over the age of six months, dying from all causes in a "normal" year in the Ciskei, lies between five and six per cent. During drought years, this figure can rise to as high as 50 per cent in unplanned locations (1965 Annual Agricultural Report). During the 1965 drought, over 31 per cent of the cattle on the Goshen Trust Farm, Cathcart, died. It is difficult to obtain accurate figures in these districts as, apart from the problems of enumeration, cattle which die are consumed by the local Bantu communities usually regardless of the cause of death. The 1968 drought, up to November, has accounted for an estimated 25 to 35 per cent decimation of the Glen Grey cattle population, which means that over 13, 000 head of cattle have died in this one district. Other districts will not fare so badly, but the overall cattle depopulation of the Ciskei will quite likely exceed 20, 000 head. Judging from reports from local traders, hides and skins are coming in at an unprecedented

daily rate, this figure might not be far from the final estimate. This figure of 20,000 represents approximately one per cent of the total number slaughtered in South Africa during the year 1965-1966.

According to the findings of the Commission (1955), 28 per cent of cattle deaths in the Bantu areas of South Africa, were due to diseases, 56 per cent to poverty and 16 per cent to other causes between the years 1946 to 1952. In 1958-1959, European farmers lost 7.3 per cent of their livestock compared with Bantu-owned stock, 12.1 per cent (Bisschop & Groenewald, 1963). Robinson (1957) mentions the average deaths for Rhodesian Bantu-owned stock as being 2.5 per cent in 1956.

2.9.10 Growth and Meat Production:

No recorded statistics are available, but from visual observations, Bantu cattle are slow growing compared with the European cattle in bordering areas. There are many reasons for this, but primarily the difference is due to faulty and inadequate nutrition and poor inheritance. The crossbred progeny from Brown Swiss bulls, show better conformation and size, but these have suffered during the droughts of recent years and show signs of being stunted in some districts. Apart from the poor nutrition, inbreeding and the, hitherto, indiscriminate use of inferior sires, the best being castrated for draught purposes in the past, the level of management is poor and is coupled with restriction at nights in kraals, limited dosing practices, possible mineral deficiencies, lack of dipping, and, of course, diseases. Periodic droughts aggravate the situation and growth can be fairly seriously affected, with the result that mature size and weights (720 to 920 pounds) are seldom attained much before four years of age. Table 27 is reasonably representative of liveweights for Bantu cattle in the Victoria East District in particular and the Ciskei in general. Sixty cows averaged 729 pounds liveweight, while 60 oxen averaged 921 pounds, all weights being obtained by using a "Weighband".

These 120 cattle not only had representatives of the "Native type", but Afrikaner, Ayrshire, Jersey and Brown Swiss types, inter alia, were discernible, and all were generally in good condition. Twelve Brown Swiss crossbred oxen averaged approximately 1,040 pounds each, and where nutritional conditions are adequate, weights in the region of 1,700 pounds can be achieved. The two oxen with the highest weights, were grazed in a special grazing camp on the Trust Farm.

Beef production is purely incidental, that is, no calves are specifically raised with a view to disposing of them as beef animals. They might well be used in the plough and later sold as beef animals. Such animals are usually sold more because of absolute necessity due to official pressure or want, than to the

TABLE 27: LIVEWEIGHT CLASSES FOR BANTU-OWNED MATURE COWS AND OXEN IN THE VICTORIA EAST DISTRICT - DECEMBER, 1968

Liveweight class - lbs.	Cows number in class	% of Total cows	Liveweight class - lbs.	Oxen number in class	% of Total cows
Under 600	4	6.67	Under 600	1	1.67
600-699	23	38.33	600-699	9 1)	15.00
700-799	19 1)	31.67	700-799	10 1)	16.67
800 and over	14 1)	23.33	800-899	12 3)	20.00
			900-999	8 2)	13.33
			1000-1099	8	13.33
			1100 and over	12 5)	20.00
	60 2)	100.00		60 12)	100.00
Mean Wt : lbs. 729			921		

1) To 12) = Number of Brown Swiss Crossbreds in Class.

following of a logical farming system.

In recent years, there has been a decided improvement in the condition of the best animals offered for sale at local auctions (Schulze, 1968) and this is due, in some parts, to the foresight of Agricultural Officials who have been fortunate enough to be in a position to make grazing available prior to the date of local stock sales. Otherwise the condition of the stock to be sold varies from poor to fairly good in dry periods, and fair to good in normal years.

The annual number of Bantu-owned cattle sent direct to the East London abattoir by speculators or Bantu farmers, has shown a marked increase during the past decade. The number of bovines originating from Bantu farmers, increased from 85 in 1958, to 1,160 in 1967 which represents a 1,264 per cent increase. While it is difficult to identify all bovines originating from Bantu farmers, due to speculators including parcels of European reared stock with those of Bantu origin, there is a definite trend as indicated in Table 30.

Carcass weights on a cold, dressed basis, at the East London abattoir, for Bantu origin cattle, average in the vicinity of 380 pounds while individual carcass weights varying from 260 to 510 pounds according to abattoir statistics. Assuming a dressing percentage of about 50 per cent, this would represent liveweights of 520 to 1,020 pounds.

Of 451 head of cattle positively identified as originating from Bantu farmers and slaughtered at the East London abattoir in 1967, the grades allocated were distributed on a percentage basis as follows:

Prime A and B	approximately	0.7 per cent
Grade I	"	2 per cent

Grade II	approximately	7 per cent
Grade III	"	23 per cent
Grade IV	"	67 per cent

The above figures were extracted from daily records kept at the East London Meat Control Board's offices. Nearly 90 per cent of all Bantu cattle are graded as thirds or fourths, and, with a few exceptions, those graded prime, grade I or grade II, are those which originate from Bantu stockowners on European-owned farms. Of all cattle slaughtered at the East London abattoir in 1967, only about 48 per cent were graded as thirds and fourths, while nearly 37 per cent were graded as firsts or seconds, with about 15 per cent super or prime.

It is of interest to note that a R1.00 bonus is awarded to owners of dehorned cattle arriving at the abattoir, and Bantu-origin stock very seldom qualify, as polled cattle, naturally polled or mechanically dehorned, are the exception.

It appears to be common practice for one person in a location or area, to slaughter an animal and to cut up the carcass and sell the meat to all and sundry, and this apparently, operates on a rota basis at approximately monthly intervals in normal years.

Animals which die are invariably consumed by the local population, and human deaths have been recorded as a result of eating disease-infected meat. A case of a family eating Anthrax-infected meat after a dose of a strong solution of Potassium Permanganate, had been administered to each member of the family, occurred in the Peddie District about two years ago (Schulze, 1968).

Stock Sales, Local Butcheries and Private Slaughterings: In 1958, according to the Annual Agricultural Report, livestock were sold on seven sales, three of which were European sales, and 1,028 largestock units or cattle were sold at an average price of R35.78 each. These include a parcel of 20 cattle railed direct to the East London abattoir from the Middledrift District, which averaged R57.59 each. In 1965, 3,052 cattle were sold at an average price of R45.22 each; in 1966, 3,457 cattle averaged R49.82 each, being sold on 33 Trust sales and, in some districts, on monthly European stock sales. In districts where Trust auctions are held, speculators may not trade directly with the Bantu livestock owners, although the possibility exists of such illegal trade.

As can be seen from Table 28, the tempo of cattle sales is increasing, in that the number of cattle sold on local auctions has increased by over 500 per cent from 1958 to 1967, with over an 88 per cent increase from 1966 to 1967 alone. In order to encourage the sale of livestock, especially cattle, the agricultural officer needs to have the confidence of the local Bantu farmers, but

TABLE 28: NUMBER OF CATTLE SOLD AND AVERAGE PRICES REALISED IN THE YEARS 1958 AND 1965 TO 1967 [1)]

District	1958			1965			1966			1967		
	Number Sold	% of Total	Av. Price R. c.	Number Sold	% of Total	Av. Price R. c.	Number Sold	% of Total	Av. Price R. c.	Number Sold	% of Total	Av. Price R. c.
Herschel	263	25.6	36.23	612	20.1	48.54	649	18.8	51.38	1,126	17.3	63.11
Glen Grey	102	9.9	44.13	853	28.0	43.86	555	16.1	53.42	778	11.9	64.98
Whittlesea	242	23.5	44.25	926	30.3	48.34	1,367	39.5	50.15	1,280	19.6	63.23
Cathcart	5	-	-	-	-	-	26	0.8	22.00	24	0.4	47.54
Fort Beaufort	100	9.7	-	-	-	-	-	-	-	-	-	-
Victoria East	-	-	-	-	-	-	-	-	-	85	1.3	92.41
Middledrift	20	2.0	57.59	180	5.9	37.21	154	4.5	41.39	589	9.0	64.01
Keiskammahoek	-	-	-	-	-	-	-	-	-	517	7.9	58.68
Stutterheim	217	21.1	16.25	60	2.0	12.00	96	2.8	18.75	53	0.8	35.73
King W. Town	84	8.2	37.94	-	-	-	62	1.8	40.02	56	0.9	48.98
Peddie	-	-	-	167	5.5	54.87	267	7.7	59.39	1,615	24.8	69.38
East London	-	-	-	254	8.3	37.62	281	8.1	48.34	397	6.1	68.73
Total	1,028	-	35.78	3,052	-	45.22	3,457	-	49.82	6,520	-	64.96

1) Extracted from Annual Agricultural Reports.

once sales are held in a district, and providing prices are good, there is a tendency for stock numbers to increase at each succeeding stocksale. As is the case between 1958 to 1967, average prices paid per head of cattle, have risen from nearly R36 to R65, and this alone would provide the necessary incentive to bolster-up the local auctions. While districts vary in the number of cattle sold each year, some districts, Herschel, Glen Grey and Whittlesea, have consistently sold the largest percentages on auctions over the past few years.

The total number of cattle sold or slaughtered during the years 1958 and 1965 to 1967, and the number of butcheries operating in the Bantu areas, are shown in Table 29.

While the total numbers of cattle sold or slaughtered, remain within narrow limits, local auction sales are attracting more sellers annually. Private slaughterings of cattle accounted for between 23 to 54 per cent of the total number slaughtered between 1965 and 1967, while the number sold to local butchers varied from 20 to 26 per cent.

The number of Bantu-owned butcheries is on the increase, being 15 or 43 per cent of the total in 1958, and 25 or 53 per cent of the total in 1967, representing an increase of 67 per cent over a period of nine years.

With reference to the annual slaughter rate, which, in the case of the Ciskei, is taken to include the cattle sold for slaughter purposes, this varies between 6.29 to 7.52 per cent of the total cattle population over the years 1958 and 1965 to 1967. The South African equivalent was approximately nine per cent in 1952 - 1956 compared with that of Australia, 20.4 per cent and the United States, 40 per cent (Harwin, 1956). Average annual sales and home slaughter of cattle by Rhodesian Bantu amounted to 6.2 per cent and 4.4 per cent respectively of the total Bantu cattle population prior to 1957 (Robinson, 1957).

Hamburger & Waugh (1968) believe that an improvement in animal production is based upon improved and regular marketing schemes, and that, as the selling of Bantu stock or produce progressed, the question of how higher prices could be realised, would be raised in the minds of the particular community selling such commodities. They point out that such improved schemes need the support of "properly trained Bantu extension officers".

2.9.11 The Incidence of Cysticercosis in Bantu Cattle:

The survey included the East London abattoirs as mentioned, where the numbers of stock originating from Bantu farmers and slaughtered during a period of 10 years, were extracted from the daily slaughter sheets at the abattoir. As mentioned earlier, there is a definite problem in identifying the ownership of stock slaughtered, and the data presented in Table 30, will be near to the actual position to form a basis of assessment.

TABLE 29: TOTAL NUMBER OF CISKEIAN CATTLE SOLD OR SLAUGHTERED DURING THE YEARS 1958 AND 1965 TO 1967, AND THE NUMBER OF BANTU-OWNED BUTCHERIES

	1958		1965		1966		1967	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Sold Direct to Controlled Markets	No record	-	107	0.7	317	2.2	439	3.4
Sold to Local Butchers	2,356	-	3,744	26.2	2,799	19.5	3,010	23.3
Sold at Local Auctions	1,028	-	3,052	21.4	3,457	24.0	6,520	50.5
Number Slaughtered Privately	14,890	-	7,388	51.7	7,798	54.3	2,947	22.8
TOTAL (Slaughtered or Sold)	16,897		14,291		14,371		12,916	
Number of Bantu-owned Butcheries	15		22		25		21	
Total Number of Butcheries	35		43		47		42	
Cattle Slaughtered or Sold as a % of Total Cattle Population	7.52		6.80		7.27		6.29	

TABLE 30: MEASLY MEAT (CYSTICERCUS BOVIS) INCIDENCE IN TOTAL AND EUROPEAN AND BANTU-OWNED BOVINES SLAUGHTERED AT EAST LONDON ABATTOIR 1958 TO 1967
(PERSONAL SURVEY)

Year	Number of Bovines Slaughtered				Detained Carcasses						Condemned Carcasses							Total Carcass Infestation						Frequency of Incidence - 1 Case in :-			Total Detained or Condemned Bovines of Bantu-Origin - all Causes	Cysticercus bovis as % of all Causes
					Total		European Origin		Bantu Origin		Total		European Origin		Bantu Origin			Total		European Origin		Bantu Origin						
	Total	European Origin	Bantu Origin	Bantu as % of Total	Number	% of Total Number Slaughtered	Number	% of Total European Slaughtered	Number	% of Total Bantu Slaughtered	Bantu as % of Total Number Detained	Number	% of Total Number Slaughtered	Number	% of Total European Slaughtered	Number	% of Total Bantu Slaughtered	Bantu as % of Total Number Condemned	Number	% of Total Number Slaughtered	Number	% of Total European Slaughtered	Number	% of Total Bantu Slaughtered	Total Cattle	European Origin	Bantu Origin		
1958	16,016	15,931	85	0.53	1,047	6.5	1,040	6.53	7	8.24	0.67	117	0.73	116	0.73	1	1.18	0.85	1,164	7.27	1,156	7.26	8	9.42	13.76	13.76	10.63	8	100.00
1959	17,179	16,990	189	1.10	1,304	7.6	1,287	7.58	17	8.99	1.30	133	0.77	126	0.74	7	3.70	5.26	1,437	8.36	1,413	8.32	24	12.69	11.95	12.02	7.88	26	92.31
1960	16,515	16,267	248	1.50	1,008	6.1	988	6.07	20	8.06	1.98	91	0.55	86	0.53	5	2.02	5.49	1,099	6.65	1,074	6.60	25	10.08	15.03	15.15	9.92	28	89.29
1961	17,456	17,172	284	1.63	834	4.8	818	4.76	16	5.63	1.92	109	0.62	106	0.62	3	1.06	2.75	943	5.40	924	5.38	19	6.69	18.51	18.58	14.95	22	86.36
1962	17,388	16,994	394	2.32	842	4.8	814	4.79	28	7.11	3.33	89	0.51	86	0.51	3	0.76	3.37	931	5.35	900	5.30	31	7.87	18.68	18.88	12.71	37	83.78
1963	18,517	18,303	214	1.17	735	4.0	718	3.92	17	7.94	2.31	94	0.51	93	0.51	1	0.47	1.06	829	4.48	811	4.43	18	8.41	22.34	22.57	11.88	20	90.00
1964	19,370	18,792	578	2.98	609	3.1	580	3.09	29	5.02	4.76	80	0.41	74	0.39	6	1.04	7.50	689	3.55	654	3.48	35	6.06	28.11	28.73	16.51	57	61.40
1965	20,641	19,429	1,212	5.87	465	2.3	419	2.16	46	3.80	9.89	164	0.79	120	0.62	44	3.63	26.83	629	3.05	539	2.77	90	7.43	32.82	36.05	13.47	134	67.16
1966	23,806	23,085	721	3.03	535	2.3	498	2.16	37	5.13	6.92	298	1.25	288	1.25	10	1.39	3.36	833	3.50	786	3.41	47	6.52	28.58	29.37	15.34	77	61.04
1967	21,359	20,199	1,160	5.43	651	3.1	576	2.85	75	6.47	11.52	103	0.48	92	0.46	11	0.95	10.68	754	3.53	668	3.31	86	7.41	28.33	30.24	13.49	102	84.31
Total	188,247	183,162	5,085	2.70	8,030		7,738		292		3.64	1,278		1,187		91			9,308	4.94	8,925	4.87	383	7.53				511	74.95

The overall incidence of bovine measles (Cysticercus bovis) is higher in Bantu stock than in European stock being 7.53 per cent compared with 4.87 per cent as indicated in Table 30. The frequency in 1967, was one case in 30 and one case in 13 for stock originating from Europeans and Bantu respectively, and, while the position is by no means a pleasant one for the cattle-owners and South Africa as a whole, the frequency has actually decreased over the past decade, some years being better than others. Arising out of these figures, is the fact that, for every 100 head of cattle in the Bantu areas, one can expect to find over seven head of cattle infected with measles, and approximately one in every seven would be condemned as being unsafe for human consumption, the remaining six being suitable for use only after extensive freezing of the carcasses. The cost to the country in terms of wasted food, labour and capital, needs to be kept in mind in a search for a satisfactory solution to the problem. Of the total number of bovine carcasses detained or condemned, and of Bantu-origin, 75 per cent are the result of measles.

In a survey carried out in the abattoirs of South Africa, Viljoen (1937) gives the incidence of C. bovis as being 5.69 per cent at the East London abattoir over a period of three years. There is thus a considerable reduction in the incidence of cysticercosis in cattle at this abattoir over the 31 years since this survey was made.

2.9.12 Diseases and other factors resulting in the condemnation of Bovine Carcasses of Bantu origin at the East London Abattoir:

Of the total of 5,085 bovines of Bantu-origin slaughtered at the East London abattoir over the past 10 years, 122 or 2.4 per cent, were condemned as unfit for human consumption for reasons other than cysticercosis. The main causes of rejection were:
Emaciation - 91 or 1.79 per cent; peritonitis or septic peritonitis - 9 or 0.18 per cent; tuberculosis - 7 or 0.14 per cent, and bruising, emphysema, pneumonia, and dropsy inter alia, 15 or 0.30 per cent. Emaciation is the biggest single cause for condemnation, excluding C. bovis, and is due mainly to overstocking coupled with periodic droughts.

2.9.13 Milk Production:

Bantu Agricultural Extension Advisers generally agree that the average daily production of the average Xhosa cow at the height of its lactation, is nearly half a gallon of milk. Cole (1961) mentions figures of one and a half to two pints in June and four and a half pints in December, per cow in the Polela Reserve in Natal.

Depending on the prevailing climatic conditions, the length of the lactation period varies between four to seven months.

Two types of dairy schemes have been introduced, the first developed and maintained by the South African Bantu Trust and the second developed and maintained by a group of farmers. The latter are commonly referred to as "co-operative schemes". Initial policy requirements were that:

1. A minimum of 25 milking cows should be available.
2. Regular dipping should be the rule.
3. Reasonable levels of nutrition and management should be practised by those with "hire-purchase" animals.
4. A sound level of hygiene should be maintained.
5. Any organic matter suitable for the making of compost, should not be burned.
6. In the case of the Trust scheme, five to ten per cent of the gross income should be used for capital repayment and overheads.

As indicated above, good cows can be obtained on a hire-purchase or repayment basis by intending milk suppliers (Proclamations No. 29/1952 and R-5/1963; General Circular : Secretary, Department of Bantu Administration and Development, No. 26/1964).

Co-operative and Trust dairy schemes, operate, or have operated, in all districts with the exception of Fort Beaufort. These schemes are inspired and guided by the agricultural officials of the Department of Bantu Administration and Development in die Ciskei, and the financial side falls directly under the control of the local Bantu Affairs Commissioner. A well-built rondavel, built of bricks or blocks and thatch, with washup troughs made of 44 gallon drums cut in half, are provided by the Department together with a separator and stand, and cream cans. A monthly deduction of five per cent of the gross monthly return is made from all monies received from cream sales and this is used to pay for the separator, cans and all other items, including spares, replacements and repairs, as well as to pay the person, responsible for the wash-up work, a monthly emolument. Whole-milk is brought to the dairy by each milk producer, the milk is weighed, separated and the milk and cream weights recorded in a register. Each person receives his own skim-milk back and this is taken home where it is practically all allowed to go sour to form "amasi" which forms part of the family's diet, when available. Very little whole-milk is used for family consumption purposes except in the case of infants. Some separated sweet-milk is used in tea or coffee by adults in those locations which have a dairy scheme in operation.

The number of dairy schemes operating at any one time in the Ciskei, fluctuate from year to year, and even from month to month. For example, in the East London District, 20 co-operative dairies were in operation in 1964 and

1965, 12 in 1966 and 11 in 1967; Glen Grey had eight in operation in 1964, seven in 1965 and nine in 1967; King William's Town had 12 in operation in 1964, eight in 1965 and one in 1966 and 1967. As pointed out by some Agricultural Officers during the survey, the average Xhosa farmer is inclined to start out on a new scheme in an enthusiastic manner, but soon loses interest, especially if climatic or other conditions go against him for a period. On the other hand, there are milk-producers who keep on supplying the local dairy year in and year out, except when droughts prevail. Figure 14 shows the fluctuations encountered in the milk supply at some dairies in the Ciskei, during all or part of the period 1964 to 1968.

The general practice in "calf feeding" is to allow one quarter per calf at the morning and evening milking, in the case of cows with calves under three months of age. Calves over three months of age are only separated from their mothers at nights, and are allowed to suckle one teat at the morning milking, and all teats during the day until separated in the late afternoon. Hence the actual milk yield of most cows would be over twice as much as indicated, and is based on a study made on Nguni cows in Swaziland (Brown, 1956).

The Jan Tshatshu dairy scheme in the King William's Town area, is one of the most permanent dairies operating being based on kikuyu pastures irrigated by the partially purified effluent from the Good Hope Textile Factory, and on veld grazing. During the severe drought of 1964-1965, this dairy was out of operation for three months, but otherwise has been in operation since its inception. This scheme sells whole-milk to the inhabitants of the Bantu Township of Zwelitsha at a flat rate of 23 cents per gallon, and differs from the other dairy schemes in that it has a large and modern-type milking shed with correspondingly adequate facilities. It is also organised on a communal basis. Milking is undertaken by the "kwedini" at approximately five a.m. and again after three p.m., although it is more a question of milking twice a day to supply the needs of their customers at these two different periods, than to increase yields. The number of cows milked during the course of each month, varied from 41 to 87 over the years 1964 to 1968, and possibly more, but the cow numbers for 1967 were not recorded in the dairy register. The cows per owner, varied from 1.02 to 1.51 and the number of owners fluctuated from 37 to 81 during the years under review. Average yields per cow per day varied from 5.99 pounds up to 9.49 pounds with an overall average of 7.86 pounds, and it is interesting to note that these average daily yields have steadily decreased per cow from 1964 up until 1968, and, whether or not the high sodium content of the irrigation water, which is possibly also drunk by the cattle, has anything to do with the decline is undetermined. A Senior Agricultural Official

is of the opinion that this decrease is due to overstocking and a consequent drop in both the level of nutrition and management over the years.

Fresh, whole-milk is sold by a few stock-owners in some locations, such as in the Whittlesea District, but these are the exception rather than the rule. One representative dairy, operating entirely on a dryland basis, has its through-put indicated on a production per cow per month basis in Figure 14. This dairy is Jaho Dairy in the Glen Grey District. The statistics are extracted from the relevant dairy files for these districts. Jaho Dairy situated in the Macubeni Location, is one of the few dairies which have operated continuously since its inception and the apparent average yield per cow per day over the period December, 1963 to March, 1968, was 3.06 pounds. Since milk is delivered to the dairy and the incoming milk weights recorded as being from a certain number of cows, and no account is taken of any milk spilled, or used for domestic purposes, the word "apparent" is used to take this unknown factor into account. Based on the total milk weighed each month and the butterfat returns from the local creameries, butterfat content of the milk can be calculated, and for Jaho Dairy it averages 2.68 per cent. However, due to the fact that milk is mostly separated when it is cold, the skimming efficiency is possibly on the low side, and the butterfat figures could be higher than indicated. The average price received per gallon of milk on a butterfat basis, was $11\frac{1}{2}$ cents. One of the reasons why this dairy has operated so successfully throughout the years, is due to the reserving of a 100 morgen camp for winter grazing purposes. The monthly rainfall figures are shown in Figure 14 for Lady Frere, to indicate the partial indirect effect of rainfall on production. In other districts, lack of rain either due to normal seasonal influences or to drought, not only curtails milk production, but causes the dairies to close for periods of up to six months, and sometimes, to shut down altogether.

The East London District Section V Dairy and Tugela Dairy (Herschel) both show breaks in continuity of operation, the former for one month and the latter for five months. The apparent average milk production per cow was 2.5 pounds per day with average butterfat 3.48 per cent and 3.2 pounds per day with average butterfat 2.72 per cent respectively. Number of suppliers and the number of cows milked daily during the months indicated, varied from six to 25 suppliers with 14 to 60 cows for Section V Dairy, and eight to 57 suppliers with 10 to 108 cows for Tugela Dairy. It has happened, as in the case of Jaho Dairy in June, 1963, that the separator breaks down and requires extensive repairs, with the result that, in spite of milk being available, no separating can take place, and potential cream is lost to the processing plants and income to the suppliers. Other East London milk schemes virtually came

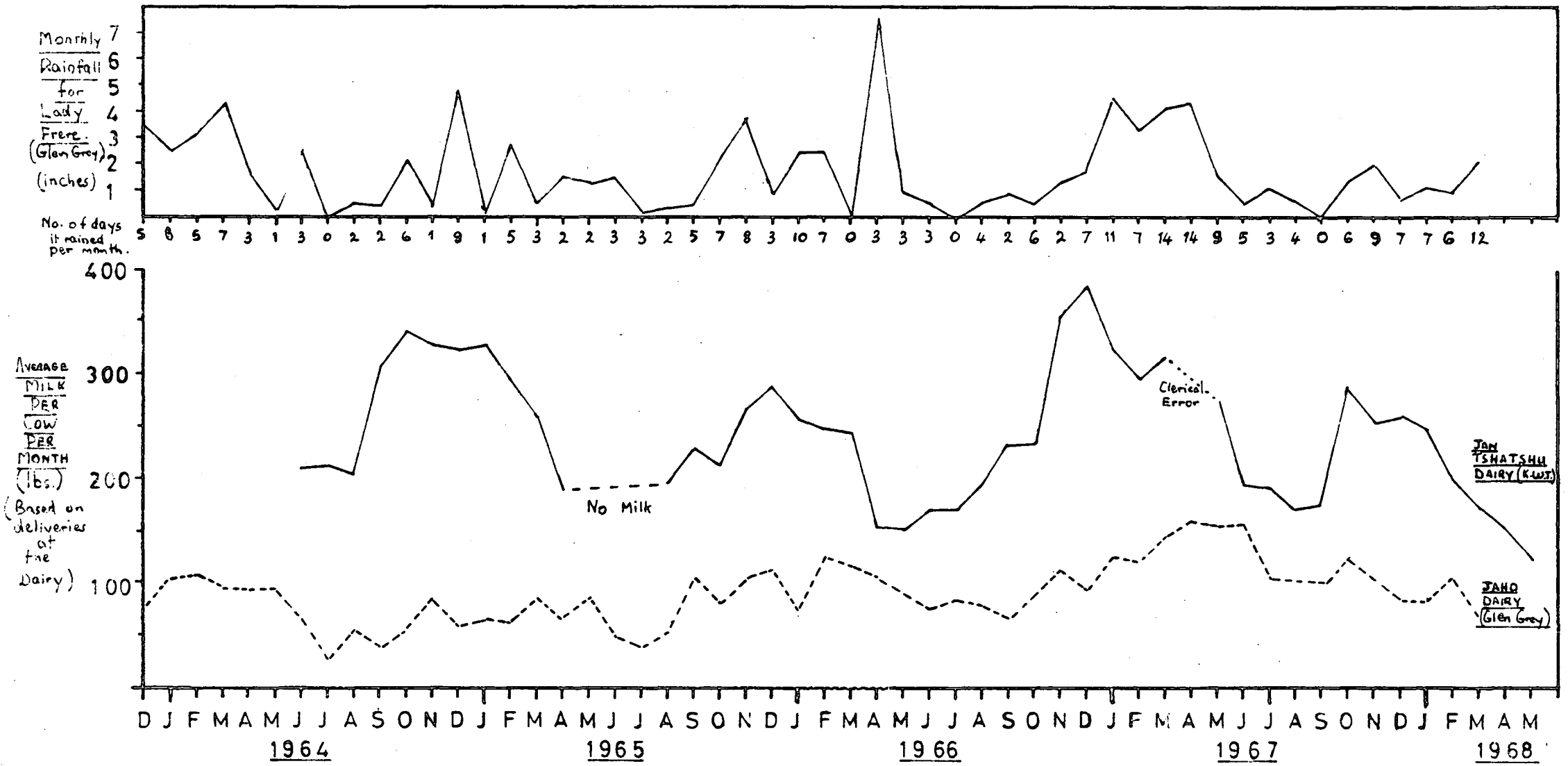


FIGURE: 14 : Milk Production at Two Dairies in the Ciskei.

to an end when one Tribal Authority suggested that 10 per cent of the proceeds should be paid into Tribal Authority funds. In early 1968, only four of the original sixteen schemes were in operation.

Other dairies in the Glen Grey District are regular suppliers of cream, compared with the other districts, and the statistics are as follows:

TABLE 31: GLEN GREY DISTRICT DAIRY STATISTICS FOR THREE SCHEMES

Dairy	No. of Suppliers	No. of Cows	Average Milk Yield per Cow per day - lbs	Average Butterfat %	Average Value of Milk in cents per gallon	Year
Nottingham	10 - 20	17 - 51	2.77	3.70	16.7	1966 & 1967-68
Hillside	1 - 22	3 - 61	2.50	3.07	10.0	1963-64
Waterfall	7 - 10	13 - 44	6.49	1.93	9.7	1967

Donnington Dairy in the King William's Town District, supplied milk to the Bowker's Park Creamery between 1957 and 1963, which averaged 4.01 per cent butterfat.

The monthly cream statements were analysed for three dairies, and the grading results were as follows:

TABLE 32: KING WILLIAM'S TOWN DISTRICT DAIRY SCHEMES: BUTTERFAT AND GRADING RESULTS

Dairy	Period	Total Butterfat sold - lbs.	Grade I %	Grade II %	Grade III %
Koloni	March'61 to March'65	3,571.16	51.09	25.58	23.33
Peuleni	Jan.'63 to Jan.'68	3,598.13	22.54	27.77	49.69
Donnington	Jan.'63 to Jan.'68	2,077.00	76.26	22.48	12.52

Some dairies such as Donnington, are clearly able to produce cream of the highest quality with the minimum of the lower grades. Peuleni Dairy, on the other hand, had nearly 50 per cent of its cream production graded as grade

three. The approximate difference in value between the grades, is two cents per pound, which means that there is a loss of income in those dairies where the standard of hygiene is low.

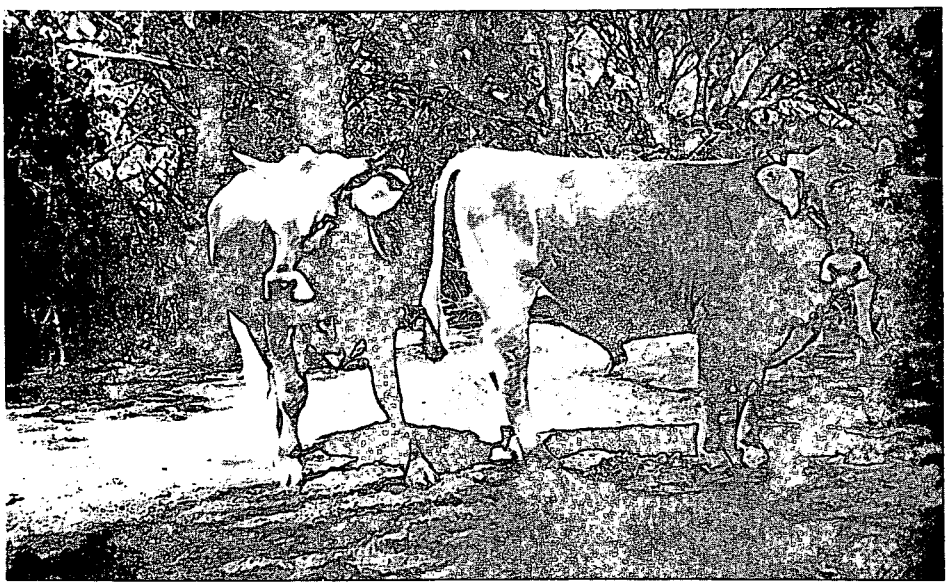
2.9.14 Draught Oxen:

A considerable number of oxen are retained for draught purposes, and are calculated to comprise nearly 38 per cent of the total cattle population, including calves, or nearly 43 per cent, not including calves. This latter figure applied to the 1967 cattle population of 205,232 head, means that there were approximately 88,250 oxen in the Bantu Ciskei, and that these are kept primarily for the purposes of ploughing, seedbed preparation, planting, cultivation and transport. Harwin (1956) indicates that it is generally accepted that one tractor replaces in the region of 50 trek-oxen in the European areas. Applying this figure to the Ciskei where tractor numbers have increased by 147 between 1964 and 1967, means that a decrease in the cattle population of nearly 7,500 head between these years should be noticeable. While there has been a decrease of just over 19,000 head of cattle, this change is more due to natural and official culling than to an increase in tractor numbers. The Agricultural Officers confirmed that the advent of additional tractors in their respective areas has no affect on cattle or oxen numbers, let alone any change in sex groupings or ratios.

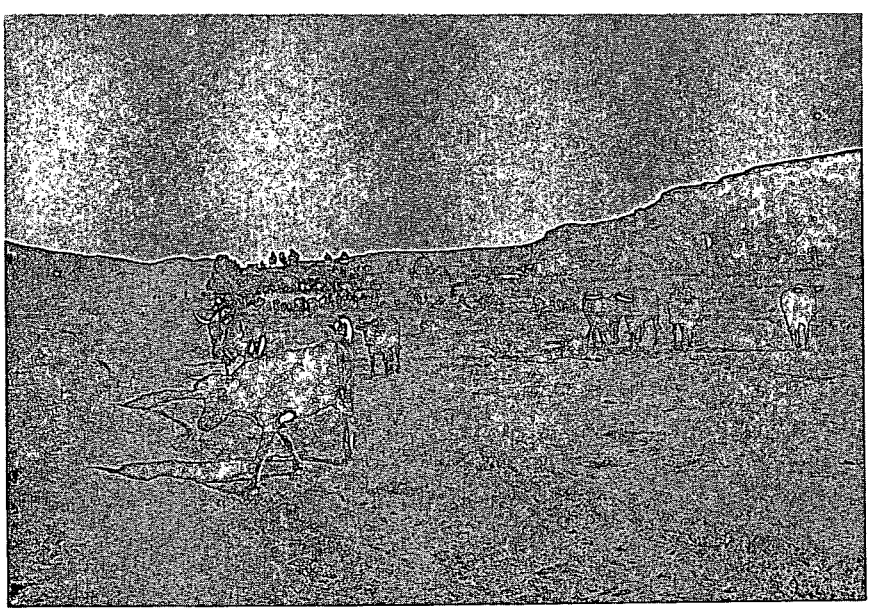
The training of trek-oxen commences at an early age, the young oxen being extremely tame due to constant handling from birth onwards. These young oxen are inspanned and worked with older cattle, including lactating cows, between the ages of 18 months to two years. The usual number of oxen in a span varies from two to eight or 10, the depth, speed and effectiveness of ploughing being affected accordingly. Apart from the pulling of ox-wagons, oxen varying from two to four and more on occasion, are employed to transport materials on sledges, or to drag firewood or trees to the residential sites from nearby woodlots. Occasional Scotch carts are seen being drawn by two oxen usually.

The work-production efficiency of these Bantu oxen depends primarily on their weight and the amount of energy available in the grazing each day. Oxen are of low weights, comparatively speaking, and in the majority of cases and years, barely receive a maintenance ration for a large portion of the year. In most areas, especially sourveld, they lose weight due to sub-maintenance veld conditions during the winter months, and the necessity of keeping large numbers of oxen becomes apparent. These are necessary to meet the needs of cultivation alone, and this fact accounts for the high proportion of oxen to breeding stock in the Bantu areas.

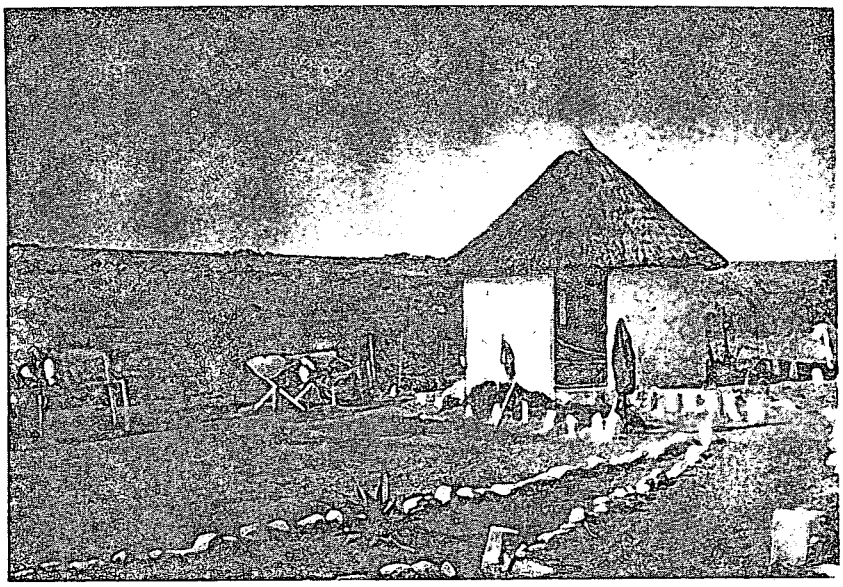
BANTU CATTLE - WHITTLESEA DISTRICT



BROWN SWISS BULLS - VICTORIA EAST DISTRICT

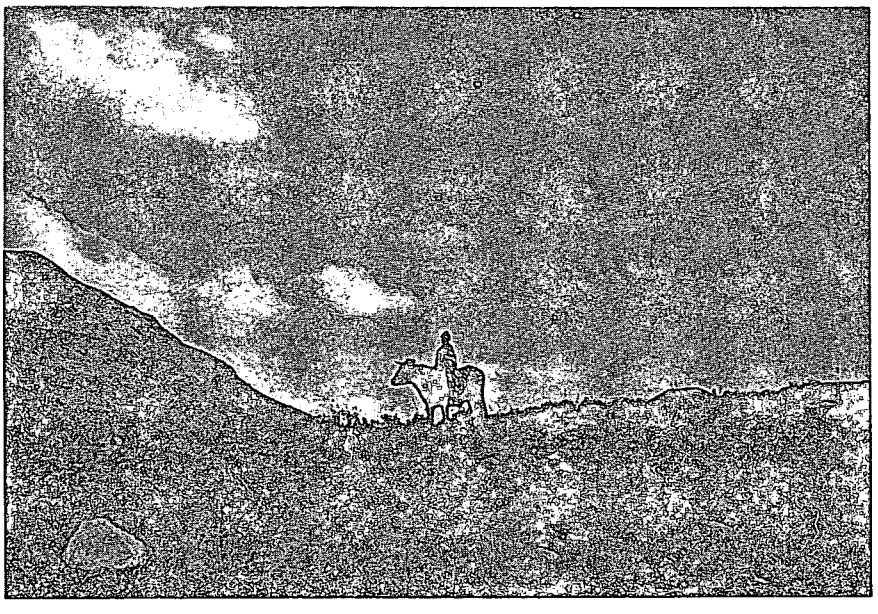


CATTLE GOING TO GRAZING - GLEN GREY



TYPICAL CO-OPERATIVE DAIRY - FORT COX

AUTUMN PLOUGHING OPERATION - HERSCHEL



OX-RIDING - HERSCHEL DISTRICT

The condition of oxen at ploughing and planting time, is one of the main limiting factors in the use of available arable land. The Annual Agricultural Reports of 1956-1957, 1958 and 1959, show that as much as 60 to 80 per cent of the total arable areas in some districts, notably Fort Beaufort, Peddie and Victoria East, is not cultivated in some years, and the above inference can be made, namely that the oxen were not able to cope with the energy demands made upon them. The intermittent drought periods also affect the working ability of these oxen. The Annual Agricultural Report for the Ciskei in the year 1956-1957, mentions that a "lack of adequate draught animals, appears to be proving a factor in limiting the area of land ploughed for cropping". In 1964, nearly 82 per cent of the total arable land (dryland), was cultivated; in 1965 this was about 88 per cent; in 1966 about 74 per cent and in 1967 nearly 67 per cent. While droughts have been responsible for land not being cultivated, the onus appears to lie with the oxen in most cases, in that they have not been in a suitable condition at the commencement of the planting season.

In the Glen Grey District, it is notable that the landless own stock in fairly high numbers, and it is common practice for the landless to do the ploughing for the landowners on a share or monetary basis.

Management of oxen is much the same as for other cattle, except that preferential grazing treatment is sometimes accorded these animals and not to milk cows, for example.

The Use of Oxen as Riding Animals: Ox-riding on a limited scale to date, is beginning to feature in the lives of the inhabitants in the mountainous terrain of Herschel District. Stock limitations have brought about a change in that, the keeping of horses and donkeys for riding purposes, is apparently on the decline, and the ox is thus again being used as a riding animal by the "kwedini" as in earlier times.

2.10 SHEEP:

2.10.1 Introduction:

References are made to sheep being in the present Eastern Cape Coastal area, as early as 1593 (Theal, 1916), but presumably these are the indigenous fat-tailed type which were known to be in the possession of the Hottentots (Epstein, 1937). Woolled sheep were first imported from Europe in 1655 (Theal, 1896). The Fingos and later, the Xhosa, acquired their Merino sheep and knowledge of sheep-farming from the 1820 British Settlers (Thom, 1936; De Klerk & Bosman, 1952). Brookes (1924) writes that the Fingos or Mfengu, were settled amongst the Europeans in the Peddie and Victoria East Districts, and that the Fingos were quick to realise the value of sheep. Not being so tradition bound, these Fingos sold their cattle in 1870 in order that

sheep could be purchased. Several flocks of 1,000 to 2,000 sheep were in the hands of the Fingos in 1870. This progressiveness is still noticeable today, in that some of the best Ciskei wool comes from the predominantly Fingo locations (Fort Beaufort, Upper Tyumie, Whittlesea in particular). It is noteworthy that the nearer the Bantu locations are to the European areas, the better the quality of both sheep and wool.

Charles Brownlee in his 1864 Memorandum (quoted by Brookes, 1924) mentioned that sheep enabled the Bantu owner to pay his taxes, by means of woolsales, without having to sell any of his livestock - "a proceeding to which he is very averse". These statements both have relevance 104 years later.

2.10.2 Breeds and Breeding:

Of a total number of 448,946 sheep,all of this number are woolled-sheep of the Merino type (1967 Annual Agricultural Report). The Dohne Merino, apart from having the Merino fleece characteristics, does well in the Ciskei, being noted for its milk capacity and hence good rearing capabilities, its relative hardiness, and ability to produce good mutton carcasses. Dohne Merino rams are being used, in increasing numbers each year, and are available on a subsidised basis through the Department. South African Merino rams are also used for breeding purposes, especially in districts bordering on the European sheep areas.

Table 33 provides some vital statistics on sheep breeding and production, the figures being based on the individual Agricultural Officer's experience in his district. In the improved sheep areas, two per cent rams are used while ten per cent or more rams exist in some districts and locations, the reason being that the young rams are not castrated until 12 months of age. In many locations, it is common to find a large number of ram lambs being left to mate with the ewes, after which the young rams are castrated, and the process repeated again the following year. Consequently, the level of inbreeding would appear to be comparatively high, and low density fleeces and small animals of poor appearance result. Due to natural selection, or survival of the fittest, these animals are relatively hardy, constitutionally speaking. Poor nutrition can also be regarded as an important contributory factor to this phenomenon of small animals and poor fleeces.

Where the more progressive sheep-owners have been persuaded to use superior rams, a marked improvement is noted in the lambs, and in a district like Whittlesea with a large sheep population, seven locations out of 24 have eliminated inferior sires and introduced Dohne Merino rams on a communal basis. In 1967, 100 of these rams were purchased and put to use. They were subsidised by the Department of Bantu Administration and Development at a rate

TABLE 33: ESTIMATED SHEEP BREEDING MORTALITY, CASTRATION AND SHEARING DATA AND FLOCK COMPOSITION IN THE DISTRICTS OF THE CISKEI [1)]

District	% Lambs Born			Lambing %	Rams as a % of Ewes	Mortality %		Castration		% Shorn At		Wool Weights lbs.		% Sheep with Kemp	Flock Composition %		% Owners who dose for parasites
	Spring	Autumn	Rest of Year			Up to Weaning	Flock	Age in Months	Method	Six Months	Twelve Months	Mean	Range		Females	Males	
Herschel	40	60	-	60-80	10 +	Up to 30	-	Up to 12	Knife	70	30	-	-	40	50	50	-
Glen Grey	20	80	-	50	-	10-15	5	3-6	Knife	80	20	3-4	-	7	-	-	10
Whittlesea	25	75	-	-	2-3	-	-	3-4	Knife + Burdizzo	100	-	-	-	some	50	50	increasing
Victoria East	50	50	-	60-70	3	10 +	5-6		Burdizzo	-	-	3.7	$2\frac{1}{2}$ to $5\frac{1}{2}$	some	95	5	-
Middledrift	15	80	5	80	-	40 to 50	10		Knife	85	15	-	-	some	-	-	10
Keiskammahoek	-	-	-	-	-	-	-		-	-	-	$2\frac{1}{2}$	-	-	-	-	-
Stutterheim	-	-	-	90	2	40 to 50	15		Knife	-	-	3	$2\frac{1}{2}$-4	very little	67	33	-
King W. Town	10	90	-	60-85	$2-2\frac{1}{2}$	10 to 30	5		Knife + Burdizzo	90	10	$4\frac{1}{2}$	-	20	75	25	-
Peddie	40	50	10	50-60	-	-	-		Knife	-	-	4-5	2-8	high	75	35	-
East London	25	70	5	60	3 +	5	3		Knife	25	75	3	-	5	-	-	-

1) Based on information received from Agricultural Officials.

of 50 per cent of the purchase price up to a maximum of ten rand plus a five per cent handling fee. The use of these rams in the Whittlesea District resulted in bales averaging 263 to 275 pounds in weight being filled by 75 of the cross-bred progeny's (two to four tooth) fleeces at six months. Previously 125 ewes with six month's wool growth, were required to fill similar bales. At Shiloh, the Dohne Merino cross-bred lambs (nearly two tooth), were found to be the same size as their mothers and the fleeces were not only longer, but also cleaner, showing the improvement in wool density.

TABLE 34: DOHNE MERINO RAMS SOLD TO BANTU SHEEP FARMERS 1958 - 1967

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	Total
Number of rams	20	30	31	67	65	144	124	86	82	180	829

The majority of the districts have had Dohne Merino rams introduced in recent years, although in Herschel and Glen Grey, South African Merino rams are favoured. In both these districts, there are at least two "stud" sheep-farmers per district, whose flocks are well above average, and who have invested in good to very good, Merino sires. In the Herschel District, these flocks consisted of 51 to 78 ewes and the ram lambs were sold to local sheep-owners at approximately R15 per head, while in Glen Grey, the two "stud"-flocks averaged 50 ewes.

In Stutterheim, ten participants in a local Sheep Breeding Scheme, sold 13 young rams at an average price of R16 each in 1967. Young Dohne Merino rams were initially loaned to this scheme, while old ewes were obtained from the Dohne Research Institute.

Lambing percentages vary from about 50 to 90 per cent with an average of approximately 70 per cent. Paradoxically, higher lambing percentages appear to be associated with night-kraaling due to ease of mating. The favoured lambing season in all areas is autumn, with the second lambing season occurring in spring. A few lambs, about five per cent or less, are born outside these seasons. While there are several points in favour of autumn lambing, the general absence of winter forages and/or supplementary feeds, and the extremely cold winter conditions experienced in some districts, notably Herschel, Glen Grey and Whittlesea, cause a fairly heavy lamb mortality in most years. These conditions, aggravated by drought, as in 1968, bring about even greater losses.

An African farmer at Wartburg in the Stutterheim District had 125 Dohne Merino-type ewes in 1967. He recorded 110 lambs born alive representing an 88 per cent lambing and of these he reared 92 or 74 per cent. In 1968 before the

completion of the lambing season, 79 lambs had already been born to 100 ewes. In the eastern Orange Free State, an average of 81.6 per cent lambing has been recorded and 74 per cent were reared (Van Marle, 1966).

2.10.3 Flock Composition:

In Table 33 it is estimated that between a quarter to a half of the flock consisted of males, that is wethers and rams, the remainder being ewes. An analysis of a flock consisting of 398 sheep belonging to one of the big sheep-owners in the Kamastone Location at Whittlesea, was undertaken in April, 1968 and the details appear in Table 35.

The lambing percentage, based on four-tooth and older ewes, was nearly 80 per cent. The two-tooth ewes could not have lambed up to the date the flock was mouthed, and have been excluded. The total number of breeding ewes, two-tooth and upwards, was 45 per cent or, if the two-tooth are excluded, 37 per cent of the total flock. Excluding lambs, which number 119, from the total flock figure, actual breeding ewes, four-tooth and over, amounted to 53 per cent of the total adults. Of the lambs born and reared, 52 per cent were females, and the tendency is for the females to dominate in the classes up to the aged group. However, in the four-tooth class, the males unaccountably predominate. Wethers comprise over 35 per cent of the total stock over two-tooth, and this is analogous to the position in several Ciskeian districts as shown in Table 33.

Of the total flock number, lambs were nearly 30 per cent, two-tooth 14 per cent, four-tooth 12 per cent, six-tooth 21 per cent and full-mouth 23 per cent, the aged-sheep amounting to less than one per cent.

Towards the end of 1967, full stock counts were made, as a trial, in the Madakana, Lower Ward, and Blikana, Penhoek Ward, Locations in Herschel District. These flocks consisted of 4.4 per cent rams, 72.8 per cent ewes and 22.8 per cent wethers, excluding lambs. Lambs, expressed as a percentage of the total ewes, amounted to 48.9 per cent, and taking lamb mortality into account, the lambing percentage would appear to be over 70.

Comparative average figures for European-owned flocks in the eastern Orange Free State, are given as ewes 36.6 per cent, wethers 33.4 per cent, "young" sheep 18.9 per cent and suckling lambs 11.1 per cent of the total flock (Van Marle, 1966).

Table 36 serves to indicate the number of small stock owners falling into the various numerical categories. Of the individual stock counts taken in 23 locations representing 3,758 owners in the Ciskei, over 49 per cent own no sheep or goats, 38 per cent own between one and 25; almost 7 per cent own between 26 and 50; 3.5 per cent own 51 to 100; over two per cent have flocks greater than 100 and less than 700 in number. In these 23 locations, approximately 24

TABLE 35: ANALYSIS OF A FLOCK OF SHEEP IN THE KAMASTONE LOCATION - WHITTLESEA DISTRICT (APRIL, 1968)
(Rams excluded as owned on a communal basis)

Sex Groups	Lambs		2-tooth		4-tooth		6-tooth		Full Mouth		Aged		2-tooth to Aged		Total
	No.	% of age groups	No.	% of age groups	No.	% of age groups	No.	% of age groups	No.	% of age groups	No.	% of age groups	No.	% of age groups	
FEMALES	62	25.6	31	12.8	18	7.4	47	19.4	81	33.5	3	1.2	180	45.2	242
% of sex groups	52.1		57.4		36.7		57.3		89.0		100		64.5		60.8
MALES	57	36.5	23	14.7	31	19.9	35	22.4	10	6.4	0	-	99	24.9	156
% of sex groups	47.9		42.6		63.3		42.7		11.0		-		35.5		39.2
Total	119	29.9	54	13.6	49	12.3	82	20.6	91	22.9	3	0.8	279		398

TABLE 36: PERCENTAGE SMALL STOCK FREQUENCY PER LIVESTOCK OWNER
(Based on 1968 Stock Counts)

District	Goats as a % of small stock in locations	Number of locations	Small Stock Frequency %										Number of Stock-Owners
			Nil	1-25	26-50	51-100	101-200	201-300	301-400	401-500	501-600	601-700	
Herschel	49	2	57	27	5	8	2	1	-	-	-	-	353
Whittlesea	17	3	24½	26½	21½	12½	12	2	1	-	-	-	289
Victoria East	28	3	23	50½	15	10	1	-	-	-	½	-	263
Middledrift	37	3	28	64	7	1	-	-	-	-	-	-	513
Keiskammahoek	29	2	39	56	4	½	½	-	-	-	-	-	421
Stutterheim	4	2	55	15½	10½	7	7	3	1½	-	-	½	223
King William's Town	35	3	58	37½	3	1½	-	-	-	-	-	-	579
Peddie	22	2	41	47	9	3		-	-	-	-	-	352
East London	39	3	80	19	1	-	-	-	-	-	-	-	765
Mean			49.4	38.1	6.7	3.5	1.6	0.45	0.1	-	0.05		3,758

per cent of the small stock are goats. In the predominantly cattle areas, such as East London, 80 per cent of the stockowners have no small stock, while in the sheep areas, such as Whittlesea, less than 25 per cent of the stockowners own no sheep or goats. In the 1968 stock count, 10,426 livestock-owners in 138 locations and wards, owned an average of 10.6 sheep and 3.1 goats, the latter comprising approximately 22.5 per cent of the total small stock.

2.10.4 Nutrition and Management:

As sheep receive very little else but grazing, veld is the source of nearly all nutrients, and where the veld is overgrazed and the poorer pioneer grasses and shrublets predominate, the sheep and their fleeces are accordingly affected.

In the Keiskammahoek District, where Macchia (fynbos) has spread over large areas, it is common to see sheep nibbling at these shrubs, as there is very little else to graze in a drought year. In autumn and winter, crop residues are grazed when available. Whittlesea District sheep-farmers grew 214 tons green oats, 311 tons green barley, 159 tons of ryegrass and 4 tons of green maize plants and it is understood that most, or all, of this material is used for sheep grazing or feeding, especially in the case of ewes and lambs. In the Victoria East District, Dohne Merino rams were given a daily allowance of a "handful" of maize throughout the year, otherwise very little, if any, concentrates are fed to sheep. No mineral feeding is practised as far as can be ascertained, with the exception of a few isolated cases where salt is provided.

The management standard is much the same as that for cattle. In the fenced areas, sheep are communally grazed during the day in camps and are not generally herded and this includes rams, ewes, wethers and lambs. Where the improved rams have been introduced, these are grazed separately except during the breeding seasons. In the non-rehabilitated areas, herding is necessary to prevent damage to crops and gardens. At night, kraaling is carried out, and this practice is the main cause of the spread of parasites, both external and internal, and diseases. In the sourveld areas of King William's Town and Victoria East Districts, excessive teeth wear has been noticed by the Agricultural Officers as is the case with cattle. Sheep and goats are run together and are similarly managed.

According to information received in the King William's Town District, lactating ewes are sometimes "milked", when the lambs are old enough, but only sufficient quantities are removed for use in tea. Where herding is still in progress, it appears that the herd-boys do, on occasion, milk the ewes for their own nourishment, while out in the veld.

2.10.5 Castration and Docking:

This operation is carried out between two and six months of age, although in some districts and locations, as has been already mentioned, castration is done as late as 12 months of age. Most flockowners do their own castrating, using knives, although some obtain the services of the Agricultural Extension Advisers, as for example in the Victoria East District, where 1,410 rams and ram lambs were castrated in 1965, 962 in 1966 and 474 in 1967. The decreasing number reflects improvement in the flocks and the "self-help" policy of the Department.

Docking is sometimes carried out at an early age, especially by the more progressive, but there is a tendency to regard the tail as meat, in that haphazard docking is carried out during periods of family meat shortages, and the docked tail is cooked.

2.10.6 Endo- and Ecto- Parasites:

The practice of dosing for internal parasites is increasingly being used by Bantu farmers, although at this stage, the number dosing regularly throughout the year, when required, remains very low. One of the complaints voiced by some District Agricultural Officers was that dosing of sheep would be carried out once, and an improvement in the condition of the sheep would result, but in the absence of further dosing, there would be retrogression. In most districts, at present, dosing for Nodular worm (Oesophagostomum sp.), Wireworm (Haemonchus contortus), Tapeworms (Moniezia, Thysaniesia and Stilesia spp.), Bankrupt-worm (Trichostrongylus sp.), inter alia, is carried out by a few individuals under the direction of the Agricultural Extension Advisers, or based on their own experiences and knowledge gained while working on European-owned farms. Not only are Phenothiazine and other proprietary worm remedies used, but the broad-spectrum worm remedies are increasing in popularity in a few districts, the prices being, unfortunately, on the prohibitive side for the average Bantu farmer. In the mountainous areas, for example Herschel District, the health of sheep is of a fairly high standard compared with sheep in the low-lying areas. One thousand, one hundred and seven sheep-owners in the Herschel District dosed their flocks during 1967, while in the Whittlesea District, parasite control is becoming increasingly popular. This is due to the noticeable improvement induced in the sheep, and to the increased monetary return which has acted as a stimulant. The number of farmers, who dose in any particular area, is also dependent on the keenness of the local Agricultural Extension Adviser.

Of the external parasites, lice (Damalinia ovis) are a fairly common occurrence in some localities, for example Herschel and Stutterheim, but are controlled by insecticides or arsenic dips. The Ked (Melophagus ovinus) occurs,

but to what extent, is not determinable, although it appears to be on the increase. The paralytic tick (Ixodes sp.) causes trouble in the Whittlesea District, but predominantly in the areas with doleritic outcrops, where rodents act as intermediate hosts (Mönnig & Veldman, 1956). This is being overcome by the use of footbaths.

Sheep are dipped twice annually after shearing, in the Whittlesea District, according to the Agricultural Officer, while in other areas, dipping is spasmodic.

2.10.7 Diseases and "Gut-Tie":

Apart from Lamb Dysentry, Pulpy kidney and Blue-tongue, very few other diseases seem to have made an appearance.

Sheep having what appears to be "compacted intestines", have died in the Herschel District - the condition being referred to locally as "telescoped intestine". "Gut-tie", as this condition is commonly called, is probably caused by inflammation of the intestine, which results in excessive bowel movements, due to incorrect nutrition, or internal parasites, and occurs more frequently in the winter months when the grazing is hard and dry. There is no cure, but the feeding of succulents, for example spineless cactus, or saltbush, during winter, considerably reduces the incidence. (Veterinary Research Institute, Onderstepoort in a letter dated 15.10.58).

2.10.8 Mortality:

Lamb mortality up to weaning, can be extremely high depending to a large extent, on prevailing conditions, varying from five per cent in some districts and years, up to 50 per cent in others. In the 1968 drought, it is estimated that 20-25 per cent of the small stock population have died up to November, in the Glen Grey District, which means that at least 40,000 sheep probably died in this one district alone. Apart from droughts and severe weather conditions in winter, the main causes are most definitely malnutrition, internal parasites and diseases, such as Lamb Dysentry (Clostridium welchii) and Pulpy Kidney (Enterotoxaemia caused by Clostridium ovitocicum), although the degenerative effects of inbreeding cannot be excluded as being a part causative effect. An average of 9.3 per cent mortality from birth to weaning is recorded by Van Marle (1966) in the European farming areas of the eastern Orange Free State.

In adult sheep, mortality varies from three to 15 per cent and the interplay of the above factors, as mentioned for lambs, causes a comparatively high loss. In the case of the adult sheep, Blue-tongue (Malarial catarrhal fever or sheep fever) is generally the prevalent disease. The difficulty in obtaining accurate information on sheep losses should be mentioned, as no reliable records are kept, and invariably, vultures strip the flesh off the carcasses prior to any positive identification of the cause of death being made. In the planned areas, diseases and parasites appear to be the main causes of sheep losses, since rehabilitation has

meant an overall improvement in the quantitative and qualitative nutritional level of the veld. Shearing of sheep during the winter months, although not as a general practice, has been noted, and where such an action has been followed by cold, wet conditions, this too, must contribute to sheep losses.

In mountainous regions, snow can be the cause of death on occasion. Serious losses were experienced in the Umtwakazi Location, Whittlesea District, during the last week of June, 1968. A heavy snowfall covered this area, which is near the Katberg, for a period of nearly ten days and resulted in the loss of over 40 sheep, 400 lambs, 10 cattle and about nine pigs.

Of all sheep dying in the Bantu areas of South Africa between the years 1946 and 1952, 33 per cent of the deaths were due to disease, 47 per cent to poverty, and 20 per cent to other causes (Commission, 1955).

2.10.9 Shearing, Wool Characteristics and Yields, and Value:

A wool improvement scheme was inaugurated by the Department in 1959, with a view to providing the necessary wool handling, sorting and baling facilities, as well as European and Bantu technical field-staff. The latter would be available to give advice in all phases of wool production, especially when shearing was in progress, so that fleeces would be removed, skirted and classed correctly. The accepted manner of identifying sheep run communally in the Bantu areas, is to paint on each sheep identification marks which are renewed as required during the year. The only logical and practical way to overcome the problem this presented, was to remove the brands prior to shearing, and this was also invisaged in this scheme. Wool sheds were to be erected and the shearing seasons were to be March/April and September/October, which would meet the requirements of both those who shear sheep at six-monthly intervals and those who shear annually.

Most of the suggestions of the improvement scheme have been put into operation. Communal shearing sheds have been erected in several districts and specialist sheep and wool Extension Advisers are available for consultation and for giving demonstrations. A prohibition on the use of unscourable marking fluids on wool of any kind was imposed in terms of the Wool Commission and Wool Amendment Act, 1960. Contravention of this prohibition involved a fine not exceeding R200 or imprisonment for a period not exceeding six months, or both. During 1967, an attempt was made to eliminate this undesirable practice, mainly by means of propaganda, and although this resulted in an improvement, between 50 and 60 per cent of sheepowners still use non-scourable marking fluids, according to the Agricultural Officers.

Commencing in 1961, meetings were held with Bantu Agricultural Staff and farmers as well as Tribal Authorities to emphasize the importance of wool

classing and the use of scourable brands. Traders were also requested to help in the encouragement of classing and to pay a realistic price for classed wool. Equipment was purchased in 1961 and 1967, with money from the Ciskei Wool Levy Fund (which accumulated during the 1939-1945 war). At present this Fund, now approximately R78, 000, is scheduled to be used by the new Ciskeian Department of Agriculture. Equipment included 106 sorting and piece-picking tables, 266 bins, 56 wool-presses and 38 scales. Three collapsible and movable shearing sheds have been designed and built in the Ciskei, and are used fairly extensively, while permanent-type sheds have been erected at central points. In the King William's Town District, a Bantu Farmers' Association has used its own funds to erect a shearing shed for the use of its members, and several Regional Authorities have provided for future buildings in their estimates (Norton, 1968).

(a) Shearing:

This operation is carried out using handblades, and is either on an "individual" basis, whereby the owner usually provided meat and beer for all helpers, or on a collective or communal shearing basis. The owners of the bigger flocks tend to use the former method. Owners with small numbers shear on a family basis, and sell the wool to the local traders, or where sufficient wool is available, to wool-brokers, as is usually the position with the flock-owners with large numbers of sheep.

The collective or communal scheme falls under the auspices of the local farmers' association or Regional or Tribal Authorities.

As is reflected in Table 37, 92.7 per cent of the total wool shorn and sold in 1964 originated from individuals not belonging to collective shearing schemes, this representing about 94 per cent of the sheep population. In 1965 this figure had decreased to 91 per cent of all wool sold, representing the clip of about 95 per cent of the total sheep population. In 1966 this figure had risen to 88.7 per cent of all wool sold, representing 92 per cent of the sheep population. In 1967, 90.7 per cent of all wool sold originated from individuals, and represented 93 per cent of the sheep population. In spite of the difference between the individual price of 11 cents and the communal price of 17 cents per pound, co-operative shearing and marketing schemes are making slow progress. One reason for this is that, with the example set by the co-operative scheme, many flock-owners have embraced the principles underlying the improved scheme, but are selling on an individual basis. Declining wool prices do not reflect this tendency, but it appears that more wool is being marketed directly than ever before (Norton, 1968).

Individual shearing is usually carried out inside one of the owner's huts, and very little sorting or piece-picking occurs. The wool clip is generally sold

TABLE 37: WOOL SALES AND STATISTICS FROM 1964 TO 1967 [1]

District	1964							1965							1966							1967						
	Wool Produced	% Sold		Average Yield per Sheep		Average Price - cents per lb. wool		Wool Produced	% Sold		Average Yield per Sheep		Average Price - cents per lb. wool		Wool Produced	% Sold		Average Yield per Sheep		Average Price - cents per lb. wool		Wool Produced	% Sold		Average Yield per Sheep		Average Price - cents per lb. wool	
	lbs.	Indiv.[2]	Co-op.[3]	Indiv.	Co-op.	Indiv.	Co-op.	lbs.	Indiv.	Co-op.	Indiv.	Co-op.	Indiv.	Co-op.	lbs.	Indiv.	Co-op.	Indiv.	Co-op.	Indiv.	Co-op.	lbs.	Indiv.	Co-op.	Indiv.	Co-op.	Indiv.	Co-op.
Horschel	166,716	99.6	0.4	4.0	4.3	15	14	150,813	99.5	0.5	4.2	5.0	15	20	126,177	99.1	0.9	2.9	4.1	14½	16	170,723	93.7	6.3	3.5	4.3	10	20½
Glen Grey	398,416	97.9	2.1	2.6	2.0	15	29	402,690	98.1	1.9	2.7	1.9	15	18	395,000	95.9	4.1	2.3	4.0	15	15	460,678	94.3	5.7	2.5	3.9	9	15
Whittlesea	185,578	84.3	15.7	2.8	3.7	20	29	213,574	92.6	7.4	3.7	4.0	20	30	157,032	66.4	33.6	2.8	4.9	4	14	206,520	82.9	17.1	3.9	4.9	18	18
Cathcart	2,400	100	0	3.1	-	20	-	1,860	100	0	4.0	-	15	-	N.R.	-	-	-	-	-	-	N.R.	-	-	-	-	-	-
Fort Beaufort	14,600	100	0	3.2	-	20	-	11,263	100	0	3.6	-	15	-	11,968	100	0	2.5	-	15	-	14,628	100	0	3.0	-	20	-
Victoria East	63,525	93.5	6.5	3.0	3.9	15	25	47,400	81.6	18.4	2.4	4.0	15	22	62,153	92.0	8.0	2.9	3.2	15	20	79,030	85.0	15.0	3.3	3.3	14	18
Middledrift	183,856	85.4	14.6	2.7	4.4	16	30	206,154	86.6	13.4	3.0	4.5	14	32½	199,507	80.8	19.2	3.1	6.0	12	14½	166,270	86.5	13.5	3.0	4.0	10	15
Kefakammahoek	60,067	80.9	9.1	2.6	3.3	15	30	41,438	72.6	27.4	1.9	2.9	12	13½	22,777	65.1	34.9	0.9	2.4	14	15	41,983	94.7	5.3	2.5	2.7	8	12
Stutterheim	33,587	74.4	25.6	2.4	3.1	20	29	32,002	27.9	72.1	1.0	6.2	20	21	38,353	31.4	68.6	3.7	5.2	13	30	25,345	56.6	43.4	2.7	3.7	20	21
King William's Town	111,308	97.9	2.1	2.0	2.0	20	22	102,570	97.5	2.5	2.2	1.5	20	21	82,399	97.1	2.9	3.2	1.4	12	21	83,600	92.5	7.5	3.5	3.5	10½	15
Peddie	62,409	96.1	3.9	1.9	4.0	15	18	90,275	94.2	5.8	3.0	4.0	11	19	63,672	98.9	1.1	2.0	2.2	10	15	96,262	99.3	0.7	3.0	3.3	10	28
East London	60,000	100	0	3.3	-	15	-	8,084	100	0	4.0	-	20	-	9,000	100	0	4.6	-	20	-	8,000	100	0	4.5	-	20	-
Ciskei	1,292,462	92.7	7.3	2.7	3.4	16	28½	1,205,213	92.1	7.9	2.9	4.4	16	24	1,147,070	88.7	11.3	2.6	4.5	13	18½	1,353,039	90.7	9.3	3.0	4.0	11	17

1) Based on statistics in Sheep File, King William's Town, and Annual Agricultural Reports, 1967.
2) Individual
3) Co-operative
4) N.R. = No Record

to local traders, who undertake the sorting and classing or forward it direct to the wool-brokers. Some flock-owners, with larger numbers of sheep, send direct to the brokers in East London, Port Elizabeth and other smaller towns, and the fleeces are most often processed by the owner within certain limits. Co-operative or communal shearing, on the other hand, is better organised and the facilities are superior, with the result that this wool is cleaner, better sorted according to fleece components, and classing is undertaken. The actual work of shearing is done by the sheep-owner members of a particular co-operative scheme, and wool classing is under the guidance of a Bantu Extension Adviser.

(b) Wool Characteristics and Yields:

The wool is of the fine-wool type, being approximately 64's and 66's, and is inferior in quality to that produced by the European farmers. It is tender and lacking in character and has a relatively high percentage of kemp fibres. According to a Farmer's Co-operative Union Official it is, however, comparatively seed-free.

The wool is short since between 85 to 90 per cent of all wool originating from the Bantu sheep farmers is shorn between five to seven month intervals due to personal financial considerations or pressure on the individual sheep-owner. Baker (1968) of Billson's, East London, further indicated that something less than 20 per cent of the Merino clip of South Africa during the years 1962 and 1963 was of the short wool type. Recent trends in synthetic fibres over the last ten years have caused these speciality wools to have a limited demand. The style, the high percentage of dust and foreign matter in the fleece, as well as the heavy urine and dung staining that is a feature of this wool, are due mainly to night-kraaling of sheep. The value of the wool is consequently reduced by at least 20 per cent, since the scoured-wool yield was about 44 per cent compared with that of European origin which was 54 per cent and more. A somewhat higher percentage of coloured fibres occur in Bantu-owned sheep which is the result of breeding. It is estimated that some ten per cent of the total wool originating from the Bantu Ciskei, is of the coloured or coarse, strong wool, type. Baker (1968) also ventured that the best Ciskei wools came from the Fort Beaufort, Upper Tyumie and Berlin areas, followed by Alice District, Middledrift and Peddie, with King William's Town having the most inferior wool.

A wool expert (E. Hirsekorn) pointed out that the "native" wool handled by his company was very fine and had a good crimp. Wool, he felt, should not be shorn under eight months. Twelve months' wool from the Bantu Ciskei was also not anywhere in the same class as that from well-bred Merinos, and due to fineness and poor breeding, measures between two to two and a quarter inches unstretched compared with good Merino wool which is three to three and a quarter

inches. Of the short wool, approximately 65 to 70 per cent was used in the felting industry, about 20 per cent used for blending in combed wool, and about ten per cent for blanket-making of a cheap type, the latter wool having a high kemp percentage being grown under relatively good grazing conditions.

Murray (1968), a King William's Town broker, reported on a small clip sent in by a Debe Nek Bantu sheep-owner, which weighed 181 pounds and which had been classified by the owner into seven lines. The piece-picking, he said, was not very accurately done, and this applies generally to Bantu-origin wools handled by his company. Of approximately 1,000 bales of Bantu-origin wool annual output, somewhere in the vicinity of 98 per cent of the wool has to be re-classified. The value of the wool, as it enters the sorting hall is approximately thirteen cents, but on being properly classified, a net value of 17 cents is achieved. Murray (1968) emphasises that he had found that demonstrations involving the owner's clip and indicating the actual amount of money saved by applying the correct method of presentation, had proved to be successful with some of his Bantu clients.

According to the Farmers' Co-operative Union Catalogues, one to 33 for the 1965/1966 Wool Season, wool originating from the Bantu areas of the Ciskei received prices ranging from 20 to 37 and a half cents per pound, with an average of 24 cents per pound.

District wool yields, average yields per sheep and average prices received per pound, are indicated in Table 37. Districts producing the largest clips in the Ciskei are Glen Grey about 32 per cent, Middledrift nearly 16 per cent, Whittlesea 15 per cent, Herschel 12 per cent and King William's Town nearly eight per cent. The remaining districts producing about 18 per cent together. While the figures generally are reliable, the sheep figures in some districts appear to have been estimated, or the count is rounded off to the nearest thousand. Over the four years under review, yields per sheep per district vary from nearly one pound up to 4.6 pounds, with an average of 2.6 to three pounds for the Ciskei for the individual shearing system. Under the wool improvement scheme from 1.4 to 6.2 pounds were obtained per sheep with the districts averaging between 3.4 to 4.5 pounds over the four-year period. The difference between the overall average per sheep for the two shearing and selling approaches, is approximately 1.4 pounds. For the sake of comparison, an average of 7.3 pounds per sheep is given for the 1959-1960 season in the eastern Orange Free State (Van Marle, 1966).

Prices received for wool per pound over the four years for each district, also show fairly wide variation being eight to 20 cents and averaging 11 to 16 cents for the Ciskei, for individually sold clips. Those clips shorn, processed and sold collectively vary from 12 to 32 and a half cents per pound and average

17 to 28 and a half cents for the Ciskei as a whole. The difference between the prices paid on the average for individually and collectively sold clips, is approximately seven cents per pound. On a gross return per sheep per annum basis, individual sellers averaged 41 cents and co-operative members 95 cents over the period 1964 to 1966. This represents a difference in earning power of 54 cents per sheep, or expressed in terms of sheep, 23 sheep produced the same gross return as 10 to 11 sheep owned by co-operative members.

Thus, not only do the co-operative sheep-owners obtain higher average wool yields per sheep, but they also receive higher prices. The co-operative schemes have had the number of sheep shorn under its aegis increased by nearly 21 per cent over the three-year period 1964-1966, while wool sold has increased by nearly 60 per cent. However, expressed as percentages of the total for the year 1966, they are low, being approximately 7.7 per cent and 12.9 per cent respectively. Between 1966 and 1967 there was a decline in both the number of sheep shorn communally and in the amount of wool handled, being approximately 7.1 per cent and 9.3 per cent respectively, although the actual quantity of wool shorn increased by nearly 18 per cent. This increase is attributable to the use of improved rams and the better grazing in the Ciskei due directly to rehabilitation (Norton, 1968).

Examples of wool descriptions and of prices received for wool produced in the Middledrift District and sold during early 1968 on the East London wool auctions, are as indicated in Table 38.

TABLE 38: WOOL DESCRIPTIONS AND PRICES RECEIVED - MIDDLEDRIFT DISTRICT, 1968

Number of bales	Classification	Total Weight lbs.	Average price in cents per lb.
3	CF	992	23-1/4
3	CM	989	22
1	CX	308	15-3/4
1	CF	300	23-1/4
3	LOX	1,271	10
8	BKS	2,407	17½
1	LBF	345	28-1/4
1	LLBM	311	28-3/4
5	BP	1,786	15-3/4
1	C & C	315	9-3/4
5 + 106 lbs.	Assorted	10,712	-

Thirty-one Bantu sheep owners, plus the Trust-owned sheep, supplied the above wool and individual owners had anything from two to 1,006 pounds distributed amongst the different bales. One owner had different amounts of wool, ranging

from six to 122 pounds, in 18 different bales.

In disposing of their wool, readily available cash payments have had a major influence in the selling habits of the Bantu. Due to economic pressure, the greater percentage of the wool has been sold directly to local traders, either for cash, or on a barter basis. The trader, generally with little or no knowledge of wool classing, forwarded the wool in bulk to the brokers where sorting took place. Barker (1968) estimated that 60 to 65 per cent of the Bantu wool clip was sorted by the various brokers in the Border area, as a contrast to Lesotho, where less than five per cent is sorted by the brokers. Very few Ciskeian traders actually sorted wool, and therefore, the prices paid out to producers by the traders were necessarily on the low side to offset handling at the brokers and the possibility of low prices being received due to kemp, coloured wool, low yields and market changes. Thus, there has been little incentive for the wool-producer to sort his wool, even if he had the knowledge and experience to do so, since the traders preferred to buy on a "non-sorted" basis.

Since the Department started on the sheep and wool improvement scheme, wool consciousness has increased and the wool-growers with the largest clips, either class and sell their own wool, as previously indicated, or sell on one or other of the co-operative schemes in their area. This new awareness of the value of wool is beginning to pay dividends in that the demand for better sires has increased and producers are now prepared to pay a fair price for good rams. In the Tsitsikama Location, Whittlesea District, the overall standard of the flocks and wool is very high, and apart from this being one of the best sheep areas in the Ciskei, co-operative breeding was started there in the 1940's under the Agricultural Officer. Demonstrations also played a large part in improvement, and today, the wool is of a uniformly high quality.

While some Bantu wool producers are prepared to wait for their wool-cheques, many brokers either pay out an advance on receipt of the wool, or have a "float" at the local Bantu Affairs Commissioner's office, where an advance payment of 10 cents per pound of wool forwarded, can be made (Norton, 1968). The average price realised under the co-operative schemes, has also been about 23 cents, while the trader can only pay out between 12 to 14 cents per pound. On an estimated extra eight cents net per pound on the total wool clip for 1967, other than the wool sold communally, an additional amount of somewhere in the proximity of R97,000 would be available for the Bantu sheep farmers in the Ciskei.

The total Ciskei wool-clip for 1965 is estimated to be 0.63 per cent of the total Merino, "Natives", and Coloured and Coarse (C & C) wool produced in the Cape Profince in the 1965-1966 season (calculated from the Ciskei Agricultural Report, 1965, and Schedule I, Statistical Analysis of the South African Wool Clip,

1965-1966). The Ciskei wool clip for the same year, was only 15 per cent of the total "Native" wool produced in the Cape Province.

A comparison of average prices received per pound, and the average wool yield per cent, is made in Table 39. From the figures in this table it is clear that wool of Bantu origin has a lower value, 13 to 22 cents per pound, when compared with the adjacent European farming areas, 37 to 43 cents per pound. The wool yield is also clearly shown in that wool of Bantu origin yields 40 to 44 per cent wool when washed, while wool from European areas yields between 53 to 60 per cent of the original wool weights on scouring.

A comparison between fibre fineness of Bantu and European produced wools, is also of interest, figures being available for four districts only. The bulk of the Bantu produced wool in these areas, falls in the 64/70's class, while European produced wool falls mainly in two classes, namely 64's and 64/70's, but has a wider distribution of the finer classes, which is not the case for Bantu-produced wool.

Glen Grey is exceptional in that 54 per cent of the fleeces fall in the 64/70's, and 44 per cent in the 64's. In the Herschel, Middledrift and Keiskammahoek areas, over 77 per cent falls in the 64/70's class with 18 to 21 per cent in the 64's. Arising from these figures is the fact that the bulk of Bantu-produced wool is finer than that of the European-produced Merino wool.

An investigation of the lengths of Merino wool originating from Bantu and European areas, reveals that in the Herschel, Glen Grey and Keiskammahoek Districts, between 54 to 63 per cent of the wool falls in the four to eight month length classes, compared with five to 14 per cent for the European areas. Middledrift area is the exception, in that most of the wool is shorn between nine to 12 months, and falls in the corresponding length classes. This appears to be contrary to the Agricultural Officer's experience.

2.10.10 Meat Production and the East London Abattoir Survey:

(a) Meat Production:

All meat production in the Ciskei is incidental to the main purpose of wool production. Stock are sold at the local auction sales, as are cattle, and occasional batches are sent to the East London abattoir. Unfortunately, sheep and goats are classed together as small stock in the sales and slaughter records and Table 40 gives an indication of the phenomenal increase in the number of small stock units sold, even over the relatively short period between 1965 to 1967, when a 248 per cent increase in numbers sold occurred. The average price paid per unit varied over the three years mentioned, but these prices will also depend on the number of goats included in the total number sold.

TABLE 39: AVERAGE PRICES RECEIVED AND WOOL YIELDS; PERCENTAGE INFERIOR WOOL AND COMPONENTS OF MERINO FLEECES FOR BANTU AND ADJACENT EUROPEAN AREAS - 1965/66 WOOL CLIP (S. A. WOOL COMMISSION)

District	Average Wool Prices per lb.		Average Wool Yields %		% of Fleeces in Inferior Top-making Class		% of Merino Fleeces in Each Class								Merino Wool Fleeces According to Qualities %												Merino Wool Fleeces, Bellies and Lambs According to Lengths													
							Merino Fleeces as % of Total Fleeces		Bellies as % of Total Merino Fleeces		Lambs as % of Total Merino Fleeces		LOX as % of Total Merino Fleeces		70's and over		70's		66/70's		64/70's		64's		60/64's		Warp %		12 Months %		10/12 Months %		9/11 Months %		8/10 Months %		7/9 Months %		6/8 Months %		6 Months %		4/6 Months %	
	Bantu Origin	European Origin	Bantu Origin	European Origin	Bantu Origin	European Origin	Bantu Origin	European Origin	Bantu Origin	European Origin	Bantu Origin	European Origin	Bantu Origin	European Origin	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E
Herschel	21.67	Lady Grey 39.89	41.01	57.26	94.49	10.21	77.07	67.47	13.84	17.25	-	2.51	9.09	12.77	-	0.09	-	3.20	-	4.08	77.37	27.07	17.63	48.32	5.00	17.24	-	2.20	-	40.54	9.26	27.33	18.62	14.31	2.87	5.16	10.00	2.89	46.09	3.45	7.74	2.42	5.42	1.70
Glen Grey	20.92	Indwe 39.89	40.00	56.81	88.19	15.76	51.36	65.94	9.94	16.59	9.45	4.63	29.25	12.84	-	-	-	3.33	-	4.37	53.63	26.64	44.39	46.00	1.98	19.66	-	12.74	1.55	37.78	8.98	24.70	15.11	11.85	6.59	4.65	13.55	3.57	16.73	1.69	21.42	1.12	16.07	1.90
Fort Beaufort	[1]15	43.30	Vict. East 43.12	60.16	26.87	2.55	63.25	62.50	14.00	18.05	5.33	4.09	17.43	15.36																														
Victoria East	23.52	Adelaide 43.25	43.12	59.51	26.87	3.15	63.25	64.10	14.00	16.69	5.33	3.98	17.43	15.23																														
Middledrift	21.28	K. W. T. 38.44 [2]	40.19	54.40 [2]	100.00	2.04	57.99	60.29	14.68	18.26	-	3.77	27.33	17.68	-	10.53	-	14.15	-	11.93	79.01	30.83	20.99	24.54	-	8.02	-	2.69	65.52	28.42	-	26.87	5.25	14.08	14.29	7.61	4.60	6.73	-	7.50	-	3.26	10.34	2.84
Keiskammahoek	21.92	Stutterh. 41.86	41.78	57.97	100.00	-	67.69	64.52	8.57	17.71	6.26	2.81	17.48	14.96	-	3.22	-	10.94	-	11.54	78.69	32.26	17.99	32.30	3.32	9.74	-	2.37	-	36.05	2.72	21.72	3.46	14.67	-	6.84	30.92	7.69	30.26	5.68	23.00	3.37	9.64	1.61
Peddie	[1]12.5	Bathurst 39.60	45.34 [3]	56.65	-	3.54	63.50	60.60	16.60	20.89	4.15	3.06	15.75	15.45																														

1) Figures from 1965 Ciskei Wool Production - K. W. T. File.

2) Includes ± 20% "Native" Wool.

3) Includes ± 57% "Native" Wool.

B = Bantu Origin

E = European Origin

TABLE 40: NUMBER OF SMALL STOCK SOLD AT LOCAL AUCTIONS IN THE CISKEI AND AVERAGE PRICES REALISED IN THE YEARS 1958, 1965 TO 1967 [1]

District	1958			1965			1966			1967		
	Number	% of Total	Average Price R. c.	Number	% of Total	Average Price R. c.	Number	% of Total	Average Price R. c.	Number	% of Total	Average Price R. c.
Herschel	-	-	-	30	1.76	2.99	-	-	-	-	-	-
Glen Grey	19	16.24	3.43	330	19.35	5.89	123	4.25	6.70	158	2.66	7.31
Whittlesea	-	-	-	1,143	67.04	5.36	2,583	89.22	6.05	4,969	83.67	5.42
Cathcart	42	35.90	?	-	-	-	100	3.45	4.00	87	1.46	6.46
Middledrift	-	-	-	162	9.50	3.69	17	0.59	4.18	162	2.73	5.70
Keiskammahoek	-	-	-	-	-	-	-	-	-	475	8.00	4.66
Stutterheim	56	47.86	16.00 [2]	-	-	-	72	2.49	9.00	39	0.66	10.76
Peddie	-	-	-	40	2.35	1.31	-	-	-	49	0.83	4.30
Total	117			1,705		5.17	2,895		6.07	5,939		5.46

1) Adapted from Annual Agricultural Reports.

2) Ram Breeding Scheme: Rams sold at average of R16 each.

Table 41 merely serves to indicate that only a relatively small percentage, that is five to eight per cent of the small stock, are sold on the local auctions. The majority are sold to local butchers, 45 to 47 per cent, or slaughtered privately, 48 per cent. Thus, it appears that small stock are the major source of meat in the Bantu areas.

The annual turnover in small stock slaughtered or sold varies between five to six per cent of the total small stock population, but it would appear almost impossible to obtain an accurate picture of the actual number slaughtered privately each year, and these figures need to be treated with reserve.

Sheep are not slaughtered for ritual purposes, as far as can be ascertained, the reason being that they do not cry out when being slaughtered (Hunter, 1936).

(b) Sheep sent to the East London Abattoir:

During a period of 10 years, 1958 to 1967, 410 sheep were sent to the East London abattoir by Bantu farmers, and of this number, eight or 1.95 per cent, were condemned or detained. Seven were condemned for emaciation, while one was detained for cysticercosis. The number of sheep of Bantu origin, sent to this abattoir fluctuates but the tendency is to increase in numbers. In 1963, five were received, in 1964 the figure was 90, in 1965 - 69, 1966 - 50, while in 1967, 134 Bantu-owned sheep were processed.

Sheep originating from European farmers amounted to 107,307 in 1966 and, of this number, 295 or 0.28 per cent were condemned mainly for emaciation (152 sheep) and general pigmentation (23 sheep). Of the sheep slaughtered in 1967, 102,331 head, 141 or 0.14 per cent were condemned, 76 for having sarcocystis infection and 65 for being emaciated.

Although the number of Bantu-owned sheep is on the low side in comparison with European-owned sheep, the latter having an incidence of condemnation of 0.21 per cent, the official rejection of sheep carcasses of Bantu-origin is high, being 1.95 per cent. While the sarcocystis organisms can be controlled presumably by a reasonable level of hygiene, the emaciation is mainly a matter of improved winter nutrition, since all these rejections were made in the winter months.

2.11 GOATS:

2.11.1 Introduction:

The early Portuguese landing in the Table Bay area recorded the presence of goats, and Van Riebeeck found the Hottentots in possession of a "handful" of goats, while further inland, they were numerous and owned by the "aborigines". In a census taken in 1691, 220 Cape Goats were owned by the Colonists and increased to an estimated three and a half million in the 1890's (Speight, 1963). As previously mentioned, Theal (1882), refers to goats being in the possession of the Xhosa when first visited by the Europeans.

TABLE 41: TOTAL NUMBER OF SMALL STOCK SOLD OR SLAUGHTERED DURING THE YEARS 1958, AND 1965 TO 1967 [1)]

	1958		1965		1966		1967	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Sold Directly to Controlled Markets	-		Nil	-	12	0.03	537	1.3
Sold to and Slaughtered by Local Butchers	8,916		16,740	47.3	16,898	44.7	18,158	44.5
Sold at Local Auctions	117		1,705	4.8	2,895	7.7	5,939	14.5
Number Slaughtered Privately	14,890 (Large and Small Stock)		16,943	47.9	18,022	47.6	16,199	39.7
Total Slaughtered or Sold	-		35,388		37,827		40,833	
Number Slaughtered or Sold as a % of Total Small Stock Population	-		5.4		6.0		6.0	

1) Adapted from Annual Agricultural Reports.

Angora goats, owned by the Bantu, have been acquired from the European farmers in recent years, and are favoured in that they provide a means of obtaining a monetary return without necessitating slaughter, and are ideal from the ritual point of view, in that they are white.

2.11.2 Breeds and Breeding:

While the African short-hair type goat is most commonly found in the Ciskei, the Angora goat and improved Boerbok, are gaining in popularity. There is a paucity of data as far as goats are concerned, due, no doubt, to the goat's ability to survive under relatively difficult conditions, its low monetary value, and the fact that it is viewed with disfavour by the majority of the European Agricultural Officials.

The goat, particularly a white one, plays a major part in the ritual life of the Bantu, and contributes to the local available meat supply, fairly large numbers exchanging ownership for these purposes.

As indicated in Table 42, the African Goat predominates in the Ciskei and numbers, at an estimate, approximately 129,800 or nearly 56 per cent of the total goat population, while the Angora type number about 52,700 or approximately 23 per cent, and the Boerbok some 47,900 or 21 per cent of the total. It must be emphasized that these are estimates based on information supplied by the District Agricultural Officers, and can only be accepted in broad terms.

Rams appear to be in the region of four per cent, while the kidding percentage is estimated to vary from 35 to 115. In a trial count of goats in the Lower Madakana and Penhoek (Blikana) wards in Herschel District in 1967, kids, expressed as a percentage of the does or ewes, represent 42.9 per cent, while the rams, in terms of ewes, represented 17 per cent of the total. Of the total adult stock numbering 852, ewes comprised 76.4 per cent, rams 4.5 per cent and castrates ("kapaters") 19.1 per cent. In the Middledrift District, it was estimated by Agricultural Officials, that breeding ewes constituted approximately 75 per cent of the herd, with 20 per cent castrates and about four to five per cent rams, and that kidding occurred throughout the year. However, in the Whittlesea District, kidding occurred mainly in spring and autumn, and this appears to be the position in areas, other than the coastal plateau.

As with sheep, late castration is carried out in some locations, with the result that inbreeding has resulted in degeneration in body size, and in the quality of the Mohair, in the case of Angora-type goats, as is the position in the Herschel and Whittlesea Districts. The number of goat rams or bucks, castrated by officials in the Victoria East District, was 347 in 1965, 139 in 1966 and 89 in 1967, showing a fairly sharp decline in numbers over the past three years in spite of the increase in goat numbers in this district between 1966 and 1967.

TABLE 42: ESTIMATED NUMBERS OF VARIOUS GOAT BREEDS EXPRESSED AS PERCENTAGES, AND GOAT BREEDING STATISTICS FOR THE CISKEI 1)

District	Goat Breeds %			Kidding %	Castration Age in Months	% Rams
	Angora Type	Boer Type	African			
Herschel	70	-	30	60-80	-	-
Glen Grey	-	mainly	-	-	-	-
Whittlesea	75	25% crossbred	-	-	-	-
Fort Beaufort	-	-	100	-	-	-
Victoria East	-	-	100	115	8-9	-
Middledrift	-	Few Rams	100	35	-	4
Keiskammahoek	-	-	100	-	-	-
Stutterheim	-	mainly	-	-	-	-
King William's Town	-	Few Rams	mainly	-	-	-
Peddie	less than 5%	-	95 +	-	-	-
East London	-	-	100	75	-	3

1) Adapted from data supplied by District Agricultural Officials.

2.11.3 Nutrition:

This is practically identical to that for sheep, with the exception that shrubs and herbs are browsed to a much greater extent. Goats are run on a communal basis, along with sheep and are kraaled at nights with few exceptions. In some locations, for example those in Mooiplaats and Kwelera Locations in the East London District, where conditions are not so well suited to sheep, cattle and goats are the main livestock groups, no sheep being kept. The African-type goats in the Keiskammahoek District, are some of the largest goats in the Ciskei, and this is put down to the preponderance of bush of many varieties. In such bush-covered areas, the goat can play a useful rôle in bush control, as well as provide food. In the King William's Town District, it is noteworthy that the goat is making a re-entry in the bush regions, and improved Boerbok rams are being used on African Goat ewes.

2.11.4 Management:

This is more-or-less similar to that for sheep as both groups are treated as one flock or herd. Prior to being released from the kraals in the mornings, some of the better ewes are milked and yield between half to one pint each per day presumably above that required by the kids. The kids, in this case, are kept in separate enclosures at night. The goat's milk is used for domestic purposes. Goats are generally herded during the day, especially during the cropping seasons, until they are brought back to the kraals in the late afternoons.

As far as can be ascertained, little dosing is practised, and the debilitating parasites are similar to those occurring in sheep. In areas, such as Whittlesea, where a large number of herbs are eaten, the parasites appear to have but a slight and unnoticeable effect on goats, although the relatively low rainfall experienced in this district, is contributory. In other areas, parasites apparently have no effect or have a limited action, and this is said to be the case in Herschel District.

As regards the culling of stock, it appears that the goat is the first to be culled by the Bantu stockowner, if Middledrift and Whittlesea Districts can be taken as examples. The nuisance value of the goat as a non-respector of fences, induces owners to get rid of the goats first in most locations in the Ciskei.

Mortality is generally, fairly high in the case of kids, being as high as 10 per cent especially in the higher and colder winter regions, such as Herschel, where the severe winters are definitely a limiting factor in goat keeping. In 1965, 40 per cent of the goat losses were estimated to be due to cold conditions and 25 per cent to diseases (Annual Agricultural Report, 1965). In adult stock, the mortality rate seldom exceeds five per cent of the total goat population, the prevalent diseases being Heartwater (Rickettsioses), goat mange (Sarcoptic Mange)

and goat scab (Psoroptic Mange) caused by Psoroptis ovis. The latter mange, becomes endemic at times, and is a problem to control due to goat movements between locations and wards, and in many instances, due to the lack of co-operation on the part of the stock-owners.

Losses due to abortion, apparently did not affect Angora goats in the Herschel District to the same degree as was the position in some European areas.

2.11.5 Rôle of the Goat in Bantu Life:

While the goat supplies both meat and milk as well as Mohair in the case of the Angora, it also is kept for ritual purposes but its main value is as a supplier of meat. White goats are used for sacrificial purposes to placate, or as a thanks offering to the ancestral spirits, and this is where the Angora goat is in demand. When white goats are required urgently for divination or ritual purposes, comparatively high prices are paid for suitable goats, as much as R12 each being paid for the right animal. In the placating of the ancestral spirits, goats are considered to be less efficacious than cattle (Hunter, 1936).

Large numbers of goats are sold annually in certain districts such as Whittlesea. While the goat has an economic rôle in the life of the Xhosa and Fingo, the prices paid per goat at most auction sales are on the low side. At two sales in the Glen Grey District held in March and May, 1965, 11 goats averaged R4.58 each, while at a Middledrift sale, in September, 1964, 153 goats averaged R4.03; at Peddie sales in November, 1964 and March, 1965, 82 goats averaged R1.51 each, and Whittlesea, during the period 1960 to 1966 at six sales, 206 goats were sold and averaged R4.80 each. Bantu-owned goats slaughtered at the East London abattoir between 1958 and 1967, totalled 72 in number, of which one or 1.39 per cent was condemned for being severely emaciated.

Angora-type goats contribute to the incomes of the districts of Herschel and Whittlesea as can be seen in Table 43.

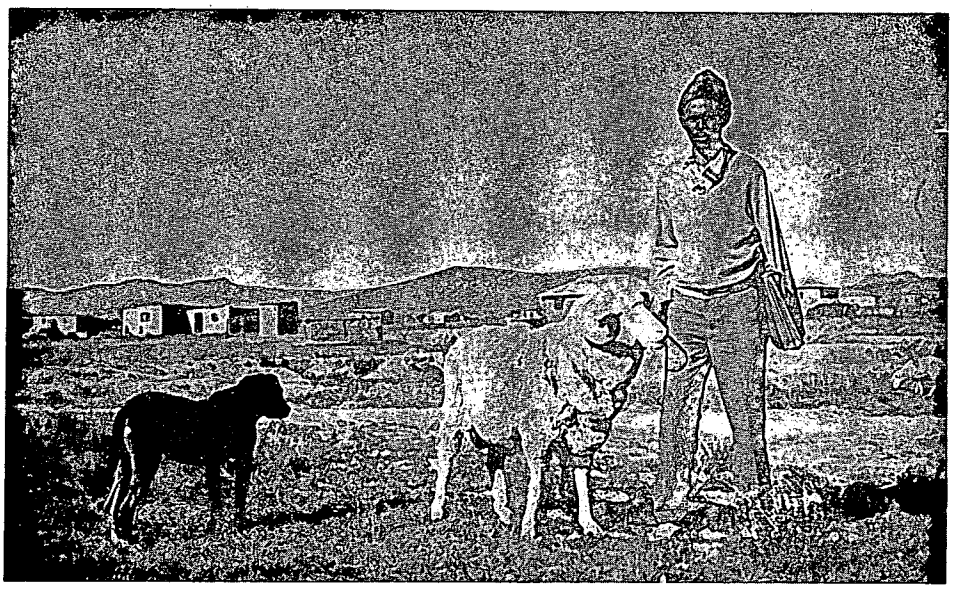
Herschel is the main producer of Mohair and has been over the 12 year period under review, with Whittlesea second in importance, producing an increasing volume of Mohair. Available production statistics for Keiskammahoek and Glen Grey are erratic, while the prices paid per pound in the former district, seem to be out of proportion when compared with the other districts, and it is felt that some of these figures cannot be too seriously considered. The higher quality of the Mohair produced in the Whittlesea area, is reflected by the prices paid per pound, being over 90 cents during the boom period.

Figures supplied by the Mohair Board (personal communication, dated 18th October, 1968) for prices paid to Bantu producers in the Transkei between the 1st July, 1967 to the 30th June, 1968, are as follows: East Griqualand 11.61 to 24.05 cents per pound; Pondoland 23.49 cents per pound; Temboland 14.80

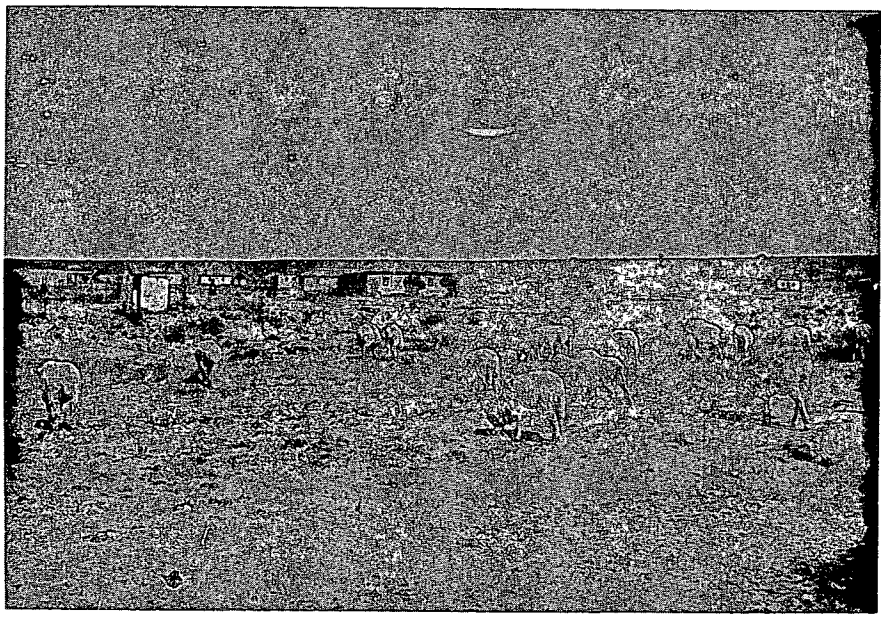
TABLE 43: ESTIMATED MOHAIR PRODUCTION AND VALUE IN THE CISKEI FROM 1956 TO 1967 [1)]

District:		Herschel			Whittlesea			Keiskammahoek and Glen Grey		
	Year	Mohair lbs.	Total Income Rand	Value per lb. cents	Mohair lbs.	Total Income Rand	Value per lb. cents	Mohair lbs.	Total Income Rand	Value per lb. cents
	1956	30,830	13,872	45.0	3,083	1,448	47.0			
	1957	40,000	14,000	35.0	600	240	40.0			
	1958	35,000	13,000	37.1						
	1959	35,000	12,000	34.3						
	1960	35,000	11,800	33.7				924	184	19.9 (GG)
	1961	50,000	12,000	24.0	626	340	54.3			
	1962	40,000	11,000	27.5	723	143	19.8	780	2,200	282.0 (KKH)
	1963	35,000	10,000	28.6	150	60	40.0	500	1,000	200.0 (KKH)
	1964	52,000	18,200	35.0	2,377	1,588	66.8			
	1965	40,000	8,000	20.0	3,791	1,972	52.0			
	1966	25,000	5,000	20.0	1,457	1,334	91.6			
	1967	30,000	6,000	20.0	13,627	2,848	20.9			

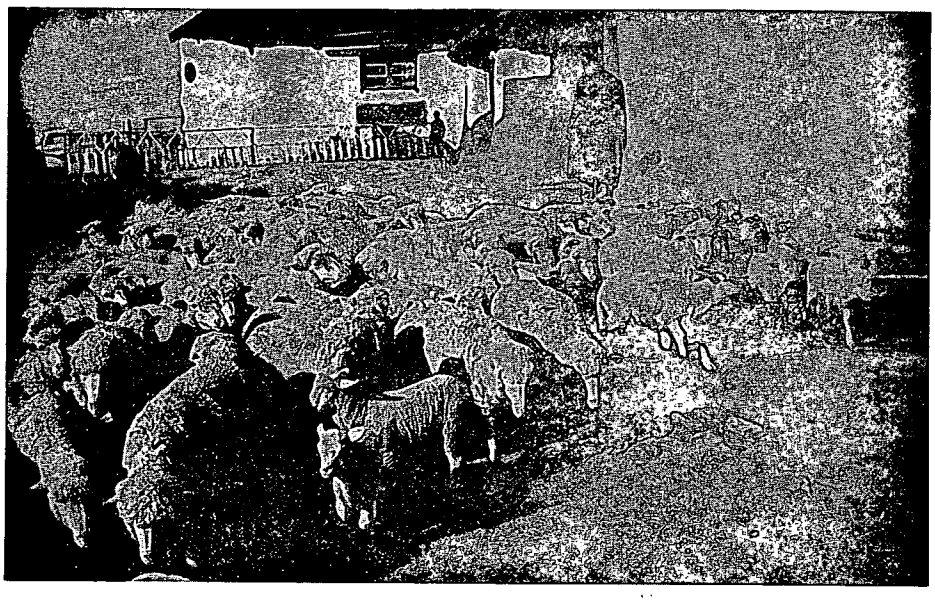
1) Adapted from Annual Agricultural Reports.



MERINO STUD RAM AND OWNER - HERSCHEL DISTRICT



MERINO-TYPE SHEEP - HERSCHEL DISTRICT



MERINO-TYPE FLOCK - STUTTERHEIM DISTRICT

to 37.21 cents per pound, with Idutywa area averaging 55.56 cents per pound.

Production figures for the Lesseyton Location (Whittlesea District) near Queenstown, indicate that in 1964, 854 goats averaged 1.05 pounds of Mohair each which was valued at 90 cents per pound; in 1965, 984 Angora-type goats averaged 1.12 pounds per goat, being worth 60 cents per pound; and in 1966, 1,260 goats averaged 1.11 pounds each, the Mohair being worth 50 cents per pound. The overall average was 1.10 pounds per goat at an average price of 61 cents per pound. All the Mohair was railed direct to the brokers.

A 1965 census of the goat population in the Herschel District, revealed that 1,550 goatkeepers owned 26,010 Angora-type goats, while the Boerbok-type goats numbered 26,285. Unfortunately, no further data was recorded.

2.12 PIGS:

2.12.1 Introduction:

It is estimated that over 96 per cent of the total pig population of the Bantu Ciskei, are of the "native" type or the African Hut-pig breed, the latter name being preferred. A scattering of the improved pig breeds, such as the Large Black, Large White, Tamworth and crossbred stock, occur in the various districts. It appears that domesticated pigs, in the hands of the Xhosa, were the result of shipwrecks on the eastern coast of South Africa, but there is little clarity on this somewhat contentious subject. Pig-farming in the Cape Colony, is said to have commenced as early as 1849 (Brookes, 1924).

The Hut-pig is a scavenger-type pig widely distributed amongst the Bantu in the Ciskei. It serves a most useful function, in that it acts, in numbers, as a "sanitary squad", and where pigs have been penned, the problem of human excreta in the vicinity of the residential areas in some locations, has to be faced. In one district, it was indicated that the pig, or pigs, generally belonged to the womenfolk, and this relationship apparently exists throughout the Ciskei (Schulze, 1968). However, there are many improved pigs which are owned by the men, and it can be assumed that only in traditional society does the pig belong to the women.

2.12.2 Breeding:

Table 44 provides information on the pig population, including some breeding statistics. The percentage boars, estimated in two cases, varied from five to 10 per cent, but the common practice of allowing the young boars to mate with the sows, prevails in a large area of the Ciskei. After mating has occurred, the young boars are castrated, and when sufficiently large enough, are sold or slaughtered between the ages of one to three years. This practice means that the genetic relationship must be higher than that normally expected, and that the possibility of inbreeding degeneration is present. However, this is

TABLE 44: ESTIMATED PERCENTAGES OF BREEDS,AND BREEDING AND MANAGEMENT DATA [1)]

District	Breeds %		Boars %	Number of litters per year	Av. No. in litter	Litter Size Range	Mortality % up to weaning	Measles	Slaughter Age - Years
	Hut-pig	Other							
Herschel	100	very few	-	2	6-7	5-9	20	90 +	2-3
Glen Grey	98	2	-	2	6-7	5-12	30	70 +	-
Whittlesea	100	few	10	1	6	3-9	10-20	v. high	1
Victoria East	98	2	-	2	5-6	4-7	-	90	2-3
Middledrift	100	few	-	2	5	-	50	80	2
Keiskammahoek	98 +	2	-	2	5	3-7	-	high	-
Stutterheim	98 +	2	-	2	7	2-10	30 +	Wartburg 40 Mgwali 10	-
King William's Town	98 +	2	-	1-2	8-9	2-14	30-40	50	-
Peddie	100	few	-	-	-	-	-	v. high	-
East London	100	few	5	1	6	3-10	1 +	75 +	any

1) Based on information supplied by Agricultural Officials.

difficult to assess, as no standards for comparison exist in the region.

It is generally conceded that two litters are born each year per sow, although in the Whittlesea and East London Districts, one litter per year is more common, the reason for this being unknown. The fertility of the sows is high considering the plane of nutrition, and is possibly, enhanced by the use of young virile boars. The gilts first display signs of oestrus from about six months onwards. The average litter size varies from five to nine in the various districts, but as few as two and as many as 14, have been noted. The relative absence of boars throughout the districts visited, was surprising. However, apart from the system mentioned previously, there are one or two pig-owners, in most locations, who apparently specialise in keeping a boar, or even two, and "hire" out these boars as, and when, they are required. The owner of the sow served by one of these boars, is required to feed and care for the boar until it is returned, and he is honour-bound to allow the owner of the boar first choice of one of the weaners in the litter, unless other arrangements have been made. Whittlesea and King William's Town are examples of areas where this practice exists.

2.12.3 Nutrition and Management:

Except in locations where they are required to be kept under control, the Hut-pig obtains a great proportion of its food by scavenging far and wide. Veld bulbs and roots, leaves and seeds of grasses and herbs, are devoured, as well as hut-scraps, melons and a small allowance of good or mouldy maize, the latter known as "mdlungu". As previously stated, human, and possibly other excreta, is readily eaten by these Hut-pigs possibly due to the high proportion of maize meal and other cereals eaten by the Bantu. In the Victoria East District, on the school children returning to classes after a break at a location school, the pigs all congregate in the "latrine" area to devour the human excreta. This is the reason why the incidence of measly pork is so high in pigs running free in the locations. The Stutterheim District serves as an excellent example in that the incidence of cysticercosis at Heckel Trust Farm is non-existant due to the pigs being kept in sties, while at Wartburg Location, the incidence is estimated as being in the order of 40 per cent, with Mgwali Location about 10 per cent. Pig management in locations where the pigs scavenge, is virtually non-existent.

Where pigs are penned, there is some improvement in the management level in that the pigs are fed more maize, and green edible weeds from the lands and veld, are brought to the sties, usually on a daily basis. The standard of hygiene, feeding, watering and the size of the sties on occasion, leaves a great deal to be desired. In one such pen, a pig had been dead for a day or more, and had not been removed up to the time of the writer's visit. In the Herschel District, a pit dug in the ground, served as a "pen" to hold two to three weaners, until

such time as erosion caused the pit to erode through to the water-course, upon which a pen, four feet in diameter, was built of packed stone (see photo). This was but a slight improvement on the previous quarters.

There are areas where the improved pig breeds are kept under good conditions, and pig-production meals or other concentrates, such as wheat bran, germ-meal, sorghum grain, beer-hall residues, and maize, are fed. The pens and shelters, as well as the overall management, can be termed "reasonable" in such areas, but unfortunately, the pig has no "pride of place" in the traditional make-up of the Bantu, as is the case with cattle.

Weaners are purchased from European famers in the area on occasion as, for example, in the Stutterheim District, and these are fattened in pens.

Prices paid for Hut-pigs at local sale-yards in each district, are necessarily low due to the gamble involved as to the presence of measles. Examples of numbers offered and sold, and of prices paid, are presented in Table 45.

TABLE 45: PIG SALES STATISTICS IN TWO DISTRICTS [1)]

District	Sale Pen	Number of sales held	Period	Number offered	Number sold	Number sold as a % of number offered	Average price R. c.
Glen Grey	Hillside	4	1963-65	395	184	47	9.14
Middledrift	-	6	1963-65	600	453	76	7.48

1) Adapted from Annual Agricultural Reports.

At the Hillside Sale Pen, no pigs were sold at the first sale, 27 at the second sale averaged R13.74, and 122 at the third sale averaged R9.14, while at the fourth sale, the average price paid for 35 pigs was R5.60. This drop in price within a period of a year, is unequivocally due to speculators having a high percentage of their pigs sent to the abattoirs, detained or condemned. At the Middledrift sales, the average prices paid per pig per sale varied from R5.37 to R10.80. Out of a total of 36 sales held at Sterkspruit in the Herschel District between 1959 and 1965, at Oxton and Kamastone in the Whittlesea District between 1964 to 1966, and Peddie, 1964 to 1966, only 23 pigs were offered for sale, but only one of these was sold for R11.00.

In the East London District it was estimated by the Agricultural Official that some 15 to 20 per cent of the pigs slaughtered, are used for home-consumption purposes, the remainder being sold, whereas in the Middledrift area approximately five per cent are sold, the remainder being used for home-consumption.

In other areas, it appears that most are sold usually within the location concerned. Pork is eaten fairly widely today, except by the Zionists, some herbalists and others. The existing taboos concerning pork, have already been indicated earlier. Over two per cent of the total number of pigs slaughtered at the East London abattoir, originated in the Bantu areas.

2.12.4 Meat Grading:

The grading of 291 positively identified Bantu-owned pigs at the East London abattoir, was as follows during the period July to December, 1967:

TABLE 46: GRADING OF BANTU-OWNED PIGS AT THE EAST LONDON ABATTOIR, JULY TO DECEMBER, 1967

Class	Grade	Pig grade numbers expressed as a % of the total Bantu-origin pigs	Total pig grade numbers expressed as a % of the total number of pigs slaughtered
Porker	Grade I	1.7	21.2
	Grade II	4.5	20.2
	Grade III	34.3	11.8
Baconer	Grade I	1.4	12.4
	Grade II	3.4	9.5
	Grade III	4.1	4.5
Sausage Pigs		47.1	13.9
Larders		2.1	0.5
Roughs		1.4	3.7

As seen above, the greatest number of Bantu-origin pigs are graded as Porker grade III and as Sausage pigs, both these combined representing over 81 per cent of the total Bantu pigs slaughtered. In the case of the total number of pigs slaughtered at the abattoir and which are mainly of European origin, the tendency is for a more even distribution among the classes with the exception of larders and roughs.

An observation made by a Meat Board official in East London, is that the Bantu-origin Sausage pigs have a minimum of fat compared with those of European origin, the latter having a great deal of fat. This reflects the different nutritional levels involved.

2.12.5 Mortality:

Up to weaning, the mortality is apparently high, being somewhere between 25 to 30 per cent of all piglets born alive. There are, however, no available recorded data to substantiate this high mortality rate.

2.12.6 The Incidence of Cysticercosis in Pigs:

A high incidence of measles is very apparent from a study of the daily slaughter records at the East London abattoir, between 1958 and 1967. Both Cysticercus cellulosae and Echinococcus granulosus have been included as both can have serious effects on man when infected meat is ingested (Miller & West, 1953). While the bladder worm (C. bovis) of the bovine can survive for up to about a year, the bladder worms of the pig (C. cellulosae and Echinococcus sp.), are apparently able to survive for up to a period of 10 years (Monnig & Veldman, 1956), a factor which needs to be remembered in any programme designed to overcome the high incidence of measly carcasses.

Over the ten year period 1958 to 1967, of the total number of pigs slaughtered each year, a considerable number are either detained for freezing, or are totally condemned and thus lost as food for man. As in the case of bovines, the daily slaughter sheets were checked for pigs sent in by Bantu farmers and totalled for each year, and it is felt that the actual position is represented by the figures in Table 47.

2.12.7 Other Causes of Carcass Rejection at the East London Abattoir:

Of the total carcasses detained or condemned at the East London abattoir, 9.3 per cent or 34 carcasses, were rejected permanently or condemned due to Tuberculosis, with 24 carcasses or 6.6 per cent of the total number; Sarcocystis with four carcasses condemned; emaciation with four carcasses, and Septic Peritonitis and Septic Pneumonia with one carcass each.

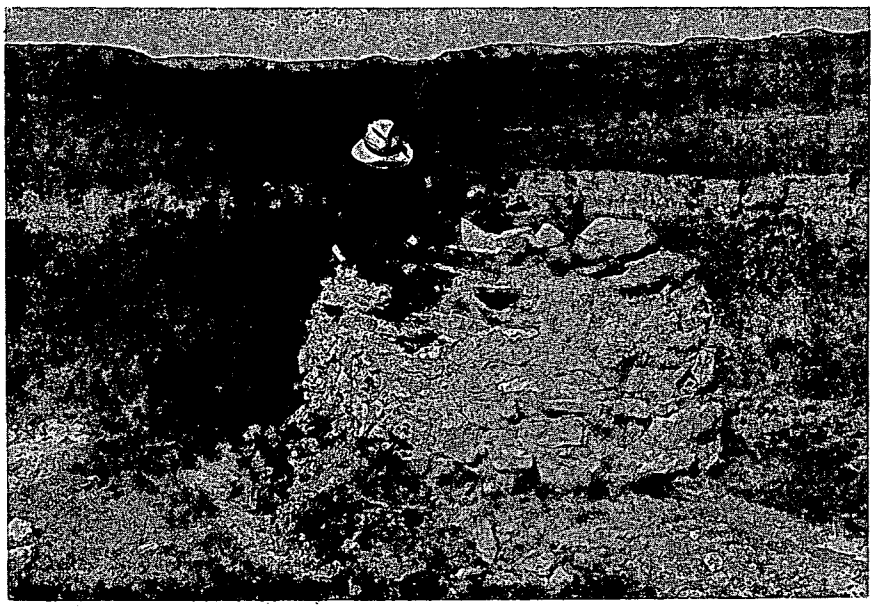
2.13 EQUINES:

2.13.1 Introduction:

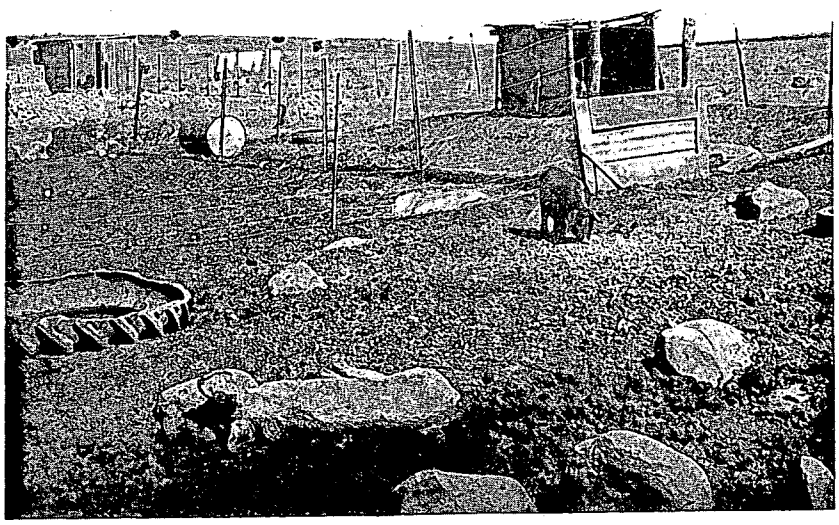
Equines were never part of the Xhosa heritage and were obtained by raids into the Cape Colony, or were found as strays, or were presented to the chiefs by "travellers and military gentlemen". Kay (1833) goes on to mention that some of the young chiefs possessed some particularly fine studs. Horse-sickness decimated large numbers from time to time (Cory, 1930). The donkey, or ass, made its appearance in the Bantu areas in much more recent times, and was most likely obtained from the Europeans. There are approximately 4,242 donkeys in the Bantu areas of the Ciskei, the largest number, 1,941, according to the 1967 Annual Agricultural Report, being found in the Herschel District, but this had increased to 2,200 according to the 1968 census. Glen Grey had 1,503 and Peddie 524. There are even fewer mules, the largest number occurring in the King William's Town area where there are 80, followed by Middledrift with 20, and Peddie with 18 in 1967. Table 17 should be consulted for the various district totals, and here it is seen that horses number nearly 9,600 being, by far, the most numerous of the equine group.

TABLE 47: MEASLY MEAT (CYSTICERCUS CELLULOSAE AND ECHINOCOCCUS GRANULOSUS) IN TOTAL (EUROPEAN AND BANTU), EUROPEAN AND BANTU-OWNED PIGS SLAUGHTERED AT EAST LONDON ABATTOIR 1959 TO 1967. (PERSONAL SURVEY)

Year	Number of Pigs Slaughtered				Detained Carcasses							Condemned Carcasses							Total Number of Infestations						Frequency of Incidence			Total Bantu Stock Detained or Condemned for all causes	C. cellulosae and Echinococcus granulosus incidence as a % of all causes
					Total		European Origin		Bantu Origin		Bantu as a % of Total Number Detained	Total		European Origin		Bantu Origin		Bantu as a % of Total Number Condemned	Total		European Origin		Bantu Origin		One Case In:				
	Total	European Origin	Bantu Origin	Bantu as % of Total	Number	% of Total Number Slaughtered	Number	% of European Number Slaughtered	Number	% of Bantu Number Slaughtered		Number	% of Total Number Slaughtered	Number	% of European Number Slaughtered	Number	% of Bantu Number Slaughtered		Number	% of Total Number Slaughtered	Number	% of European Number Slaughtered	Number	% of Bantu Number Slaughtered	Total	European Origin	Bantu Origin		
1958	15,114	15,079	35	0.23	28	0.17	25	0.165	1	2.86	3.85	140	0.93	138	0.92	2	5.71	1.43	166	1.10	163	1.09	3	8.57	91.04	92.51	11.67	5	60.00
1959	9,245	9,197	48	0.52	44	0.48	43	0.47	1	2.08	2.27	172	1.86	165	1.78	7	14.58	4.07	216	2.34	208	2.25	8	16.66	42.81	44.22	6.00	9	88.88
1960	10,530	10,492	38	0.36	50	0.47	49	0.46	1	2.63	2.00	209	1.98	203	1.93	6	15.79	2.87	259	2.45	252	2.39	7	18.42	40.66	41.63	5.43	8	89.50
1961	12,137	12,054	83	0.68	5	0.04	5	0.04	0	0	0	153	1.26	144	1.19	9	10.84	5.88	158	1.30	149	1.23	9	10.84	76.82	80.90	9.22	10	90.00
1962	11,316	11,208	108	0.95	8	0.07	8	0.07	0	0	0	109	0.96	98	0.87	11	10.19	10.09	117	1.03	106	0.94	11	10.19	96.72	105.74	9.82	14	78.57
1963	10,422	10,193	229	2.20	10	0.10	9	0.09	1	0.44	10.00	380	3.65	351	3.37	29	12.66	7.63	390	3.75	360	3.46	30	13.10	26.72	28.31	7.63	32	93.75
1964	11,091	10,524	567	5.11	26	0.23	22	0.20	4	0.71	15.38	465	4.19	361	3.25	104	18.34	22.37	491	4.42	383	3.45	108	19.05	22.59	27.48	5.25	111	97.30
1965	12,730	12,234	496	3.90	7	0.05	7	0.05	0	0	0	349	2.74	276	2.17	73	14.72	20.92	356	2.79	283	2.22	73	14.72	35.76	43.23	6.79	80	91.25
1966	14,003	13,652	351	2.51	7	0.05	5	0.04	2	0.57	28.57	151	1.08	122	0.87	29	8.26	19.21	158	1.13	127	0.91	31	8.83	88.63	107.50	11.32	34	91.18
1967	12,717	12,206	511	4.02	9	0.07	8	0.06	1	0.20	11.11	156	1.23	107	0.84	49	9.59	31.41	165	1.30	115	0.90	50	9.78	77.07	106.14	10.22	61	81.97
Total	119,305	116,839	2,466	2.23	192	0.16	181	0.15	11	0.45	5.73	2,284	1.91	1,965	1.65	319	12.94	13.97	2,476	2.08	2,146	1.80	330	13.38	48.18	54.45	7.47	364	90.66



PIG-STY - HERSCHEL DISTRICT



PIGS - VICTORIA EAST DISTRICT

TYPICAL PIG PENS (right) - LIVESTOCK KRAALS (left)

2.13.2 Horses:

(a) Breeds and Breeding:

Numerous breeds, especially the Thoroughbred, appear to have had genetic influences on the present "Native" horse. The Basuto Pony has Arab, Barb, Persian and Thoroughbred blood in its make-up, being directly descended from the Cape Horse (Summerhays, 1953) and, apart from descendants being present in the Herschel District, it is represented in other Bantu areas of the Ciskei, but has intermingled with other breeds latterly, most probably the Thoroughbred and the Cape Horse. Apart from Herschel, where the Basuto Pony type exists being 1,945 in the year 1967, and possibly parts of Glen Grey District, the common breed is thus the nondescript type referred to as the Native Horse. In many respects this is a smaller edition of the Thoroughbred, the latter breed having played a decisive part in the breeding of this type. It most probably averages between 800 to 900 pounds in weight and is usually maintained in reasonable condition.

Little data is available on the breeding side and the following information is based on discussions with various Agricultural Officials in the Ciskei. Stallions occur at a high level in some districts, being about five to ten per cent of the total adult, horse population, although this can go as high as 40 per cent. The reason for this high figure is that males are only normally castrated between the ages of four to eight years of age, and up to the time of emasculation, are used for stud purposes. An estimation of the number of brood mares and geldings is difficult to arrive at, but it would appear that the former make up about 50 per cent of the adult population, that is, approximately 4,800, and the latter about 40 per cent. The breeding rate is undetermined.

(b) Nutrition and Management:

Apart from veld grazing, the horse receives very little else, except that the day preceding the day a horse is required for riding to town, it is placed on the best available grazing in some districts, and it appears that a closed or rested camp is sometimes used for this purpose. Normally the horse is grazed in the vicinity of the huts or residential site and, in many instances, a tie is used so that the horse is readily available when required. No minerals are fed to horses as far as can be ascertained.

The breaking-in process is just as the word implies, and the general handling of the horse leaves very much to be desired, and this applies especially when being ridden in most instances.

(c) Prevalent Diseases, Parasites and Mortality Rate:

Horse-sickness occurs almost universally in the Ciskei with the exception of the Herschel District. In some areas, like Glen Grey, up to 50

per cent of the owners immunise their horses annually, while in others, for example Middledrift, less than about two per cent inoculate. Vaccine is obtainable through the local Bantu Affairs Commissioners or Agricultural Officers.

There has been, and probably still is, a high incidence of Dourine, caused by Trypanosoma equiperdum, in the equine population in the Middledrift area according to the Agricultural Officer, and this disease quite likely occurs in other districts as well. Being a venereal disease, it can spread rapidly and the mortality is generally in the region of 50 per cent (Mönnig & Veldman, 1956).

Mange, usually of the Sarcoptic type, has been found on horses in the East London District, but its incidence generally has not been determined.

Bots (Gastrophilus) occur in most areas, more especially in the coastal belt, and no dosing is practised. Mortality of the horse population as a whole, is estimated as being about three to five per cent.

(d) The Rôle of the Horse in the Life of the Xhosa and Fingo:

The horse plays a very small rôle in the economic life of the Bantu. Those sold, averaged the following prices on the local auctions in the districts mentioned: East London: R20, six being sold on three sales; Herschel: R22.50, where four were sold on three sales; and Whittlesea: R32, where nine were sold on three sales.

The horse is occasionally seen being used in harness, as a draught animal in the pulling of a single-planter unit, for example. However, as riding animals they are most important, although the motorised scheduled and private transport is beginning to make social changes in the traditional life of the rural Bantu.

The horse also plays a fairly important rôle in recreation and sport in districts, such as Herschel, Glen Grey and Whittlesea, where race tracks have been constructed. At Sterkspruit in Herschel District, a race track of over one mile in length has been laid out, and horse-races are held on the average three to four times per year, being extremely well attended. The jockeys wear "silks" and races are held according to age classes and distances. Girls also take part in the races as jockeys and some are said to be outstanding. On-course betting is part of the scene and a sizeable sum of money is involved.

As a source of meat, the horse is scorned by all except the Basutos (Lesothos) in the Herschel District. These people eat the flesh of all equines and actually dry the surplus meat in much the same manner as for biltong, as previously indicated.

2.13.3 Donkeys and Mules:

In both groups the nutrition and management is similar to that of the horse, the donkey being used as a pack-animal mainly, while the mule is used as a draught animal in harness. With official pressure on the stocking rate

in the rehabilitated areas, donkeys and mules are culled out first in most instances, along with the horse, and this is the reason why the ox is being used for riding purposes again. The womenfolk carry heavy loads on their heads, and this is mentioned as being one reason why the donkey most frequently is culled. Donkeys normally sell for between R2.50 and R4.00 each, but in the Peddie District, eight were sold in November, 1964 for 50 cents each.

One landowner in the King William's Town area has discarded oxen as draught animals and uses six donkeys to do his ploughing because of the donkey's ability to survive under difficult environmental conditions.

2.14 POULTRY:

2.14.1 Introduction:

The Hut-fowl, as far as can be ascertained, originated from poultry reported to be in the possession of the Xhosa by Portuguese sailors in the 15th Century (Theal, 1882; Theal, 1916). These evolved, probably with infusions of blood introduced by the early Portuguese and the early Cape Colonists, into a hardy type which today survives under indifferent nutritional conditions. Lichtenstein, quoted by Gericke (1952), reported that the Xhosas had no poultry, but that certain "Northern Tribes" had a small type of fowl.

There are an estimated 232,330 (1967 Agricultural Report) poultry of all types in the Bantu Ciskei, and, of this number, the African Hut-fowl forms the greatest number, probably being in the region of 97 per cent or more of domestic poultry. It is commonly seen wandering around the huts and lands, and obtains most of its food from the veld, earth and scraps from the hut, with a small quantity of maize grain provided usually on a daily basis.

2.14.2 Breeds:

Apart from the Hut-fowl, which predominates, improved poultry breeds are slowly being introduced into most districts, especially those near the European areas. Such breeds are the New Hampshire, Rhode Island Red, Black Australorp, Light Sussex and crossbred stock.

Inbreeding, in the case of the Hut-fowl, is a feature of poultry-keeping, but to what degree, needs further investigation over a long period.

Small numbers of geese and Muscovy ducks are kept by a few individuals but are negligible as sources of food at present.

When enquiries were made as to the colour preference for fowls, it was pointed out by the Agricultural Extension Advisers, that dark fowls, red, brown or black, were preferred since white fowls were easily spotted by hawks, and were taken more easily. This probably also applies to sitting hens at night time, but in this case, they can be more easily noted and stolen. Poultry are generally regarded as being the possessions of the womenfolk.

2.14.3 Nutrition:

As mentioned in the preceding section, the Hut-fowl obtains the major portion of its food by scratching round the huts, veld and lands, with small quantities of scraps and concentrates included. Where the improved breeds are kept in runs, provision is made for the feeding of proprietory growth and laying mashes. Based on experience, it is the better educated Bantu, such as the school teachers and Agricultural Advisers, who go in for semi-intensive poultry-keeping. In the Gaga Location, Victoria East, the poultry-keeper with the largest numbers, is a teacher and her husband a headmaster. Early schemes, involving semi-intensive poultry-keeping, were started in the Middledrift District in the past. In these schemes, a landless person received one eight of a morgen plot and built wood and daub huts under iron, to house the hens, which were obtained from the Fort Cox College of Agriculture at reasonable prices. The eggs were marketed through the Egg Circle. This scheme does not appear to be flourishing very well today.

2.14.4 Egg Production:

The Hut-fowl lays eggs in batches of 10 to 12 over a period of about two weeks, then goes broody. This is repeated about four times in a season, and each hen is capable of rearing between 24 to 30 chickens each year, depending largely on local conditions. It is not uncommon to find families with one hen only, as is the case in the Victoria East and Middledrift areas, but five and more, are more frequently encountered. The size of the eggs is small being approximately one and a quarter to one and a half ounces, and the eggs are brown-tinted.

Where the improved breeds are kept, the average daily egg yield lies between a 45 to 50 per cent lay over a period of about four to five months, after which it declines until the hens cease to lay at the end of seven to eight months. The eggs, after the pullet stage, average about two ounces in weight. Flocksize, where the improved breeds are kept, varies from six up to 100 or more hens.

While the educated Bantu have no colour preference as far as eggs are concerned, the traditionalists or "Reds", prefer the brown-tinted eggs, although this can apparently, vary from district to district. For example, according to the Bantu Agricultural Extension Advisers in Glen Grey, the colour preference is predominantly in favour of white egg-shells, while in the Whittlesea, Herschel, Middledrift and the other districts, light brown shell colour is preferred. One explanation is that, due to European influences, the white egg-shell is associated with better quality, as is the case with maize.

The circumcised young men, during their period of isolation, prior to being accepted into adult society, apparently can "steal" poultry from those

owners not taking adequate precautions, and no charges can be laid.

2.14.5 Meat Production:

With the exception of a few Bantu farmers in the Victoria East District who, through the local Agricultural Official, purchased about 3,500 crossbred, Black Australorp/White Leghorn, cockerels, which were subsequently caponised, fattened and sold to travellers on the trains passing through Alice, very little specialised table-bird production occurs.

The Hut-fowls are mostly for home-consumption, a few being sold when funds are required by the womenfolk. In the Whittlesea District, poultry are considered to be one of the largest sources of meat in the diet of the inhabitants.

2.15 HIDES AND SKINS:

Hides and skins play a comparatively important part in the economic life of the Xhosa and Fingo, because of the unusually high stock loss rate in the Ciskei, especially in times of drought. Annual fluctuations in the numbers of hides and skins occur, and these are greater after drought years and appear to be partially correlated with the amount of rain falling in the growing season and hence, with veld growth. Diseases also account for a large number of deaths and the subsequent larger number of hides and skins being marketed.

TABLE 48: HIDES AND SKINS SOLD AND AVERAGE PRICES RECEIVED - 1964 TO 1967 1)

Year	Number of Hides Sold	Average Price Received R. c.	Hides sold as a % of the Total Cattle Population	Number of Skins Sold	Average Price R. c.	Skins sold as a % of the Total Sheep Population
1964	17,696	1.26	7.8	38,890	-	5.5
1965	27,162	1.05	12.9	45,793	0.59	6.9
1966	12,476	1.20	6.3	25,384	0.36	4.0
1967	3,521	1.36	1.7	16,689	0.23-1/4	3.7

1) Extracted from Annual Agricultural Reports.

As clearly reflected in the above Table 48, 1965 was a drought year. Considerable annual fluctuation in numbers of hides and skins sold, occurs. Approximately 6.5 per cent of the hides sold in 1967, were handled under the improved scheme and obtained a higher price, that is R1.40 as compared with R1.05. About 7.4 per cent of all skins sold were handled under the improved scheme in 1967, and the improved product averaged $33\frac{1}{2}$ cents per skin as compared with $22\frac{1}{2}$ cents. The value of these improved schemes is undoubtedly proved and will certainly gain more converts in future years.

The decline in the number of hides and skins sold over the past four years, is a most favourable reflection on the effectiveness of the rehabilitation schemes, especially as applied to grazing areas. However, the severe drought of 1967-1968, and 1968-1969 is expected to produce an unprecedented number of hides and skins for sale.

The average prices received for hides and skins are very low compared with prices paid for abattoir hides and skins. Most Ciskei hides, about 60 per cent, are graded thirds or fourths and rejects, and only about 40 per cent of the total are graded first or second, according to a hide and skin expert at Billson's (Hall, 1968). The basis of grading is as follows:

Grade	Number of Defects:		% Sound hide in One Piece
	in the butt	outside the butt	
First	1	3	98
Second	2	3	75
Third	50% unsound		50
Fourth	75% unsound		25

After the Fourth grade, the hide is considered to be a "reject" and is a comparative loss to both the trade and producer being worth just over half of the fourth grade. The hair side is carefully scrutinised, since most of the damage is external. It seems apparent that Bantu Ciskei hides are much lighter compared with those originating from European farms, the apparent differential factor being the level of nutrition commonly prevailing in the Bantu areas (Hall, 1968). Hides of Bantu origin are usually badly flayed, processed and stored, and the greater proportion of these, appear to originate from the Bantu Homelands. It was further mentioned that the using of "bad" salt by the Bantu, was the cause of discolouration and hence downgrading, and it was pointed out that the sheep skins from the Bantu Ciskei were lacking in density (Hall, 1968).

A hide and skin broker of King William's Town was approached, and the following information is derived from the long experience of this broker in the handling of hides and skins (Murray, 1968). Approximately 90 per cent of all hides and skins are flayed by the "kwedini" with little or no supervision by the owner, and areas containing sub-cutaneous fat, unnecessary cuts and discolouration resulted. Some Bantu farmers still have the habit of dragging the hides through the manure in the kraals in the belief that this treatment facilitates curing. To-day, the majority of hides and skins are taken, in the "green" or uncured state, to the local trader or broker, who does the curing, but as many

animals are slaughtered on a Saturday, such hides and skins may only reach the trader after a lapse of about two days. By this time, bacterial action has commenced with consequent deleterious effects. The trader generally pays out at a flat rate based on the third grade price, which, at present, is five cents per pound, and hence there is no incentive for the progressive farmer to improve on his handling of these items.

Tick damage is also a feature of hides from most areas in the King William's Town area, and especially the Amatole Basin in the Middledrift District. Drought also has a marked effect on the condition of the hides and skins and lowers the value of the article. This broker (Murray, 1968), mentioned that at the height of the drought in 1949, he had up to 8, 000 hides on hand at any one time, while in the drought of 1968, about 3, 000 hides was the maximum, and the reason is put down to the improved grazing and watering conditions resulting from the execution of the plans for Betterment Areas. Taking one broker's hides (Catalogue 8/8/1968) totalling 72, 434, the following grades were obtained:

Grade	% of Total	Approximate Value per Pound in Cents
First	8. 28	13
Second	11. 10	12
Third	46. 92	8
Fourth	16. 92	$5\frac{1}{2}$
Reject	16. 83	$3\frac{1}{2}$

Of the total hides, 80 per cent would be of Bantu origin, the remaining 20 per cent coming from European farmers. Very few of the hides of Bantu origin would qualify for the first two grades, the majority being in the third, fourth and reject classes. The above prices fluctuate fairly widely according to the laws of economics. Light hides, on an air-dry basis, weigh between nine and 18 pounds, and are mostly of Bantu origin.

Sheepskins from the Bantu areas have numerous cuts and are poorly cured, and low prices are received for "native" skins on the market, the price in August, 1968, being about one and a half cents per pound on a dry-basis. Abattoir skins, "green", were purchased at 5. 93 cents per pound for second grade skins with about half an inch of wool. "Country" or "native" skins netted four cents per pound on a dry-basis, and if damaged, only one and a half cents would be paid, and as most were damaged, the lower price was paid out.

Arising from this discussion with the King William's Town broker, were the following points. Unweathered horns, in good condition, are worth two cents each, while bones were worth one cent per pound. Bantu boys and girls gather

up these bones from the locations and bring them into the brokers. Bantu men and women won't carry bones, and the reason is not at all clear (Murray, 1968).

One of the largest users of hides in the Border area, King William's Town Tanning Company, was approached and the following information was provided by the Company Secretary. Only wet salted, abattoir hides were purchased, while the dry-salted ones, emanating chiefly from the Bantu, were not used as these were inferior and lacked quality, having external markings on them. Drought affected the value of the leather having a de-naturing effect on the fibre resulting in fibre damage, which, on the resumption of good feeding conditions, was restored up to a degree. Most leather, of Bantu origin, would fall in this category, the hide being thin, with an undernourished fibre structure and resulting in leather lacking in strength which was referred to as "empty leather" in the trade. Some 2,000 hides are processed by this factory each month.

2.16 PROGRESSIVE STOCKMEN AND AGRICULTURALISTS:

An endeavour was made to arrive at a fairly accurate idea of the percentage of stockowners and agriculturalists who could be counted as being leaders in their field or "progressive", and this is based on the Agricultural Officials' opinions and estimations in each district. A "progressive" farmer is taken to be one who is prepared to try out new ideas or methods of operation, and who maintains a reasonably good standard of farming generally, with no retrogression. It is perhaps significant that the highest evaluation is given to a predominantly Fingo district, Victoria East, where the rating was estimated to be 15 to 20 per cent of all farmers. Herschel is next with a five to 10 per cent rating, and the other districts are rated as follows: Five to six per cent - Glen Grey, Stutterheim (Mgwali seven per cent and Wartburg four per cent) and King William's Town, four per cent and less; East London with 3.5 per cent; Whittlesea - one to three per cent; Middledrift - two per cent and Peddie - "very few". At Keiskammahoek, no figure was ventured due to the Agricultural Officer being recently appointed to the post. An overall estimate for the Ciskei has been put at five to 10 per cent by a Senior Agricultural Official.

In the Whittlesea District, about 5.4 per cent of the livestock owners are women, while on the Shiloh irrigation scheme, 17 of the 166 stockowners are women, based on the 1968 census.

The Glen Grey Agricultural Officer estimated that if farmers were constantly approached and encouraged by the Agricultural Extension Advisers, the figure mentioned for this area could be doubled or trebled. It is also interesting to note the effect of the presence of a European Agricultural Officer on the Heckel Trust Farm where approximately 50 per cent of the farmers were rated as being progressive.

2.17 AGRICULTURAL SHOWS, FARMERS' DAYS AND DEMONSTRATIONS:

(a) Shows:

Initially shows commenced in the Glen Grey District and have spread to other districts.[1] In some districts, for example Herschel, they are held on an annual basis, while in others they occur infrequently. In 1958, seven such shows were held with an attendance of some 1, 550 people, while in 1959, ten shows were held, the Middledrift show alone attracting 810 people.

Herschel District is taken as an example to indicate how these shows operate on a district basis. Tribal shows are organised so that the six different ethnic groups, Hlubi, Myemane, Sotho, Amavundle, Qwathi and Batlokwa each have a show in their respective areas, usually during the month of May. The best exhibits or competitors from each of the tribal shows then compete at the intertribal Central Show held at the Sterkspruit Showgrounds. In 1967, eight tribal shows were held, the largest one being at Tugela Location, attracting 391 entries and a "gate" of 120 men, 145 women and 235 children. The 1967 Central Show had 600 entries, attracting 800 adults and 600 children, and the classes included livestock, hides and skins, farm and home produce, needlework and handcrafts as well as riding competitions. The 1968 Central Show, due to adverse farming conditions, attracted 432 entries and was held during early June. The exhibits, according to the judges, represented a marked improvement over the previous show and this tended to illustrate the fact that the regular exhibitors now appreciated that poor quality livestock should not be exhibited.

(b) Farmers' Days and Demonstrations:

Now that the era of agricultural extension has seriously commenced, lectures, demonstrations and farmers' days will become commonplace. In 1958, 1, 654 lectures and demonstrations were given to a total number of 28, 739 people or 8. 95 per cent of the total Bantu population, while during 1959, 1, 578 lectures and demonstrations were attended by 21, 568 or 6. 69 per cent of the total Bantu population in the Ciskei. Farmers' days held during 1959, totalled nine which were attended by 850 people.

Farmers' associations totalled eight in number in 1959, and had a membership of 202 members, but recent Annual Agricultural Reports make no reference to these associations.

At a meeting of the Agricultural Extension Advisers in February, 1967, in the Herschel District, it was intimated that the general feeling amongst the people was that all land and stockowners should be members of farmers' associations, and that a law be promulgated to make membership compulsory.

(1) The first Fort Hare Agricultural Show was held in 1923 (Germond, 1968)

CROP PRODUCTION AND PASTURES : STATISTICS AND SYSTEMS

3.1 INTRODUCTION:

The early description of parts of the present Ciskei were indeed glowing. Kay (1833) describes the Chumie Mission area as being "fine and very fertile, affording abundant pasturage for cattle, and possessing a soil that might be rendered exceedingly productive, if properly cultivated." He further describes the Chalumna River area, which today is part of Released Area 33, as having excellent pasture "well studded in general with herds of cattle." Patterson (1779) describes "Caffreland" as a "country well-watered and produces excellent pasture for cattle," and the soil as being so fertile that vegetation grew luxuriantly. Roberts (ca. 1890) also refers to the well-watered state of British Kaffraria and says of the soil that it "is not so rich as that of Natal, but it is quite equal to the best of the coast lands of Cape Colony."

When the "Sao Joao Baptista" was wrecked between the Kei and Fish Rivers, an account by one of its officers in 1622, mentions "that the inhabitants lived upon wild plants, shellfish and the proceeds of the chase, being utterly ignorant of agriculture, though the soil seemed rich" (Theal, 1897). "Pepper-corn-like grain" was mentioned as being part of the diet of the Bantu encountered in the Tongaland area by the survivors of another wreck in 1593 or thereabouts (Theal, 1916).

Because of the nomadic way of life of the early Xhosa, cultivation of the land was of secondary importance to the pastoral way of life (Soga, 1931) and Kay (1833) refers to the Xhosa's most characteristic trait as being that of the herdsman. References are made (Patterson, 1779; Kay, 1833; Holden, 1866) to the cultivation of "gardens", for example, Patterson (1779) mentions these in his record of travels undertaken in the region of the Keiskama River. A shifting-type of cultivation has been followed from the earliest days, and once the soil became impoverished, a new piece of land was cultivated, no recourse being made to manurial practice. Kay (1833) makes an early warning to the effect that population increases must bring about a change in this unsatisfactory system of, what could be called, land-fertility re-generation. Almost 120 years later, Hobart Houghton & Walton (1952) writing about this population pressure on land in the Keiskammahoek District, say that "overpopulation, overstocking, denudation of the vegetation, soil erosion and poverty are the general characteristics which have developed. Failure to adapt their economy, which was founded upon an abundance of land, to circumstances in which this condition no longer prevails is the root cause of this present distress." Further, unsuitable land is brought under cultivation, bush and

forests cleared on the steep slopes with consequent serious erosion. Monoculture and the lack of any fertilisation whatsoever, have considerably reduced the productive capacity of the land.

3.2 CROPS : HISTORICAL AND AGRO-ECONOMIC ZONES:

3.2.1 Arable land allotment:

The chief has always been responsible for the allotment of arable land to members of his tribe in the settled areas, and the size of the allotment would obviously vary according to the district, but usually measured in the region of one morgen (Commission, 1955).

3.2.2 Manuring and Cultivation:

Manuring has never been used by the Xhosa (Cole, 1961) until more recent times, the reason appearing to be the sacred nature of the cattle-kraals.

Kay's (1833) detailed section on cultivation makes interesting reading. All building, digging, cultivation, harvesting and other operations were the prerogative of the Xhosa females, who started their "garden" activities in September or October. Fertile sites were chosen in the valleys and on the hillsides where the soil-moisture level of the alluvial soil was better. A wooden "digging-stick" or spade (izikhuba), made by the men in such a fashion that both ends were functional, was the only implement in use at the time. The seed was then scattered amongst the vegetation within the confines of the plot and a tedious "digging" was commenced, the women working on their knees. At a later period in the history of the Xhosa, the seed was subjected to a viability test (Soga, 1931). The seed was thus buried during the digging operations and the loose vegetation left on the surface until germination of the seeds commenced, when the dried surface organic material was removed. At this point in the proceedings, the men were required to build a "hedge" (utango) around the site, and were most often assisted by the women. Within this enclosure a "miserable dwelling" was built to serve as a temporary shelter for one of the women, who was required to protect the crop from straying cattle at night, and from grain-eating birds during the day, once the crop reached the grain stage. After harvesting, the hedge was removed and used for fuel purposes, while the lands were once more grazed by livestock. According to Cole (1961), it is this winter grazing, which compacted the lands and made cultivation difficult in the following spring, which is one of the causes of erosion today.

Holden (1866), in referring to the work done by the women of the tribe, says "it thus becomes a part of her being, and all her thoughts, feelings, and associations flow along with it." Once the "labours of the field" were over, the

women then repaired their huts, built new ones, and made baskets, mats and clay-pots, amongst other items (Kay, 1833).

Both the European plough and the iron-hoe were introduced by the Missionaries round about 1830, and the hoe very soon became the popular implement for cultivating the lands. The plough, at this stage, due to its expense and the fact that trained oxen were required, made no headway until very much later in the 19th Century and early 20th Century. Both the hoe and the plough caused a minor agrarian revolution in that large tracts of land were sown to crops, which meant that more grain was available than ever before. Grain thus became the staple food of the Xhosa, replacing milk to a large degree (Soga, 1931).

3.2.3 Crops grown:

Apart from kaffircorn, (amazimba - Sorghum vulgare reported as being Holcus sorghum) which was extensively grown in the early days (Patterson, 1779; Moister, 1866; Theal, 1882), maize (Indian corn or Zea mays), kidney beans (Phaseolus sp.), pumpkin (Curcubita pepo), water melons (Citrullus vulgaris), tobacco (Nicotiana rustica), and hemp (presumably Cannabis spp.) were cultivated (Patterson, 1779; Kay, 1833). Most of these are exogenous in origin and were acquired from the early Europeans, including the 1820 British Settlers (Sim, 1952). Tobacco is believed to have been introduced by the Portuguese in the 16th Century (Theal, 1910), and the same applies to maize (Theil, 1919). Imfé or sweet cane (Sorghum vulgare var. Saccharatus) was also recorded as being grown (Kay, 1833; Theal, 1882), as well as calabashes (Lagenaria vulgaris) mentioned by Kay (1833), and which are probably the "species of gourd" referred to by Theal (1882).

3.2.4 Harvest and storage of grain crops:

The sorghum was cut and tied in bundles and carried home on the heads of the women. A small, circular threshing floor was made where the grain-heads could be beaten after they had been dried (Kay, 1833). A granary was dug, usually by the men, in the cattle-fold or kraal and the entrance or "neck" of the granary was of sufficient size to allow a slender man to enter. The soil was scooped out to leave a bottle-form big enough to store the grain-crop, and the internal surface was plastered with fresh cow-dung which water-proofed the container. When dry, the grain was poured in, and the entrance sealed with a thick covering of cow-dung approximately one foot thick, to exclude air and water (Kay, 1833; Holden, 1866). The grain could be kept apparently for up to two or three years, but a definite deterioration was noted (Kay, 1833), the grain acquiring a sour taste and the seed being non-viable (Holden, 1866).

Sorghum and maize seed, and the whole tobacco plants, were placed in an

upper store, called ixanti, which resembled a hut perched on bare posts, six to eight feet above the ground. A platform was constructed underneath the thatched room (Kay, 1833). Other family granaries consisted of woven baskets and later bags (Shepherd & Paver, 1947).

3.2.5 Some Xhosa methods of improving crop yields:

Poor yielding lands have been subjected to "doctoring" in order to assure the holder of bumper crops. Various methods of doctoring are mentioned by Soga (1931) and are briefly mentioned below:

Black-sand specific - handfuls of black sand were scattered at intervals until a circle is nearly formed. The "gap" allowed air to enter and prevented the crop from being burnt up.

Ant-bear specific - the skin of this animal was highly prized in that it exercised a powerful influence on crop production. High "prices" were obtained for a strip of dried skin. Such a strip was burnt at the edge of the field so that the smoke passed over the field.

A Plant charm - a small shrub similar to the cultivated canna, was planted below the field to help in the growth and production of the crop.

Incense - several plants were used, for example, the wild fig tree. The leaves were burnt and the smoke which passed over the growing crop, assured the owner of the increase in quantity of the meal during the cooking process.

3.3 CROPS : THE EXISTING AGRICULTURAL STRUCTURE IN THE BANTU AREAS:

Arable and grazing land statistics are recorded in Table 49 and include dryland and land under irrigation.

3.3.1 Arable land:

This comprises approximately 13 per cent of the total Bantu Ciskei areas, compared with the Transkei which has an estimated 21.8 per cent (J. van Wyk, 1967). Individual districts have arable areas ranging from nearly eight per cent of the total area for Stutterheim up to over 26 per cent for Keiskammahoek, and both these districts have a high percentage of planned locations, approximately 59 per cent and 86 per cent respectively. Middledrift, with approximately a quarter of the area cultivated, has over 76 per cent of the area planned, but this is not the case with Fort Beaufort which has an arable area of 24 per cent of the total area, and is now in the process of being planned. This latter district is the most densely populated area in the Ciskei having about 270 people per square mile and averaging out at 1.12 morgen total land, or 0.27 morgen arable land, per capita of population. The Healdtown Fingo Location, which comprises the Fort Beaufort District, is tenanted by the Bantu on a quit-rent basis

TABLE 49 TOTAL DISTRICT ARABLE AND GRAZING LAND STATISTICS FOR 1967, AND RESIDENTIAL AND PLANNED AREAS AS AT AUGUST, 1968.

District	Total District Area		Area Planned as a % of Total Area	Total Arable Area (Dry and Irrigable)			Total Arable Area in Planned Locations			Area of Arable Land Worked in 1967			Area of Arable Land Worked in 1967 as a % of 1964	Morgen Arable Land per Capita of Population	Total Grazing- all Locations			% of Grazing Under a Grazing Management Scheme 1967	Grazing - In Planned Location			Residential Areas Other than Townships			Total Land per Capita of Population Morgen
	Morgen	Planned Morgen		Morgen	% of Total District Area	% of Total Arable	Morgen	% of Total District Area	Total of Planned Arable	Morgen	% of Total District	% of Land Worked			Morgen	% of Total District	% of All Grazing		Morgen	% of Total District	% of Total Grazing in Planned Locations	Morgen	% of Total District	% of Residential Total Area	
Henschel	201,150	184,000	91.5	16,930	8.4	12.0	15,005	7.5	15.8	10,600	5.3	11.1	81.5	0.27	181,700	90.3	21.1	56.5	135,113	67.2	27.8	7,790	3.9	26.2	3.15
Glen Grey	289,771	122,169	42.2	36,000	12.4	25.5	23,844	8.2	25.1	32,200	11.1	33.9	92.0	0.43	240,000	82.8	27.9	21.2	81,316	28.1	16.7	6,748	2.3	22.7	3.48
Whittlesea	82,325	81,013	98.4	6,701	8.1	4.7	6,230	7.7	6.6	2,435	3.0	2.6	50.3	0.27	74,300	90.3	8.6	100.0	68,060	82.7	14.0	2,155	2.6	7.3	3.29
Cathcart	2,137	2,137	100.0	351	16.4	0.3	351	1.6	0.4	85	0.4	0.1	32.0	0.37	1,515	70.9	0.2	100.0	1,515	70.9	0.3	128	0.6	0.4	2.23
Fort Beaufort	8,132	-	0	1,979	24.3	1.4	-	-	-	180	0.3	0.2	12.0	0.27	3,684	45.3	0.4	0	-	-	-	?	-	-	1.12
Victoria East	36,514	25,902	70.9	7,300	20.0	5.2	5,608	15.4	5.9	4,757	13.0	5.0	97.8	0.44	28,400	77.8	3.3	54.9	16,827	46.1	3.5	1,312	3.6	4.4	2.22
Middledrift	81,090	61,981	76.4	20,461	25.2	14.5	12,198	15.0	12.8	10,214	12.6	10.7	64.2	0.62	65,400	80.7	7.6	30.0	42,250	52,1	8.7	2,734	3.4	9.2	2.47
Keiskammahoek	38,855	33,243	85.6	10,244	26.4	7.3	3,864	9.9	4.1	6,480	16.7	6.8	109.0	0.41	25,900	66.7	3.0	71.2	19,318	49.7	4.0	934	2.4	3.1	1.55
Stutterheim	15,078	8,839	58.6	1,169	7.8	0.8	908	6.0	1.0	1,063	7.1	1.1	106.3	0.24	7,037	46.7	0.8	100.0	7,037	46.7	1.4	185	1.2	0.6	3.05
King W. Town	146,742	110,501	75.3	20,629	14.1	14.6	18,469	12.6	19.4	15,400	10.5	16.2	89.0	0.28	113,637	77.4	13.2	93.0	76,288	52.0	15.7	5,675	3.9	19.1	2.01
Peddie	84,313	33,814	40.1	11,629	13.8	8.2	5,308	6.3	5.6	4,610	5.5	4.8	52.2	0.41	71,400	84.7	8.3	13.3	25,685	30.5	5.3	1,119	1.3	3.8	2.99
East London	71,807	19,263	26.8	7,696	10.7	5.5	3,294	4.6	3.5	7,100	9.9	7.5	101.4	0.19	46,717	65.1	5.4	91.0	13,625	19.0	2.8	947	1.3	3.2	1.73
TOTAL	1,057,914	682,862	64.5	141,089	13.3		95,169	9.0		95,124	9.0		82.4	0.35	859,690	81.3		52.1	487,034	56.7		29,727	2.8		2.61

(1) Townships and Dept. of Forestry Areas excluded.

(2) Adapted from Annual Agricultural Reports and records at K.W. Town Office.

(about two morgen arable land per landowner). The arable lands are badly eroded and the problem of providing compensating land and excising the existing lands is complicated by the topography of this area. Also, this is very much a marginal crop area, and in actual fact should have few arable lands, if any.

Several districts have climatological and/or topographical limitations imposed on the amount of arable land available for use. Herschel, Glen, Grey, Whittlesea and Peddie Districts would fall in this class. Further, the amount of arable land actually utilised each year varies from year to year in each district and is partially dependent on good rains falling in the early part of the growing season, and whether or not good winter crops were harvested. There is up to a 20 - 22 per cent fluctuation in the amount of land sowed to crops each year, and the 1968 figure is likely to be less than 50 per cent of the total possible arable land. Autumn and winter ploughing are today carried out by a large percentage of the landowners, and it is estimated that between 25 - 30 per cent of the arable lands in the coastal areas are winter-fallowed each year due to the greater reliability of the rains in this region, while in the midlands and highveld zones, about five per cent of the lands are ploughed in winter. According to some Agricultural Officials, where the previous winter crops, for example wheat, have yielded abundantly, there is a tendency for a lesser area to be planted to summer crops and vice versa, but this is also dependent on rainfall. Two seasons 1963/64 and 1966/67 are compared and the 1967 morgenage expressed as a percentage of the 1964 year for each district, shows a variation of 12 to 109 per cent. Over 67 per cent of the arable land has been planned in the Ciskei, with no planning in Fort Beaufort and 100 per cent planning in Cathcart.

Herschel, King William's Town and Whittlesea have over 80 per cent of the arable lands falling in the planned locations, Glen Grey, Victoria East, Middledrift and Stutterheim have 60 - 80 per cent, and Peddie and East London 40 to 46 per cent and Keiskammahoek 38 per cent. In the planned locations, arable land is not only fenced off, but anti-erosion measures are applied where necessary and the land is required to be cultivated correctly so that it does not retrogress. (Refer to the section on planning of locations).

The area of arable land per head of population averaged 0.35 morgen for the Ciskei in 1967, and varied from 0.19 morgen in East London District to 0.62 morgen in the Middledrift District. The arable land is included in the grazing assessment of a location by the Department of Bantu Administration and Development in that it provides a certain amount of grazing of crop residues each year, but it is possibly wiser to exclude the arable land from a grazing assessment.

The areas planted to summer and winter crops over the period 1964 to 1967, are indicated in Table 50.

TABLE 50 DRYLAND AND IRRIGATION AREAS PLANTED TO SUMMER AND WINTER CROPS 1964-1967 — EXCLUDING VEGETABLES OTHER THAN LEGUMES

SUMMER CROPS

Year	Maize		Grain Sorghum		Beans		Root Crops		Lucerne		Other Crops	
	Area Planted Morgen	% of Total Area Planted	Area Planted Morgen	% of Total Area Planted	Area Planted Morgen	% of Total Area Planted	Area Planted Morgen	% of Total Area Planted	Area Planted Morgen	% of Total Area Planted	Area Planted Morgen	% of Total Area Planted
1964	89,966	85.0	13,926	13.2	1,619	1.5	247	0.2	86	0.08	52	0.047
1965	68,534	82.3	12,129	14.6	2,142	2.6	313	0.4	64	0.08	47	0.056
1966	63,259	67.6	29,004	31.0	883	0.9	254	0.3	134	0.14	37	0.040
1967	62,392	69.9	25,227	28.2	1,248	1.4	206	0.2	229	0.26	20	0.022
Mean	71,038	76.4	20.071	21.6	1,473	1.6	255	0.3	128	0.14	39	0.05

WINTER CROPS

Year	Wheat		Peas		Other Crops		% Of Total Area Cropped		% Of Total Arable Land	
	Area Planted Morgen	% of Total Area Planted	Area Planted Morgen	% of Total Area Planted	Area Planted Morgen	% of Total Area Planted	Summer	Winter	Summer	Winter
1964	10,536	87.4	1,196	9.9	322	2.7	71.6	28.4	64.2	7.5
1965	11,499	89.0	1,287	10.0	134	1.0	92.9	7.1	48.8	8.2
1966	6,628	92.7	504	7.0	19	0.3	86.6	13.4	45.3	4.7
1967	11,138	96.0	462	4.0	-	-	89.8	10.2	44.0	24.6
Mean	9,950	91.0	862	7.9	119	1.1	84.7	15.3	50.5	11.3

(1) Extracted from Annual Agricultural Reports

The mean percentage of arable land planted to summer crops over the period 1964-1967, amounted to nearly 51 per cent (44 to 64 per cent range) of the total arable land, while the winter-cropped area was only 11 per cent (5 to 25 per cent range). Of the total area cropped in these years, an average of 85 per cent was down to summer crops and 15 per cent planted to winter crops. An average area, comprising 76 per cent (71,038 morgen) of the total area cultivated, was planted to maize each year with grain sorghums about 22 per cent and beans 1.6 per cent, and with other crops occupying a relatively minor area. Of the winter crops, 91 per cent of the land cultivated was planted to wheat, with peas, as the second main crop, being approximately eight per cent.

3.3.2 Irrigation:

The oldest irrigation scheme of sizeable significance in the Ciskei is the Shiloh Scheme, the lands being allocated by the Mission Station and Communal Reserves Act 29 of 1909.

The various improved Trust irrigation schemes in operation in 1967 were as follows:

1. Jan Tshatshu (King William's Town) scheme is a pastoral scheme which has 139 morgen of land down to kikuyu grass (Pennisetum clandestinum) and operates as a fresh milk producing unit on a communal basis. Initially lucerne was tried but proved to be unsuccessful as the water used contained too high a level of salts. Partially purified effluent from the Good Hope Textile Factory, amounting to 2 million gallons per day in normal times, is passed through a series of settling dams before being applied to the lands. This scheme operates in conjunction with dryland grazing.

2. Middledrift Settlement III has 14.5 morgen and is irrigated from the Keiskamma River.

3. Keiskammahoek District has four different irrigation areas: Gxulu/Mnyameni 120 morgen, Hamans 9 morgen, Ngudle 33 morgen and Cata 38 morgen. Total 200 morgen. Farmers have a holding of one and a half morgen of irrigable land and a half morgen is put down to lucerne, half morgen to wheat/maize and a half morgen to vegetables. A residential site consisting of one-eighth of a morgen is provided in a composite area and each landholder has grazing rights for two cows or heifers. The lucerne is cut six to eight times per year and averages nearly six tons per morgen. The other schemes are similar to this one, the lucerne being sold on a co-operative basis. The Middledrift irrigation scheme is the exception in that the lucerne is mostly fed to livestock, especially the dairy cattle.

4. Shiloh (Whittlesea) : has a total of 380.5 morgen irrigated from the Klipplaats River.

All the above schemes are worked on a canal and flood-irrigation basis and the efficient use of the available water is relatively low.

According to Section 21 of Proclamation Number R5 of 1963, concerning irrigation schemes in the Bantu areas, rentals for irrigation plots were fixed as follows:

First year of occupation	-	Rent R 2.00 per annum
Second year of occupation	-	Rent R 4.00 per annum
Third year onwards	-	Rent R12.00 per annum.

The rental is a composite fee in that it covers the residential site, the use of the allotment and water, and grazing for the permitted number of stock. Previous tariffs as determined by the Secretary for Bantu Administration and Development in 1956, were based on capital costs of R800 per one-and-half morgen holding.

Little data is available on the growing of the lucerne hay analysed below, except that which is mentioned under the irrigation schemes.

Analyses were made of samples of lucerne hay collected from four Districts in the Ciskei. As far as possible representative samples were obtained from the 1967/68 season's cuttings (as fed to livestock), and the analyses were carried out by the Döhne Research Institute.

TABLE 51 SOME MINERAL CONSTITUENTS OF SAMPLES OF LUCERNE HAY (MEDICAGO SATIVA) FROM FOUR DISTRICTS

District	Location	Dryland or Irrigation	Crude Protein Calculated from N Figures %	% of Total Composition				
				N	P	K	Ca	Mg
Herschel	Sterkspruit	Dryland(1)	16.13	2.58	0.186	1.700	1.483	0.365
Whittlesea	Shiloh	Irrigation	12.13	1.94	0.170	2.400	1.203	0.103
Keiskamma-hoek	Gxulu	Irrigation	20.00	3.20	0.236	5.625	1.243	0.280
Middledrift	Settlement I	Irrigation	16.25	2.62	0.304	3.200	1.303	0.286

(1) Sterkspruit lands have one to two feet of gravel over them and the water table is high due to the river running alongside these lands, and, in effect, is irrigated.

3.3.3 Crops grown and average yields:

Crop statistics, for both dryland and irrigation areas for an eight year period, are given in Table 52.

Crop production on a per capita per annum basis is as follows for the Ciskei in 1967:

Maize 26.7 pounds, sorghum 34.2 pounds, wheat 17.9 pounds, legumes 1.7 pounds and roots 0.5 pounds.

Nel's (1965) estimate for the amount of maize produced per head per annum in the Transkei was 240 pounds, and for sorghum ("kaffircorn") 12 pounds for the production-year 1961/62.

Maize (Zea mays) is the commonly planted summer crop being grown on 44 per cent of the total arable land of the Ciskei in 1967. This is followed by sorghum with 18 per cent. The chief winter grown crop is wheat which, in 1967, occupied nearly eight per cent of the total arable area, and with the exception of the two relatively minor districts of Cathcart and Stutterheim, the highest average annual yields are obtained in the coastal region (East London 3.64 bags per morgen; Peddie 2.4 bags per morgen and King William's Town 2.84 bags per morgen), the main reason being the more equitable spread of the annual rainfall over the winter months. Herschel with an average yield of 2.3 bags wheat per morgen bears witness to a "reasonable" amount of rain falling during the winter, as well as to the fact that these districts fall in a higher rainfall bracket. The overall Bantu Ciskei average is 2.3 bags per morgen, compared with 6.69 bags to the morgen for European farmers in the Cape. Glen Grey with 6,000 morgen, followed by Herschel (2,500 morgen) and Whittlesea (1,738 morgen) had the largest areas down to wheat in 1967.

In the case of the summer crops, maize and sorghum, the overall Ciskei averages are 1.6 and 2.0 bags per morgen respectively. East London has the highest annual maize yield averaging 3.2 bags per morgen, which also reflects an adequate rainfall, although the converse for Glen Grey's low average yield of 0.9 bags, does not apply to the same degree, since the main reasons for these low yields were due to the eroded nature of the soils, poor cultivation practices, and other malpractices. In all fairness, the recent drought years have had their effect, but aggravated by the other conditions mentioned above, the effect is more disastrously felt. The biggest single producer of maize is King William's Town District where 15,500 morgen were planted in 1967 and some 49,000 bags harvested. Glen Grey (14,000 morgen) and Middledrift (10,000 morgen) and East London (5,500 morgen). Districts were the next important producing 24,000 bags, 12,500 bags and 30,000 bags respectively. The European-farmer average maize yield for the Cape was 6.7 bags per morgen. (Agricultural Census No. 36, 1961-62).

TABLE 52 AVERAGE YIELDS OF DRYLAND AND IRRIGATED CROPS[1] HARVESTED IN AN 8-YEAR PERIOD (1956-1959 AND 1964-1967) SHOWING NUMBER (NO.), TIMES HARVESTED AND YIELD RANGES OF PRINCIPAL CROPS[3]

A. DRYLAND CROPS

	Maize - 200 lb bags per morgen			Sorghum - 200 lb bags per morgen			Wheat - 200 lb bags per morgen			Area Planted to these Crops in 1967									Birdseed 200 lb bags per morgen		Oats 150 lb bags per morgen		Barley 200 lb bags per morgen		Tobacco lbs per morgen		Cotton lbs per morgen		Cow peas or "Kaffir" Beans 200 lb bags per morgen		Other Beans 200 lb bags per morgen		Dry Peas 200 lb bags per morgen		Potatoes lbs per morgen		Sweet Potatoes lbs per morgen		Lucerne tons per morgen		Green Oats tons per morgen	
										Maize		Sorghum		Wheat																											
	Mean	No.	Range	Mean	No.	Range	Mean	No.	Range	Morgen	% of arable	Morgen	% of arable	Morgen	% of arable				Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.
Herschel	1.26	8	.30-3.00	1.63	8	.67-2.50	2.26	8	.08-3.20	4,000	23.6	4,000	23.6	2,500	14.8				-		2.68	2	0.67	1	100	2	-				1.62	4	0.90	2	-		-		2.67	2	-	
Glen Grey	.85	8	.25-1.50	3.33	8	.40-3.11	2.95	5	.30-6.00	14,000	38.9	18,000	50.0	6,000	16.7				-		-		-		-		-		0.69	4	0.89	2	1.62	4	375	2	-		3.33	1	-	
Whittlesea	1.57	8	.70-3.83	2.60	5	1.38-3.81	1.59	8	.61-3.14	267	4.5	6	0.1	1,738	29.0				6.25	1	2.27	2	2.37	1	-		-		2.64	2	0.80	3	1.26	4	300	3	-		1.67	3	0.75	1
Cathcart	2.16	5	.67-3.99	1.27	4	1.00-3.33	1.56	6	.50-4.25	20	5.7	-	-	20	5.7				-		-		2.50	1	-		-		-	-	0.60	1	1.25	1	375	1	-		-		-	
Fort Beaufort	1.16	8	.10-1.97	1.19	5	.50-2.00	1.49	6	.26-2.50	160	8.1	10	0.5	5	0.3				1.43	1	-		-		-		-		1.92	3	1.51	2	-	-	-		-		-		-	
Victoria East	1.57	8	.58-4.00	0.83	6	.33-2.00	1.04	6	.34-3.00	4,250	56.2	265	3.6	160	2.2				2.00	1	-		-		112	4	-		1.99	4	1.33	3	0.50	1	638	3	-		-		-	
Middledrift	1.18	8	.14-2.36	0.92	8	.13-1.33	1.70	8	.48-2.91	10,000	48.9	100	0.5	100	0.5				-		0.81	2	-		-		1,749	2	-	-	1.05	4	0.29	1	2,078	3	146	2	-		-	
Keiskammahoek	1.81	8	.62-4.03	1.12	8	.34-3.00	2.01	7	1.27-3.00	5,365	53.4	475	4.7	142	1.4				1.63	6	3.08	4	1.15	1	380	2	189	1	1.25	1	1.45	5	1.52	4	720	4	-		2.44	2	1.87	2
Stutterheim	2.80	6	.65-6.34	(2) 5.00	2	-	5.22	4	4.00-6.67	1,008	86.2	½	-	3	-				-		7.80	2	-		-		-		4.61	3	3.02	4	-		848	2	-		-		-	
King William's Town	2.23	8	.13-3.30	2.25	7	.74-3.50	2.84	8	.60-5.71	15,500	75.1	120	0.6	40	0.2				0.62	3	3.43	1	-	1	67	2	-		-	-	0.82	3	0.78	3	919	4	1,320	4	-		-	
Peddie	1.71	8	.27-2.63	1.50	8	.63-3.49	2.39	6	1.30-4.00	2,000	17.2	2,000	17.2	200	1.7				-		2.43	2	-		-		-		0.96	1	0.75	5	1.21	4	784	4	739	4	-		-	
East London	3.19	8	.60-5.45	2.42	8	.67-4.00	3.64	4	3.33-4.00	5,500	71.5	250	3.2	-	-				-		-		-		-		-		-	-	1.91	5	2.03	5	461	4	-		-		-	
Ciskei Mean	1.56			2.03			2.30			62,070	44.3	25,226	18.0	10,903	7.8				1.50		2.23		1.29		158		989		1.59		1.20		1.28		776		857		2.35		1.68			

B. IRRIGATED CROPS

	Wheat 200 lb bags per morgen		Maize 200 lb bags per morgen		Dry Beans 200 lb bags per morgen		Dry Peas 200 lb bags per morgen		Potatoes lbs per morgen		Broccoli lbs per morgen		Lucerne Hay tons per morgen	
	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.	Mean	No.
Ciskei Mean	8.96		42.0		2.63		2.52		3,669		-		4.41	

(1) Produced by Bantu.
(2) Only ½ morgen planted each year.
(3) Extracted from Annual Agricultural Reports.

Apart from Stutterheim, where a small area was harvested, the best average yield for sorghum was Glen Grey with 3.3 bags per morgen, and considering the prevailing conditions of the past few years and the fact that in 1967 , 18,000 morgen were planted, makes this average yield quite an achievement. Some 56,000 bags were harvested in Glen Grey in 1967. Herschel had 4,000 morgen planted to sorghum and reaped 7,000 bags, and Peddie, with 2,000 morgen, reaped 4,500 bags in 1967. The low yields harvested in some districts, such as Victoria East, could well be due to the depredations of grain-eating birds, since the old precautions no longer seem to be carried out to such a thorough extent. The pre-school children are available to undertake this task of scaring the birds away, but their reliability and effectiveness must remain in doubt. Certainly today's eagerness to attend school, in the case of the children, has contributed to lowered sorghum yields. "Birdproof" varieties are, apparently, not used. The smaller kernels round the tip of the maize cob are also liable to "bird-strike", as can be noticed during an inspection of maize lands.

In terms of bags of grain, approximately 59 per cent was maize, 27 per cent sorghum and 14 per cent wheat in 1967.

Transkei crop averages were maize 3 bags per morgen and sorghum 1.9 to 2.0 bags in the years 1961/62 (Nel, 1965), while J. van Wyk (1967) presents the following averages: maize 2.7 bags, sorghum 2.1 bags, wheat 5.0 bags, legume crops 0.75 bags, roots 5.0 tons and vegetables 206 pounds.

The remaining crops are, comparatively speaking, of minor importance. For example, "Kaffir" beans (Cow peas) covered a total area of 90 morgen (0.06 per cent of total arable land) while other edible beans and peas were planted to 1,052 morgen (0.75 per cent of arable land) and 426 morgen (0.30 per cent of total arable land) in the year 1967. No potatoes were harvested in 1967, but to give an idea of the area planted in some years (which varies from one to three years in the districts reviewed over an eight-year period), the total areas planted in the year 1964 and in 1965, were approximately 200 morgen. Of this latter figure King William's Town had 80 and 90 morgen, Keiskammahoek 41 and 34 morgen and Peddie 19 and 40 morgen respectively for the two years. The Ciskei means for the main crops, are given at the end of each column in Table 52, and these figures, compared with the means computed from available figures given in the Agricultural Census Number 36 (Report on Agricultural and Pastoral Production 1961-62) for European farms in the Cape, make it startlingly clear that Bantu methods of crop production need a drastic overhaul.

Crops not mentioned in the Table and which have been grown more as test-crops by the Bantu, are rye (3.06 bags average per morgen), barley and ryegrass, the latter two grown as grazing crops and averaging 1.32 and 0.75 tons per

morgen respectively. The average yields per morgen of crops grown on the irrigation schemes over the eight year period under review, and the area planted to each of these crops in 1967, were:

Wheat	:	9.0 bags and 230 morgen;
Maize	:	42 bags and 232 morgen;
Legumes	:	2.5 to 2.6 bags and 126 morgen;
Potatoes	:	3,669 pounds and 22 morgen;
Lucerne	:	4.4 tons and 222 morgen;

Sundry vegetables grown on 34 morgen.

On the Gxulu Irrigation Scheme in 1966, average yields per morgen of 29.6 bags maize with an overall maximum of 58 bags; 6.8 tons lucerne with maximum yield of 10.8 tons; and 11.5 bags wheat with maximum yield of 12 bags, were obtained according to the Agricultural Officer's report.

Many crops have been produced directly under the control of the South African Bantu Trust Officials in the various districts, and include such high labour requiring commercial crops as Phormium tenax (New Zealand Hemp) and Furcraea gigantica var. willemettianda (Mauritius hemp). The yields for the Ciskei as a whole are given in Table 53.

Crops not grown in 1967, but grown in other years by the South African Bantu Trust gave results as follows:

Linseed: two plantings in 1964 and 1965 averaged 868 pounds of seed per morgen at Keiskammahoek.

Cowpeas grown on a quarter morgen demonstration plot yielded one sack of seed, while hay was made from the remainder of the plants, giving 10 bales. Assuming the weights of the bales to be near 50 pounds, the figure on a per morgen basis would be approximately three-quarters to one ton.

Eragrostis hay, also harvested from a demonstration plot in the Glen Grey District, gave 15 bales from a three-quarter morgen plot, and taking the average weight of the bales to be at least 60 pounds, the yield would be between half to three-quarters of a ton on a per morgen basis.

In many cases, the Trust produced crops have average yields well in excess of the Cape average for European farmers, while others are on the low side even when compared with the Bantu produced crops. This is no doubt due to lack of adequate local experience and knowledge of the newly introduced crop, associated with other factors, human and environmental.

TABLE 53 CROPS GROWN BY THE SOUTH AFRICAN BANTU TRUST IN 1967, AREA PLANTED AND AVERAGE YIELDS PER MORGEN FOR THE BANTU CISKEI AREAS(1)

Crops	Area in morgen	Total Yields	Mean Yield per morgen	Remarks
Maize (200 lb bags)	61.25	.741	12.10	-
Wheat (200 lb bags)	7.00	30	4.29	
Sorghum (200 lb bags)	0.50	8	16.00 (equiv.)	
Cow peas (200 lb bags)	18.00	4	0.22	Additional 2 morgen planted but no result
Potatoes (lbs)	4.00	10,500	2,225	
Sweet Potatoes (lbs)	4.00	13,140	3,285	
Pumpkins (lbs)	4.00	20,467	5,117	
Sisal (tons)	35.00	no yield in 1967		Still growing
Furcraea (tons)	62.00	no yield in 1967		Still growing
Phormium tenax (tons)	398.26	91.37	0.23	See notes on Fibre Crops
Cotton (lbs)	3.00	3,312	1,104	
Pineapples	143.00	310.714 tons Cayennes and 7,052 doz Queens		
Dryland Lucerne (tons)	12.50	35	2.80	
Irrigated Lucerne (tons)	1.25	7	5.60	
Green Beans (lbs)	0.25	346	1,384 (equiv.)	
Maize Silage (tons)	10.00	173	17.30	

(1) Extracted from Annual Agricultural Reports.

3.3.4 Crop rotation:

Very little crop rotation is carried out in the unplanned areas of the Ciskei and monoculture prevails to a major extent throughout such districts. Generally maize, sorghum or beans and occasionally potatoes are the usual summer crops grown with wheat or peas being sown in autumn. The policy is to encourage the following up of a grain crop with a legume crop, and on the Trust Farms this is carried out in that one-quarter to one-third of the total lands are required to be planted to a legume each year. Where a full economic unit is involved, a third of the arable land is put down to a ley crop, or the land left fallow. In the planned locations, one third of the arable land is required to be planted to a ley crop for four years, while various annual crops are grown for eight years with the proviso that a legume crop follows two years of a root or cereal crop. With the exception of the irrigation areas, it is doubted if this is actually followed to any large extent, judging from visual observations.

3.3.5 Fibre crops:

Special mention should be made of the Trust owned and operated commercial undertakings in connection with the production and processing of fibre crops. The most successful crop to date is Phormium tenax, which, although affected by drought and cold weather to a certain degree, stands up to the prevailing conditions quite well in the King William's Town District. On the other hand, Furcraea sp., grown in the East London District on Released Area 33, had a severe setback during the 1968 Winter, and has recently been reported as having been further damaged by strong winds. The latter crop does not give the yield per morgen that is obtained from Phormium tenax. Some 400 morgen were down to Phormium tenax in 1968 with 62 morgen down to Furcraea and 35 morgen to Sisal (Agave sisalana). Phormium tenax up to the fourth year of growth, has the outside leaves removed by "side-cutting" and the average yield per morgen for the 1966-67 season was approximately 27,915 pounds. "Clear-cutting", i.e. all leaves removed, is done every four years and averaged 47,985 pounds per morgen in 1966-67. The effect of the drought is expected to cause a reduction in yield of nearly 29 per cent in the 1967/68 season. About 16 per cent of the green leaves by weight, consists of fibre, approximately half of which consists of line fibre and the other half of shorter fibre. The desired length of the best fibre is 24-28 inches and grading is carried out according to "sound" length. Anything under two inches in length is called "flume" and was worth R17 per ton in early 1968, while line fibre was valued at R130 and rope fibre at R70. These prices have subsequently dropped by almost a half and the price paid for line fibre in September/October, 1968 was R70.

Soil Preparation and Fertilisation:

Virgin soil is ploughed three to four times and disced up to three times, subsoiling being carried out where necessary. The young plants are spaced every four foot in the row with the rows seven foot apart. Rock phosphate or Belgium slag is applied at the rate of 800 pounds per morgen and Super Phosphate at 200 pounds per morgen at planting time with two side-dressings of 50 pounds Ammonium Phosphate applied later, in a cycle of four years.

Sisal production appeared promising, but slow annual growth seems to be a problem. Observations are, at present, being made to see how far below the 25 to 30 new-leaf criterion it is. In any case, land is limited and only large tracts of land should be put down to sisal from an economic viewpoint.

Cotton grown by Bantu farmers under guidance at Middledrift in 1965, yielded 2,039 pounds of seedcotton per morgen and was grown on an area of two morgen.

3.3.6 Seed varieties and seed used:

The general introduction of hybrid seed on the South African market, while hailed as a breakthrough in crop production, has had repercussions in the Bantu areas. In former years a certain amount of selection appears to have been practised by the Bantu peasant, and maize seed in particular, apparently became environmentally adapted to the various areas. In effect, a low yielding but hardy strain of maize seems to have been developed. This, of course, was bartered for goods at the local traders, and anyone requiring seed maize, merely went to the trader and obtained seed grown in the area in the previous season. In many areas, it was apparent that this approach still prevailed, but because of the general use of hybrid seed, a good deal of second generation hybrid seed is sown which tended to revert to the parent types, with a consequent falling off in overall yield. This, it seems, is still the case in 1968, and many Agricultural Officials control the situation by propaganda and by purchasing or growing improved seed for re-sale to the Bantu. Table 54 shows to what extent improved seed is sold to the Bantu. There is a definite preference in certain districts for yellow or white maize, the latter being preferred in the King William's Town District for example, and the former being favoured in the Glen Grey District. Unfortunately, there is an apparent tendency to look upon white maize meal as being superior to the yellow and is no doubt based on European preference.

3.3.7 Manurial and fertilization practices:

A comparison is made in Table 55 using the figures given in the Annual Agricultural Reports for the years 1964 to 1967 in respect of the use of manure and fertilisers by Bantu.

The average application for the Bantu Ciskei as a whole was approximately $8\frac{1}{2}$ tons of kraal manure per morgen for 1964 and 1967, while the average chemical fertiliser application was 256 pounds (excluding Whittlesea) and 346 pounds for the years 1964 and 1967 respectively. The number of Bantu using manure or fertilisers varies from year to year and the trend appears to be upward although recent droughts have obscured this to a large degree. Fairly wide fluctuations are encountered in the case of manure tonnage used, and its general use in terms of quantity, will most possibly decline since its accumulation is dependent largely on the night-kraaling of stock. Also, in the change over to new residential areas, it is common practice to cart all manure to the lands. Since the kraal has always been considered a "Sacred place", there has naturally been some initial opposition to the removal of the dung.

Expressing the area fertilised or manured as a percentage of the total available arable land, the average over the four years 1964 to 1967 was 1.3 per cent for chemical fertilisers and 2.2 per cent for manure, with the former

TABLE 54 IMPROVED SEED SOLD TO BANTU IN THE YEARS 1964 AND 1967[1]

		1964		1967	
District	Seed	Variety	Weight lbs	Variety	Weight lbs.
Herschel	Maize	American White Flint	3,000	SA4 & SA5	2,800
	Wheat		-	Scheepers & Red Egyptian	40,000
Glen Grey	Maize		6,600	Sajo, SA4 & Teko Yellow	2,240
	Sorghum		-		750
	Beans		1,600		2,500
Victoria East	Maize		-	Teko Yellow	11,800
Middledrift	Maize	Teko Yellow	47,200	SA4, SA5, SA9, SA11, 33, 100, 200 and Teko Yellow	6,106
	Beans		-		550
Keiskamma-hoek	Maize	SA60 & Silver King	2,000	SA4	7,900
	Potatoes		6,525		11,250
	Beans		390		1,100
	Wheat		4,200	Punjab & Whittlesea	5,200
	Peas		250		550
	Lucerne		300		700
	Assorted Vegetables		-	Onion, Beet Cabbage, Carrot	37
Stutterheim	Maize		-	SA9	50
Peddie	Wheat		-		10,000

(1) Extracted from Annual Agricultural Reports.

Apart from seed indicated in Table 54, seed is still purchased from traders, and in some cases, the former conditions still apply, although the fact that big seed can produce small cobs, is beginning to be accepted.

TABLE 55 THE USE OF KRAAL MANURE AND CHEMICAL FERTILISERS IN THE BANTU AREAS OF THE CISKEI FOR THE YEARS 1964 AND 1967[1]

District	1964 Kraal Manure				1964 Chemical Fertilisers				1967 Kraal Manure				1967 Chemical Fertilisers			
	No. using manure	Amount used - tons	Area covered morgen	Tons of manure per morgen	No. using fertiliser	Amount used - tons	Area covered morgen	Pounds of fertiliser per morgen	No. using manure	Amount used - tons	Area covered morgen	Tons of manure per morgen	No. using fertiliser	Amount used - tons	Area covered morgen	Pounds of fertiliser per morgen
Herschel	5	168	14	12	43	5	30	333	3	100	10	10	26	6½	60	216
Glen Grey	-	-	-	-	-	-	-	-	150	3,000	150	20	125	25	125	400
Whittlesea	135	1,856	156	±12	123	1,036[2]	286	7,244	12	115	23½	5	243	50	374	268
Cathcart	5	60	8	7½	-	-	-	-	-	-	-	-	-	-	-	-
Fort Beaufort	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Victoria East	386	3,357	172	19½	747	10	50	400	437	1,300	426	3	827	85	400	424
Middledrift	44	148	20	7	106	14	70	400	76	856	101	8½	118	50	294	336
Keiskammahoek	223	1,637	186½	9	156	38	100½	756	87	1,790	185	10	66	14	30	932
Stutterheim	150	275	175	1½	40	7	20	700	120	1,600	130	12	30	18	90	400
King William's Town	747	7,850	850	9	67	40	450	176	240	1,440	240	6	150	23	150	306
Peddie	1,800	20,000	2,200	9	350	27	200	275	40	480	48	10	34	8	35	458
East London	800	6,000	1,100	6	350	35	450	156	500	3,683	350	10½	100	16	150	212
Total	4,295	41,351	4,781½	-	1,982	1,212[2]	1,656½	-	1,665	14,364	1,663½		1,719	295½	1,708	
Mean Weight/Morgen	± 8½ tons[3]				1,464 lbs.				± 8½ tons[3]				346 lbs.			

(1) Extracted from Annual Agricultural Reports.
(2) This figure is probably erroneous and if Whittlesea is excluded, an average of 256 pounds is the Ciskei figure.
(3) These figures appear to be on the high side

practically the same each year and the latter varying from 3.4 per cent in 1964, to 3.0 per cent in 1965, 1.1 per cent in 1966 and 1.2 per cent in 1967. This bears out that available kraal manure is gradually declining in quantity and thus use, although drought obscures the absolute trend.

The custom, in some districts, appears to be that chemical fertilisers are mixed with manure in the proportion of about one to two and applied to the lands as such.

Trials have been carried out in the irrigation areas of Keiskammahoek where 1,000 pounds of fertiliser (2:3:2) have been applied to maize lands, with a 500 pound urea side-dressing when the maize plants were about 12 inches high. With plant populations in the vicinity of 48,000 to the morgen (30 inches x 9 inches spacing) high maize yields have been achieved being over 60 bags per morgen. At Hamans, band spreading with 1,000 pounds of superphosphate per morgen, has given good results (Trollope, 1968).

3.3.8 Cultivation practices:

The single-furrow, mouldboard type, ox-drawn plough is most commonly used, being drawn by any number of oxen from four to ten in a span. Harrowing or discing is sometimes carried out by the more progressive farmers. Depth of planting varies from three to five inches and is seldom more, being dependent on the draught power available and the condition of the soil at ploughing time. Some Agricultural Officials regard the soil as being "virgin" in nature below the upper three to four inches because of the ploughsole formed. Tractor ploughing is done by privately-owned tractors, Trust-owned tractors (charged at R4 per morgen) and by some European farmers in the neighbourhood of the locations who contract-plough (charged at about R5 per morgen). Broadcast sowing behind the plough is still resorted to in some areas although the ox-drawn maize planter is used by about 80 per cent or more of the farmers in the case of maize planting, and 60 - 70 per cent in the case of sorghum seed. In the sowing of peas, they are most commonly scattered over the surface of the plot and shallow ploughing of the land and maize stubble being carried out, as in the case of Herschel farmers. The germination is invariably poor, as in the latter case.

At the onset of rains from September onwards, land is ploughed up and planted to sorghum and at the next cycle of rain, maize is planted. This is more applicable in the midlands and highveld zones (Glen Grey and Herschel). In the lower lying areas, maize is usually planted after the rains when any possible danger of frost is over. It is interesting to note that ploughing units are made up of oxen together with cows (some in lactation) and bulls on occasion, and in one case, a donkey span was used in preference to the less hardy oxen.

Some cultivation is done by hand using the standard iron hoe and this is

the job of the womenfolk mainly, the ploughing and planting operations being undertaken by the menfolk. However, changes are taking place, in that during the 1968 planting season several women have been observed to handle the plough themselves. Cultivation using ox-drawn equipment, would appear to be on the increase in the majority of areas, but the extent to which it is used, has not been determined. The efficiency of cultivation leaves a great deal to be desired, and in many cases weeds compete seriously with the crop plants for the available soil moisture and nutrients.

3.3.9 Harvesting methods:

This is all done by hand when the maize cobs are sufficiently dry in about May-June. The cobs are removed by the women and either transported by the women using sacks on their heads, or sledges are used. The kernels are most commonly removed from the cobs by hand, but there are a few who use hand-shellers. Peas are also threshed by hand, five to seven women beating the dry pea-plants with sticks. With the exception of some grain, maize usually, fed to poultry and pigs, the majority of the grain produced is used for human consumption.

3.3.10 Crop production schemes in operation in the Ciskei:

Two of the first production schemes to be put into operation, show great promise. While the Ngwenya Production Scheme in 1967/68 was a comparative failure due to drought, it was the only place in the Middledrift area which actually reaped some crops.

The Tugela Production Scheme (Herschel) commenced with 20 Bantu farmers who started ploughing operations with great enthusiasm and co-operation in October, 1967. A total of 74 morgen was ploughed and sown to three maize varieties SA4, SA5 and Teko Yellow. Seed was sown at the rate of 18 pounds to the morgen, except on one morgen where 38 pounds was inadvertently used. An average of 524 pounds of fertiliser was incorporated in each morgen of land and the cost per morgen, not including the costs of soil cultivation, amounted to nearly R8 per morgen. Unfortunately, due to severe drought conditions, some farmers lost heart, but those very keen members who continued with cultivation practices, actually reaped crops which averaged out at 2.2 bags to the morgen. If averaged over the land correctly cultivated, the maize yield is nearer 3.3 bags, but even the former figure was outstanding considering that these were the only maize crops reaped in the whole of the Tugela Location. Theft and porcupine damage added to the difficulties of producing good maize crops in this area. Some farmers cultivated badly and low yields were the result. Yields varied from just over one to seven bags per morgen. The Agricultural Officer reports further that, with the onset of autumn and winter rains, "some of the enthusiastic spirit

has returned and 21 bags of Dr. Swart wheat have been sown by the members of this scheme," and the local Bantu Extension Officer at Tugela is praised for his good work, encouragement of the members and for his good record keeping ability. The Agricultural Officer is emphatic that with good weather conditions such schemes must prove to be successful.

3.4 VEGETABLE AND FRUIT PRODUCTION

3.4.1 Vegetables:

A wide variety of vegetables have been grown, or are grown in the Bantu locations, and the demand for these vegetables within these areas, is high. In 1967, peas covered 0.3 per cent of the total arable area, being grown under dryland conditions. The majority of vegetables are grown on the irrigation schemes and include potatoes, sweet potatoes, green beans, peas, cabbages and cauliflower, tomatoes, carrots. Most production of vegetables is carried out in the Keiskammehoek, Middledrift and Whittlesea Districts, because of the irrigation schemes. Of the one and a half morgen irrigable allotments worked by each settler, it is usual for up to half a morgen to be put down to vegetables and, as in the case of the Keiskammahoek schemes, in connection with the overall irrigation of the allotments, only about 10 per cent of the settlers make efficient use of the water available throughout the year. In winter the three half-morgen plots of each holding are down to lucerne, wheat and vegetables, while in summer, lucerne, maize and vegetables are grown. The lucerne plots remain down for four years and all the other plots are crop-rotated each year or half-year, as the case may be. The maize crop is fertilised as previously mentioned, and the vegetables which follow, obtain residual fertilisation. Vegetables are also the first crop planted after ploughing out lucerne, and thus benefit from following a legume crop.

3.4.2 Fruit:

Table 56 is an estimate of the fruit-tree position in the Bantu areas in 1967.

While the figures cannot be considered to be one hundred per cent accurate, they do reflect the approximate position as it was in 1967. With the serious drought that prevailed in the 1967/68 growing season, together with the resiting of residential areas in many locations, as for example in the Herschel District, where the fruit trees round the old hut and kraal sites were invariably chopped down, it is doubtful if the figures are near the true position in November, 1968. Most of the deciduous soft-fruits consist of the yellow clingstone type or canning peach. In an attempt to establish and perpetuate the contour banks in the lands, some 2,000 Kakamas peach variety trees were planted on the contour in the Whittlesea area. This idea has now spread to many other locations in the District.

TABLE 56 ESTIMATED NUMBER OF FRUIT TREES IN THE CISKEI DISTRICTS IN 1964 AND 1967(1)

District	Bantu-owned					Trust-owned	
		1964		1967		1964	1967
	Citrus	Soft Fruit	Nut Trees	Citrus	Soft Fruit	Citrus	Citrus
Herschel	-	20,000	-	-	10,000	-	-
Glen Grey	-	-	-	-	7,000	-	-
Whittlesea	-	9,000	15	16	12,563	-	-
Cathcart	-	250	-	-	210	-	-
Fort Beaufort	-	-	-	-	-	-	-
Victoria East	-	-	-	-	-	2,853	2,853
Middledrift	-	-	-	-	-	-	-
Keiskammahoek	16	1,371	-	12	1,380	-	1,301
Stutterheim	-	-	-	-	-	-	-
King William's Town	-	-	-	-	[illegible]	1,480	1,480
Peddie	-	2,000	-	-	1,000	-	-
East London	-	200	-	-	[illegible]	2,800	800
Total	16	32,281	15	28	32,353	7,133	6,434

(1) Adapted from Annual Agricultural Reports.

In the lower lying regions, such as Victoria East, Peddie, East London and King William's Town and Middledrift Districts, the incidence of fruit-fly is such that production can be a gamble. In most areas pigs eat every scrap of the dropped fruits (excluding pips) and the breeding cycle of the fruit-fly is upset and comparatively little damage is done. However, with the Tribal Authorities beginning to enforce the keeping of pigs in sties, the problem of fruit-fly attack is bound to escalate in the majority of areas. In Herschel District, it was estimated that 28,000 pounds of peaches were sold to Europeans for canning purposes in the season of 1961-62, and that some 518 pounds of dried fruit were produced and sold.

3.5 INSECT PESTS AND CROP DISEASE:

Briefly, the common insect pests which affect crop production in the Bantu areas, are stalk-borer, the larvae of the moth Busseola fusca according to Smit (1964), or Calamistis fusca according to du Plessis and Lea (1943), cutworm (larvae of Euxoa (Agrotis) segetti moth) and American bollworm (Heliothis armigera).

Blight (Helminthosporium sp.) and rust (Puccinia sp.) in wheat (Glen Grey and East London), smut in maize (East London) and ergot on sorghum (East London) are the main diseases occurring in crops.

The more progressive farmers use D.D.T. to control stalk-borer in practically all districts. In the Tugela Production Scheme four farmers out of twenty participants, used D.D.T. on 18½ morgen of maize and averaged 3.4 pounds

per morgen, while all used "Dieldrin" for cutworm control. However, this scheme is under the direct control of the Agricultural Officer and his assistants, and is not a true reflection of Bantu enterprise.

3.6 SOME BELIEFS CONCERNING CROPS AND CROP PRODUCTION:

During the course of this survey, several beliefs were mentioned as being practised, and are recorded here. A traditional method of overcoming insect plagues in the Glen Grey District, is to drive a pitch-black bull through the lands at planting time.

In the Stutterheim District, it is recorded that after a hailstorm, Bantu will not work in the lands for up to two days afterwards. To do so, would be to invite a further hailstorm.

A death in the location also means the leaving of work operations for a period of up to two days (Stutterheim and Victoria East), while a wedding in the Victoria East District can have the same result, regardless of the urgent need to plant lands or cultivate.

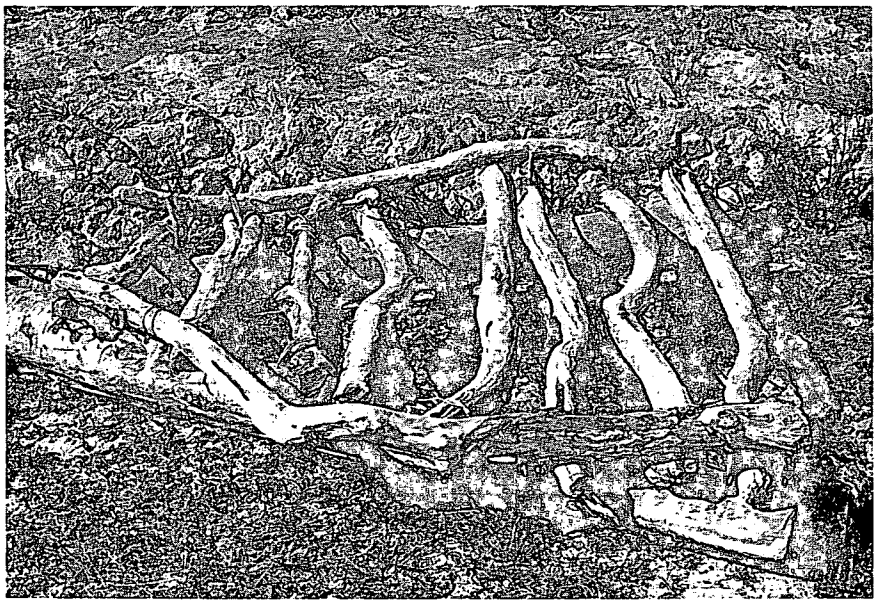
3.7 PASTURE - VELD AND ESTABLISHED PASTURES:

3.7.1 Veld:

As can be seen from Table 57, approximately 81 per cent of the total Bantu areas of the Ciskei, is grazing - in this case, veld or bushveld. Some districts, especially the hilly or mountainous ones, have a higher percentage of grazing than others, and Whittlesea and Herschel with 90 per cent grazing, and Glen Grey with 83 per cent, fall in this category. Rainfall, or rather lack of rain, is also a determinant factor. Other districts have a relatively lower percentage of grazing available but only two districts have less than 50 per cent grazing and they are Stutterheim and Fort Beaufort.

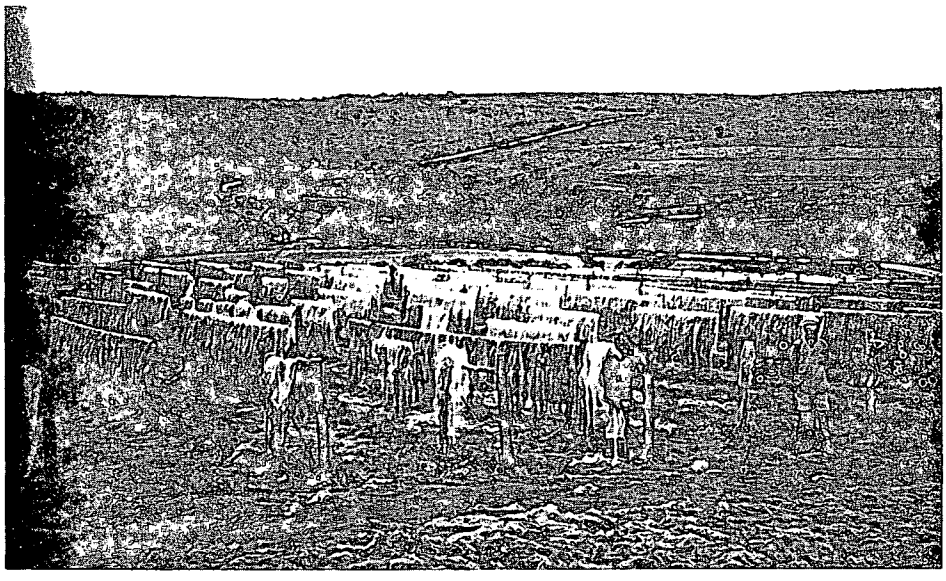
In 1964 approximately 30 per cent of the total grazing area of the Ciskei was under a controlled grazing system, while in 1967, this figure had increased to over 52 per cent. In planned locations, a three or four camp system is implemented, depending on the amount of grazing land available, and a full year's rest period is given to each camp in turn in a period of three or four years. The normal period is a September to August rest, but in some areas this has been altered to, for example, a May to April rest (Stutterheim) based on the findings at Döhne Research Station. The Hogsback grazing camps (Middledrift District) are rested from spring to spring, that is, August one year to the end of September the following year.

The composition of the veld is, unfortunately, poor by any standards, although in some areas, for example, Stutterheim, the grazing is reasonable when the environmental conditions that have prevailed in recent years, are taken into account. It is to be regretted that this survey has been made in a drought



TYPICAL SLEDGE CONSTRUCTION

MAIZE GROWN UNDER IRRIGATION - WHITTLESEA



TRUST PHORMIUM TENAX SCHEME - KING W. TOWN

year, because drought effects are difficult to assess and appropriate allowances for pasture, crop and livestock conditions even more difficult to make. On the other hand, the serious nature of the deterioration in the veld, has not been obscured by an abundance of growth as is the case in a good rainfall year. Except where the veld has been rested for a growing and seeding period, the dominant veld species are made conspicuous by their very absence. The chief climax grass is undoubtedly Themeda triandra along with, and to a lesser extent, Hyparrhenia and Cymbopogon species, as can be seen when veld is rested and managed correctly. The position today in most districts is that the lower succession species, such as the Aristida, Eragrostis and Sporobulus species and Cynodon dactylon, together with other veld grasses particularly annuals, and herbs or shrublets, as indicated in the section on vegetation, predominate. After the droughts and years of incorrect grazing management, the fact that grass species of any type are growing in some of these areas, is a testament to their hardiness.

Apart from the poorer type grasses making up the main bulk of the sward, the sward itself is on the sparse side, due no doubt, to constant grazing by small stock, with a consequent low carrying or grazing capacity of the veld.

Grazing assessments per mature large stock unit made by the Planning Committee (see planning section) average out as indicated in Table 57 for ten districts, with the individual Agricultural Official's assessment appended for comparison purposes.

Fort Beaufort could be assessed at four to four and a half morgen per mature livestock unit.

The number of camps closed for a 12 months' rest during 1967, are shown on a district basis in Table 58. Herschel, King William's Town and Whittlesea had the greatest area closed, but when expressed as a percentage of the total grazing area, Stutterheim, Whittlesea and Cathcart had over 20 per cent of the area rested. Some 12 per cent of the total grazing in the Bantu Ciskei was rested during 1967. During the ensuing year, camps rested for a year commencing in 1967, had to be re-opened for grazing purposes before the end of the 12 months' period due to the severity of drought conditions. Examples of these are Mgwali Reserve and Heckel Farm (Stutterheim), and Whittlesea. In the latter case hardly any rain fell during the growing season and it became necessary to open up rested camps in June, not only for grazing purposes, but for the drinking water in these camps. According to a communication from the Whittlesea Agricultural Office, grazing control in the past is now paying off a "handsome dividend" in that livestock losses have not been very great.

Periodically, a review is made of the existing grazing conditions in the Betterment Areas and if a decided improvement has been effected since rehabili-

TABLE 57: CARRYING CAPACITY RATING OF VELD IN THE CISKEI [1)]

District	Carrying Capacity of the Veld in Morgen per Mature Largestock Unit				
	Average as assessed by the Planning Committee	As Assessed by the Agricultural Officers			
		All Veld	Sourveld	Mixed Veld	Sweetveld
Herschel	3	3 - 6	-	-	-
Glen Grey	3.5	-	2.5	-	8
Whittlesea	4	4	-	-	-
Victoria East	3.5	4.5	-	-	-
Middledrift	3.5	-	2.5	3 - 3.5	5 - 5.5
Keiskammahoek	3	-	1 - 1.5	3 - 3.5	5
Stutterheim	2 - 2.5	2.5	-	-	-
King William's Town	3.5 - 4	-	2.5	3 - 4	3 - 4
Peddie	3.5 - 4	-	2 - 2.5	3	5
East London	2.5 - 3.5	-	2 - 2.5	3	3

1) Based on assessments by the Planning Committee and District Agricultural Officials.

TABLE 58: NUMBER OF GRAZING CAMPS, AND AREA, CLOSED FOR A REST PERIOD OF 12 MONTHS IN EACH DISTRICT IN 1967 [1]

District	Number of Camps rested	Area Rested		Area rested as a percentage of total grazing area
		Morgen	As percentage of total area rested	
Herschel	60	34,430	31.7	19.0
Glen Grey	24	8,861	8.2	3.7
Whittlesea	40	17,310	15.9	23.3
Cathcart	1	328	0.3	21.7
Fort Beaufort	-	-	0	0
Victoria East	16	2,733	2.5	9.6
Middledrift	34	11,359	10.5	17.4
Keiskammahoek	16	4,160	3.8	16.1
Stutterheim	7	1,675	1.5	23.8
King William's Town	88	19,174	17.6	16.9
Peddie	18	4,873	4.5	6.8
East London	22	3,824	3.5	8.2
	326	108,727		12.7

1) Extracted from Annual Agricultural Report.

tation commenced, or since the previous assessment, the Committee is empowered to revive the veld rating. Examples of this are the Mabalini Location (East London) where the carrying capacity was increased by more than 22 per cent since 1958, while on the other hand Mntlabali Location had an increase of 0.48 per cent in 1967. Decreases in the total mature largestock units to be carried, are also made, but this does not occur so frequently. In King William's Town District where rehabilitation plans have been in operation the longest, decided improvement in the carrying capacity of the veld has occurred in the majority of locations as can be seen by the following examples: Masele assessed in December, 1960 as being able to carry 936 mature largestock units, was re-appraised in March, 1966 as being able to carry 1,052 mature largestock units, 12.4 per cent increase. Menziwe assessed in October, 1959 to carry 598 mature largestock units, in 1967 was re-assessed with a resultant 18.4 per cent increase (110 MLU); Qaga increased by 24 per cent (137 MLU) over a period of four years. The three settlements of the Released Area 32, King William's Town District, had a carrying capacity increase of 55 per cent in just over nine years but initial population difficulties were non-existent.

Apart from a general deficiency in phosphorus, in the high rainfall regions especially, salt is the only other mineral supplement needed in the diet of grazing stock, and from what information can be gathered, very few farmers provide salt or phosphorus licks for their livestock. The position, in regard to a phosphorus deficiency along the coast, can be rated as serious.

3.7.2 Established Pastures:

Kikuyu pastures have been established in the Jan Tshatshu Location adjoining the Good Hope Textile Factory outside King William's Town and the factory effluent is used to irrigate this pasture, otherwise it would not yield very much. Approximately 150 morgen are under irrigation and more Kikuyu is being planted, and in spite of the relatively high concentration of sodium in the partially-purified effluent, the Kikuyu does reasonably well.

Other pasture grasses, tried out at Keiskammahoek on small plots ranging from 0.05 to 2.4 morgen, were clovers, Kentucky fescue, Eragrostis curvula, Panicum kabulabula, Setaria kazangula, Setaria Bear River, Phalaris tuberosa, Italian Rye, Cocksfoot, Bromis species, Hyparrhenia and Napier Fodder (Gold Coast Variety). These were tried out in 1956, some apparently being rejected as failures, while others do not appear to have been followed up on a field-trial basis to determine their suitability.

3.7.3 Bush Encroachment, Poisonous Plants, and Weeds in Lands and Veld:

Bush encroachment, of one sort or another, is still a problem of some magnitude in certain regions. Harpuis (Euryops sp.) occurs in the Glen Grey District, where it is reaching fairly serious proportions. In 1968 it was estimated by the Agricultural Officer that approximately 70 per cent of the grazing area on the hill sides was affected. It also occurs in the Whittlesea District, where Harpuis remains as a constant threat in the background, although since 1961, about 35,000 morgen have been cleared of heavy infestations by applying four to five choppingout treatments, and also in the Herschel District, where it is no problem.

Blue-bush (Chenopodium sp.) has encroached on lands in the Middledrift, especially in the Amatole Basin, East London (Chalumna area) and Peddie Districts. In the latter district, encroachment is as much as 40 per cent in some locations, and clearing costs averaged about R3 per morgen. The control method used in the Middledrift District amounted to resting the area and burning off when dry enough. It is estimated by the Agricultural Officer that 3-4,000 morgen are affected.

In the districts of King William's Town, Middledrift, Whittlesea and East London, and parts of Peddie, invasion of the veld by "mimosa" (Acacia

karroo) is a problem in places, although the demand for firewood keeps a check on size mainly but not to such an extent on the numbers. Fairly extensive areas are affected by Acacia karroo in each of the above districts but the actual area affected in recent years has not been determined. At Whittlesea it has been noted by the Agricultural Officer that "mimosa" seedlings have become established in the rested camps where they are protected from being grazed by small stock in particular. This could well become a problem in this area.

Macchia (Fyn bos) is estimated to cover between 10, 000 to 20, 000 morgen of mountain grazing in the Keiskammahoek District (Trollope, 1968), and the problem of its control is being investigated at present by a Professional Officer of the Department.

Jointed cactus (Opuntia aurantiaca) is a problem throughout most districts, as is shown by the fact that 6, 316 morgen were cleared in 1967 in the Fort Beaufort, Keiskammahoek and Middledrift areas alone.

Amongst the poisonous plants Senecio retrosus (Molteno-disease plant or Ragwort) is a problem in several areas such as in the Döhne sourveld area of Mgwali Location (Stutterheim), Lesseyton Location (Whittlesea) and Middledrift, but to what extent it causes livestock losses, is unknown.

Blue "Tulp" (Moraea polystachya Ker.) is a universal problem in the Districts of Peddie, King William's Town, East London, Middledrift, Victoria East and Fort Beaufort, where several head of livestock die each year from poisoning. The actual number poisoned each year has not been recorded as it appears that these animals are eaten by the Bantu without the cause of death being determined.

The usual weeds encountered in the lands are Stinkblaar (Datura stramonium), Kakie Bush (Tagetes minuta), Landsgrass (Eleusine indica). Blackjack (Bidens pilosa), Bindweed (Convolvulus sp.), with Cynodon dactylon encroachment in most areas. Bluebush (Chenopodium sp.) seedlings and other weeds of lesser importance occur in the lands in the different localities.

3.8 MECHANISATION:

The increasing use of tractors and tractor-drawn or operated equipment is shown by the figures presented in Table 59, which compares the 1964 position with the 1967 position. It is no longer an uncommon sight to see privately-owned tractors ploughing up land in the locations, or to see tractors used for haulage and passenger-conveyance purposes. While the traditional method of hand-hoeing is most commonly used on the smaller plots, the bulk of the arable land is ploughed up by ox-drawn ploughs, while cartage is undertaken by means of ox-wagons or sledges, although, here too, motorised transport is beginning to play an increasingly important rôle.

TABLE 59: LAND PLOUGHED BY PRIVATELY OR TRUST-OWNED TRACTORS AND THE NUMBER OF BANTU-OWNED TRACTORS IN THE CISKEI FOR THE YEARS 1964 AND 1967 [1]

District	Morgen Ploughed in 1964 by			Morgen Ploughed in 1967 by			Tractors Owned by Bantu		
	S. A. B. T. Tractors	Private Tractors	As a % of arable land worked	S. A. B. T. Tractors	Private Tractors	As a % of arable land worked	1964	1967	% Increase
Herschel	12	2,000	15.5	70	4,000	38.4	8	27 [3]	237.5
Glen Grey	-	2,500	7.1	-	18,600	57.8	69	124 [4]	79.7
Whittlesea	345	6	7.3	405	689	44.9	4	30	650.0
Cathcart	-	15	5.6	-	-	-	1	1	-
Fort Beaufort	-	-	0	-	-	-	-	-	-
Victoria East	620	750	28.2	480	1,216	35.7	14	16	14.3
Middledrift	577	550	7.1	324	200	5.1	7	9	28.6
Keiskammahoek	222	890	18.7	206	1,725	29.8	10	14	40.0
Stutterheim	165	250	41.5	31	390	39.6	7	6	Decrease 14.3
King William's Town	651	2,000	15.3	-	2,000	13.0	10	24	140.0
Peddie [2]	88	1,340	16.2	954	1,200	46.7	14	31	121.4
East London	-	340	4.9	-	700	9.9	17	26	52.9
Total	2,680	10,641	11.5	2,470	30,720	34.9	161	308	52.3

1) Adapted from Annual Agricultural Reports.
2) Figure given as 13,400 in 1964 Report but arable land total was under 12,000 morgen - accepted as 13,400 morgen.
3) In 1968 this figure had increased to 52 based on District registrations.
4) In 1968 this figure has increased to 130 based on District registrations.

As seen in the table, over a three year period, the privately-owned tractors have increased by 52 per cent from 161 to 308, and there is a corresponding increase of over 140 per cent in the land ploughed by tractors. Of the total arable land worked in the Ciskei in 1964 and 1967, 11.5 and 34.9 per cent respectively were ploughed by tractors. Well over half the land worked in the Glen Grey District was tractor ploughed in 1967, while the figures for Whittlesea and Peddie were 44.9 and 46.7 per cent respectively, Herschel, Keiskammahoek and Victoria East Districts having between 30 - 40 per cent of the land worked in 1967, tractor ploughed. On the other hand, there are districts like Fort Beaufort, with no tractors and all lands presumably ox-ploughed, and Middledrift with nine tractors and five per cent of the arable land worked, ploughed by tractors.

It is interesting to note that over 86 per cent of the draught power for world agriculture in 1950 was contributed by animals. The less developed countries had an almost complete reliance on animals, and developed countries, such as Britain and the United States utilized less than 25 per cent animal power (Acock, 1950, quoted by Phillips, 1964). Further, man competes more seriously with the tractor to rank second as a power source on the land (Phillips, 1964). In terms of costliness of operation, the tractor has been shown to cost twice as much as hand or draught power (Collinson, 1962, quoted by Ruthenberg, 1964). It is noteworthy that, in 1967, for every 458 morgen of available arable land in the Ciskei, there was one privately-owned tractor. In 1949, arable land per tractor in the United States and United Kingdom, amounted to 178 morgen and less (Van Wyk, 1955). With the exception of two District Agricultural Officials, who thought the time for more general use of tractors was not yet, the reason being the high cost involved, the tendency is to favour tractors and mechanisation in general. While the Bantu peasant farmer is keen to have his lands tractor ploughed, this based on the local demand for Trust tractors, the problems arising are the initial cost of new tractors or good second-hand ones, the cost of repairs, and the general care, maintenance and servicing of these units. The concensus of opinion is that the majority of tractors and equipment are not cared for correctly, nor are minor repairs effected in time to prevent costly, major overhauls from occurring. In the Stutterheim District, of the six tractors in the Mgwali Location at the time this survey was made, one was completely out of action with the other five in poor condition generally and with insufficient power being developed to plough to the required depth. It was suggested by some Agricultural Officers that the Bantu farmer, generally speaking, had no respect for machinery nor did he have the technical knowledge to keep tractors in running order. Most tractors were reported to be out of order more often than they were in good working condition, and this appeared to be the case especially when they were

needed for seasonal ploughing. Apart from the isolated tractor kept under cover in a shed or shelter, most tractors remain out in all weathers, and one farmer actually left his tractor in the lands at the spot he finished ploughing, until the next ploughing season!

In a few districts, Trust tractors with trained drivers, are available and the following charges are made:- ploughing R4 per morgen, and carting 20 cents per hour plus 16 cents per mile. In the Glen Grey, Stutterheim and some other Districts, White farmers were given permits to operate tractors for ploughing and planting purposes, on a contract basis, and a charge of R5 per morgen for the full operation, was mentioned. The permit system was subsequently withdrawn in Glen Grey and a consequent increase in Bantu-owned tractors occurred.

The Trust also operates stationary baling-machines in the irrigation areas for the purpose of baling lucerne hay. Lorries or tractor and trailer combinations are used in the carting of manure in some areas, the amount carted has already been indicated.

3.9 SOIL EROSION:

Based on estimates made by the District Agricultural Officials, the districts with the least soil erosion of all varieties, are Stutterheim (about one per cent affected but under control); East London and Keiskammahoek with about five per cent of the total area being affected by medium to severe erosion, and this mainly on the hillslopes; King William's Town with an estimated 12 per cent, including about 10 per cent on the hills and two to three per cent in the valleys; and Whittlesea with an estimated affected area of about 10 per cent. In the remaining areas, the position is far more serious, and the approximate estimates of the land affected by erosion, is as follows:

Victoria East	:	20 - 25 per cent.
Middledrift	:	Hillsides 15 - 20 per cent, valleys about 30 per cent and plains (or flattish areas) five - 10 per cent.
Herschel	:	Hillsides 25 - 50 per cent, valleys up to 50 per cent and plains 25 - 50 per cent.
Glen Grey	:	The whole area is affected by sheet erosion with about 20 per cent of the grazing affected by gulleys and dongas, and virtually unusable; 40 per cent usable but poor, and the remainder of the veld in fair condition. Arable lands - about five per cent completely unusable, 10 per cent bad but usable and the remainder reasonable. Termites (Harvester

ants) are active in some parts and contribute to defoliating the veld and hence erosion.

Peddie : Areas badly affected amount to about 25 per cent with about 25 per cent mildly affected to fair. In the coastal areas, only about 15 per cent of the area is affected. Tyefu's Location, which has long been against being declared a betterment area, is eroded quite badly over 40 to 50 per cent of its surface area.

Fort Beaufort : The position is serious due to the high human and stock concentration and the topography. Arable lands are affected (medium to seriously) in that, up to 45 - 50 per cent of the area is eroded. Approximately 20 per cent of the grazing is affected to the same degree.

Table 60 gives an idea of the soil conservation projects undertaken up to the end of 1967. During 1968, many more such anti-erosion projects have been completed, or are in the process of being completed. Fencing in the planned locations has amounted to some 6,970 miles up to the end of 1967, with an additional 1,053 miles as boundary fences between the White areas, Lesotho and the Bantu territories. In 1964, these figures were 5,103 and 987 miles respectively, showing increases of approximately 37 per cent and seven per cent over the three-year period.

According to Proclamation No. 116 of 1949, all Trust Land is automatically declared soil conservation districts.

The figures in Table 60 serve to illustrate the tremendous amount of work being done on anti-erosion projects, and in the three years up to and including 1967, the majority of the soil-conservation works have been carried out.

The Regional Authorities, together with the Tribal Authorities under guidance, are today responsible for soil-conservation schemes. In the Herschel District, with 23 locations, the Tribal Authority in each location was allocated R500 for the 1968 year for combating soil erosion, and with the take over of the responsibility for agriculture by the Territorial Authority, this "self-help" approach will be the favoured one.

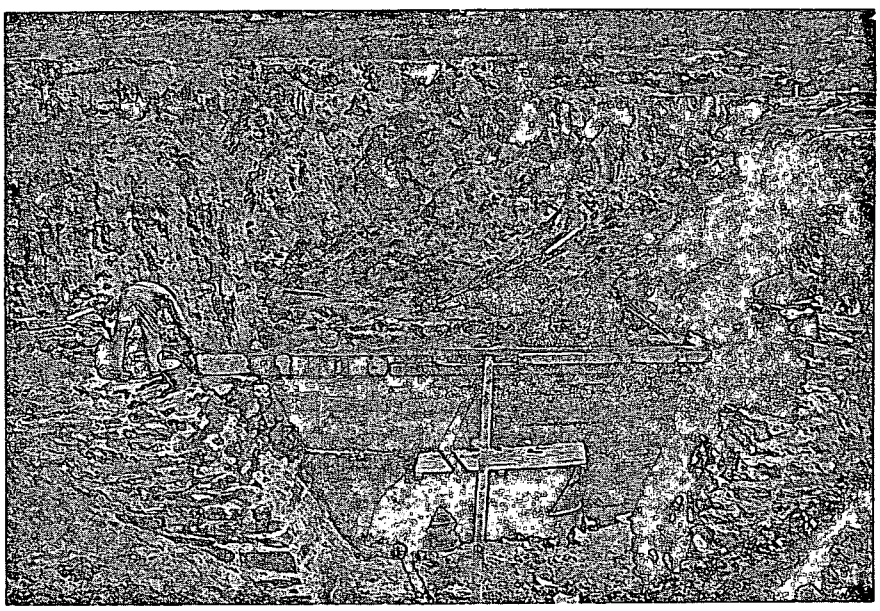
Rationalised farming methods introduced in the Betterment Areas, have reduced the incidence of night-kraaling of cattle which, in the past, has been responsible for a great deal of soil loss. Daily trampling of the veld by stock being taken out to graze in the mornings and being returned to the kraals or stockades in the evenings, has caused serious erosion to set in. Continuous

TABLE 60: SOIL CONSERVATION PROJECTS UNDERTAKEN IN THE BANTU AREAS UP TO THE END OF 1967 [1)]

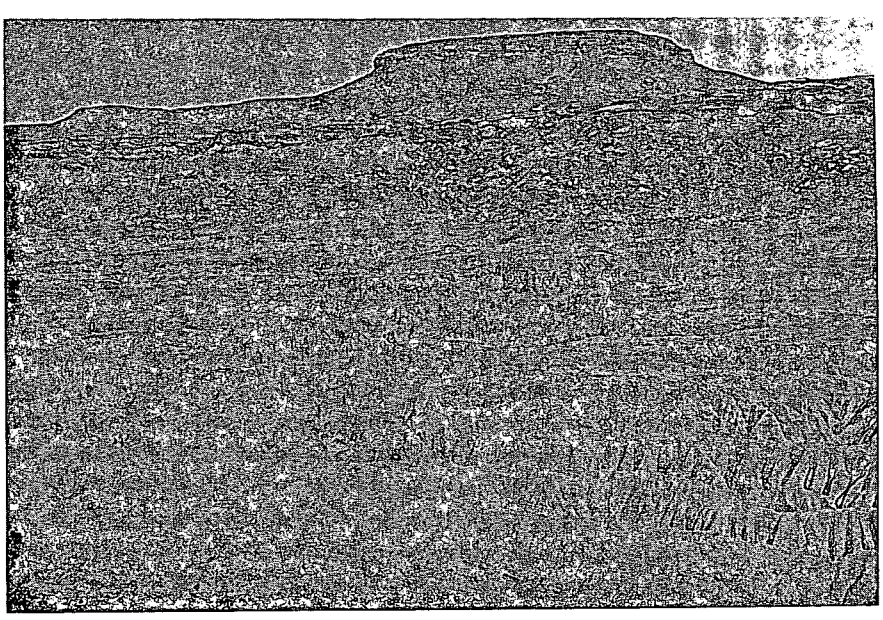
District	Contour Walls - Miles	Contour Banks - Miles	Water Meadows - Miles	Grass Strips - Miles	Silt Traps or Walls - Number	Water Shoots - Number
Herschel	-	172.63	23.51	804.69	132	100
Glen Grey	-	215.02	12.19	751.56	19	59
Whittlesea	-	91.66	3.64	63.67	12	-
Cathcart	-	1.20	0.29	1.70	-	-
Fort Beaufort	-	14.90	-	162.60	-	-
Victoria East	-	28.45	-	86.35	-	-
Middledrift	4.03	299.97	17.03	907.20	-	-
Keiskammahoek	-	39.94	0.29	740.30	-	-
Stutterheim	-	-	-	-	-	-
King William's Town	11.00	569.83	27.59	1,530.11	-	-
Peddie	-	121.10	3.78	264.41	-	-
East London	-	172.13	5.45	663.30	-	-
Total	15.03	1,726.83	93.77	5,975.89	163	159
Increase over 1964:	0 %	35 %	95 %	31 %	100 %	100 %

1) Extracted from Annual Agricultural Reports.

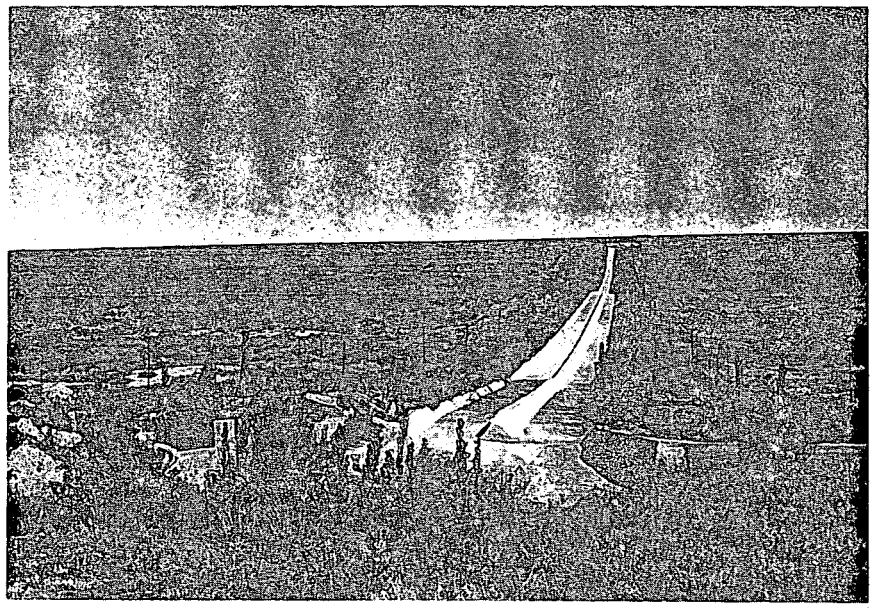
TYPICAL EROSION SCENE - GLEN GREY DISTRICT



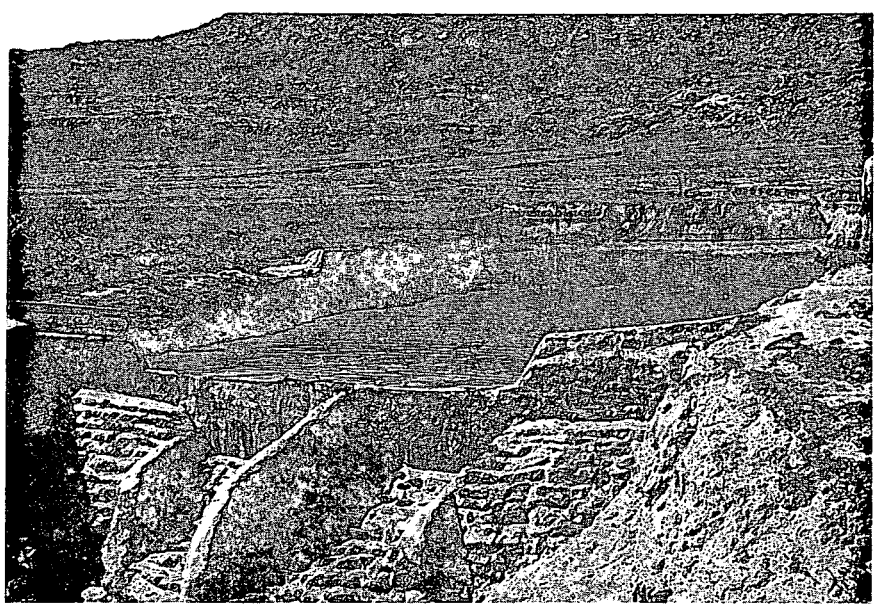
EROSION AND CONSERVATION WORKS - HERSCHEL



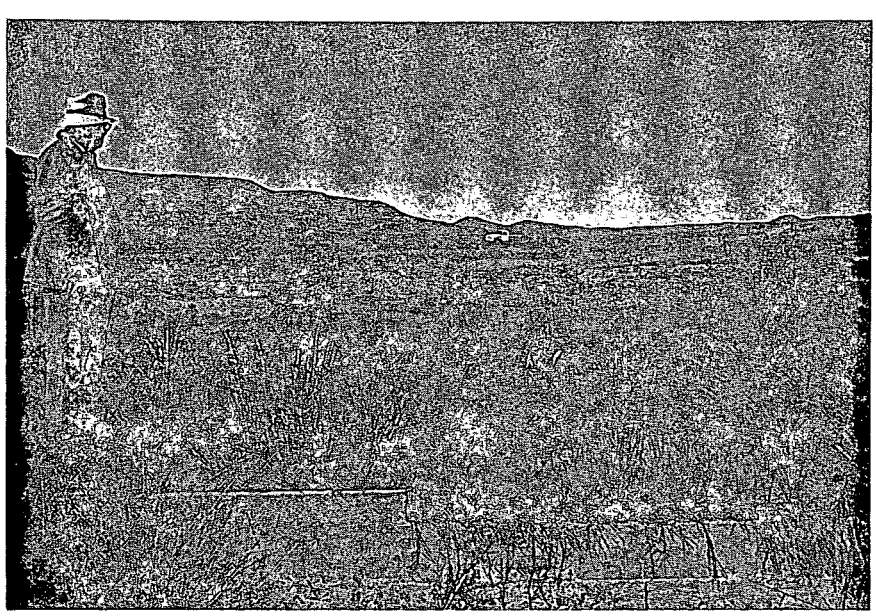
EROSION - TYPICAL OF HIGHER RAINFALL AREAS



CONSERVATION WORKS NEAR STERKSPRUIT



CONSERVATION DAM - HERSCHEL DISTRICT



REHABILITATION OF CONSERVATION DAM - HERSCHEL

grazing of veld has also caused a marked deterioration in vegetative cover, with consequent soil loss during periods of heavy rains.

3.10 FORESTRY AND WOODLOTS:

The total area under indigenous and exogenous trees, 28,767 morgen, has remained practically constant in recent years, and in 1967, this was made up of 203 morgen of pine trees, 1,571 morgen of eucalypts, 157 morgen of wattle and 28,767 morgen under indigenous forest. This total afforested area represents 2.9 per cent of the total Ciskei area, with indigenous forests covering 2.7 per cent and exogenous trees approximately 0.2 per cent of the total area. Herschel has the largest area planted to pines and eucalypts (675 morgen), followed by Glen Grey (268 morgen), Whittlesea (253 morgen), and King William's Town (213 morgen) and East London (204 morgen).

The recommended procedure in planting trees, is to plough or sub-soil and plant, and only where this is not possible due to topography or stoniness, is pit-planting resorted to. The superiority of ploughing and planting over pit-planting is clearly demonstrated near Lady Frere (Glen Grey) where there is a significant difference in the height of the eucalypts.

With the exception of Herschel and the mountainous parts of other districts, for example, Glen Grey and Keiskammahoek, forestry on anything but a small scale, that is, a woodlot system, would not prove to be satisfactory owing to the exigencies of the climate. Whittlesea, which has several hundred morgen planted to pines and eucalypts, is, generally speaking, climatologically unsuitable. Woodlots are being planted in the various locations and, the idea is to establish 20 morgen at a time, although the apparent basis, on which the area is calculated, is one-eight of a morgen per family per year. These woodlots are intended to supply building poles, fencing material and firewood, and it appears that the eucalypts are preferred. In the second five-year plan, it is envisaged that a 1,000 morgen of additional land will be planted to trees to meet the needs of the rural population.

In order to supply the young trees, permanent nurseries have been established at Sterkspruit (Herschel), Reserve Farm (Glen Grey), Mount Coke Trust Farm (King William's Town), Debe Vally Depot Farm (Middledrift) and at Whittlesea, and between them they have supplied 71,000 to 140,000 trees per annum in the past few years.

3.11 PLANNING OF LOCATIONS ON AN ECONOMIC-UNIT BASIS:

Prior to 1957, the basis of allocating lands in the Bantu districts, was purely of an arbitrary or haphazard nature, in that an application would be made for land to the Native Affairs Commissioner's Office, and a constable would then be sent out to step off a piece of arable land. With the introduction of planning

on an economic-unit basis, a sound and lasting foundation has been laid upon which to improve the Bantu locations. Before an area can be planned, it requires to be declared a Betterment Area in terms of Proclamation No. R 196 of 1967 (previously Proc. No. 116 of 1949 served but this has been repealed and replaced by R 196 of 1967). All locations in the Ciskei today are declared Betterment Areas now that Healdtown Location (proclaimed in 1967) and Sheshegu Location in Victoria East (proclaimed in May, 1968) have agreed to be planned.

The ad hoc or Planning Committee (hereinafter referred to as the Committee), consisting of the District Bantu Affairs Commissioner, Chief Agricultural Officer (Planning), the Senior Agricultural Officer for the area, and the local Agricultural Officer, together with two Bantu Agricultural Advisers, draw up a programme for the planning of a particular location. Each district, within which the location falls, is notified of the Committee's itinerary three to six months beforehand, and this then gives the local Bantu Affairs Commissioner and his field staff sufficient time to convene a general meeting at the Headman's residence, where the subject of planning and the reasons therefor, are discussed. The Bantu Affairs Commissioner also informs the people that a local census of the location will be undertaken. It is on record that a number of locations were not prepared to accept planning, as for example, Rodana Location in the south of the Glen Grey District, which turned down planning in early 1952. In such cases, the planning of such locations is shelved until a request comes from the people themselves. Tyefu's Location (about 35, 000 morgen) in the Peddie District, is another example where the people were hostile to planning of any kind, and it is interesting to observe that the local Bantu Agricultural Advisers and Chiefs use this location as their "bad example". However, after witnessing the benefits of the application of a rehabilitation scheme in adjoining areas, all such "backward" locations soon plead for immediate planning of their locations to be carried out, and today little or no opposition is encountered, with the exception of Wolf River Location, on the boundaries of the Middledrift and Keiskammahoek Districts, where some of the population are against planning. On investigation, it appears that "dagga" (Cannabis sativa) is grown (Mayne, 1968) and is, most likely, the main reason for this opposition. Today, the Bantu farmers are far more amenable to change and this is attributed to the fact that they reside in rural villages and are thus more approachable. An improvement in their social life, education system and recreation has been brought about by having a common residential area (Mayne, 1968).

"Working" maps are next prepared and all details, such as water points, existing buildings, fences, dip tanks, eroded lands, unsuitable lands, virgin land available for compensation and privately owned areas, are filled in and a

census is carried out. The census involves the collection of information on human and animal population statistics as well as the size of arable areas. Where locations are large in size, information can then be collected on a ward basis. Sufficiently large tracts of land with an irrigation potential, are excluded and planned separately, or are included on the understanding that, when water is made available, the land will be replanned and re-allocated.

The Committee, which is appointed in terms of the Chief Bantu Affairs Commissioner's (Ciskei) minute (N2/11/2/1 dated 14/5/1958), then proceeds to the location equipped with the necessary map, and statistics, and is subsequently introduced to a gathering of all residents of their local committee. The Chief Planning Officer then discusses the planning of the location in broad outline and replies to any arguments or requests made. It should be stressed that the local Headman and his Committee play a fairly prominent part in the proceedings at this stage. The three important requirements as to the siting of the residential area (or areas), arable land blocks and the sub-division of the grazing area, together with water provision, are the main points around which the conversation revolves. The discussion on the proposed siting of the residential area plays a prominent part in the proceedings especially, and general agreement is necessary before proceeding further. In general, in selecting the residential blocks for the siting of one-eight, one-quarter or one-third morgen plots, a concentration of existing kraal sites, available or future water supplies, the relationship with the arable and grazing areas, and the question of drainage and the suitability of the area for home gardens, must all be considered. Once general agreement has been achieved, the Committee can then proceed to an evaluation of the arable and grazing areas, the selection of suitable woodlot sites, the deciding of which lands need anti-erosion measures or which lands should be excised due to erosion or unsuitability. The Committee is able to make an initial inspection of approximately 1, 000 morgen per day, and in the case of Pelandaba Location (Herschel), covering some 21, 000 morgen, this involved a week's travelling on horseback. On completion of the inspection, the Chief Planning Officer reports back to the general meeting or representatives, and gives particulars of the proposed planning of the location.

On return to Headquarters, the Chief Planning Officer and staff proceed to map the area filling in all details as well as the proposed plan and a Preliminary Planning Report is prepared. At a later stage, the Committee return to the area after all preliminary details have been decided upon, and a meeting with the affected residents ensues. The proposed plan is then discussed in detail and the residents are given an opportunity to make any relevant suggestions. The operation of the re-allocation of land system, based on the Economic Unit Holding,

is then fully explained, and it is pointed out that the system works on the basis of providing sufficient arable land and grazing to allow the land-holder to earn a minimum of R120 per annum. The sizes of these holdings vary from district to district depending on the environmental conditions, topography, soil productivity and carrying capacity rating of the veld. In view of the "pressure" on land, that is the number of existing landowners in the location, it is not always possible to allocate a full economic unit, in terms of arable land, and thus, in most districts half and quarter economic units exist, and it is hoped that, with future industrialisation, the latter holders will be drawn away from the land so that the remaining landholders can operate in the capacity of full-time farmers. In re-allocating the arable lands, the local Headman and his Committee are primarily concerned, and it has happened that, due to failure of a landholder to farm correctly, an economic unit has been taken away from the holder at the request of the Headman, and re-issued to an approved person.

In areas where quitrent or free-hold title to land exists, the re-demarcation of land cannot take place, except where it requires to be excised, for example, when badly eroded, and compensatory land is available. The plan is usually accepted at the subsequent meeting, and the map is then inked in and duplicated, and a full, final report written, in which all costs involved are reflected. The final report can now be approved at the King William's Town Office, unless something controversial arises, in which case, it is forwarded to Pretoria. On approval, the final plans with map and recommendations are sent to the district concerned, where the local field staff carry on with the physical side of the plan. Prior to the commencement of rehabilitation, all hut-owners residing outside the proposed new residential site or sites, require a compensatory hut value to be decided upon, so that on moving, some compensation is available. The policy in connection with the allocation of residential sites, is as follows:

Glen Grey : Existing families are given quarter-morgen sites while all future families will receive eight-morgen sites.

Whittlesea : Only landowners are provided with quarter morgen sites while existing and future non-landowners will receive eight-morgen sites.

King William's Town : Landowners receive third-morgen sites while non-landowners and future landowners receive, or will receive, eight-morgen sites.

Hershel, Middledrift, Peddie and East London:

Is the same as for King William's Town except

that existing landowners receive quarter-morgen sites. In Herschel, the 109 pastoral Economic-Units have one-morgen residential sites.

Once the physical plan is fully operational, extension work is undertaken as a natural follow-up and concerns the actual farming side.

Several regulations are required to be observed in the Betterment Areas, such as the restriction on illegal entry of livestock into a location; no damage to fences and water points; no burning of veld except under control; controlled grazing of arable lands, but all aim at land stabilisation and improved production. Proclamation R 196 of 1967, as published in the Government Gazette Extraordinary No. 840 of 8th September, 1967, gives full details of these regulations.

The land is held under a Certificate of Occupation title and the Chief Bantu Affairs Commissioner has the power to cancel such occupancy, if deemed necessary (Mayne, 1968).

The Economic Unit Holding and the R120 figure, originated from the Tomlinson Commission (1955) and the Summary of the Report, page 113, paragraph 10, reads: "The Commission wishes to stress that this minimum gross income of £60 (R120) is based upon the present low standard of productive efficiency in Bantu agriculture, both as regards crop and livestock production. In calculating the £60 income, the 1951/52 price levels were used for all farm products. If improved farming practices are adopted, this income will be much increased or can even be doubled. The Bantu farmer will have to raise his income of £60 to higher levels, by his own efforts".

As mentioned, in connection with the Gxulu Irrigation Scheme, the highest income obtained in 1966, was R369.58 (average R215.57), and there exists the possibility of still higher returns.

The number of economic units, of the various sizes, is indicated in Table 61.

Of the total landowners (dryland) in the planned locations, approximately nine per cent have full economic holdings; 29.5 per cent have half-economic holdings, while 61.5 per cent have holdings which are less than half and in the region of one quarter-economic holdings. At the time of planning, the number of landholders was so great that only a small number could be allocated full units, the remainder receiving the sub-economic units. Excluding present irrigation schemes, it appears that there is sufficient land to meet the needs of some 35-40 per cent of the total landholders on a full-economic unit basis, based on the number of existing landowners at the time of planning of each location. As approximately 65 per cent of the total area of the Ciskei has been planned up to 1967, it is reasonable to assume that the above figures will be representative

TABLE 61: DRYLAND (MIXED FARMING) AND IRRIGATION ECONOMIC AND SUB-ECONOMIC HOLDINGS IN THE CISKEI, 1967 [1]

District	Dryland Economic Units			Irrigation Full Economic Units	Examples of Full Economic Units on a Dryland Basis			
	Full	Half	Less than Half		Minimum arable land allotment - morgen	M. L. U. [2] Associated with minimum land	Maximum arable land allotment - morgen	M. L. U. Associated with maximum land
Herschel	881 + 109 pastoral units	1,854	7,142	-	0	24	9	11
Glen Grey	-	-	-	-	4	20	12	10-13
Whittlesea	633	680	759	241	3	21	12	13
Cathcart	-	-	171	-	-	-	9	14
Fort Beaufort	-	-	-	-	-	-	-	-
Victoria East	-	1,159	-	-	4	12	9	10-12
Middledrift	58	358	957	11	5	12	9	10-11
Keiskammahoek	30	259	1,229	108	3½	15	9	10
Stutterheim	248	10	5	-	4	17-18	5	11
King William's Town	481	3,011	5,447	74 pastoral	3	10	9	10
Peddie	181	685	1,328	-	4½	17	7	8
East London	79	734	1,225	-	4	15	7½	11
Total:	2,700	8,750	18,263	434				
1965 Position:	2,171	5,086	10,551					

1) Extracted from Annual Agricultural Report, and Planning Files, King William's Town.

2) M. L. U. = Mature Largestock Unit.

of the remaining area to be planned.

In the irrigation areas, 434 full-economic units exist and each landholder or settler commands an irrigable area of one and a half morgen with grazing for two mature largestock units, with the exception of the pastoral scheme in Jan Tshatshu Location where ten mature largestock units are run on one and a half morgen irrigated Kikuyu grass and seven morgen of veld.

In arriving at an Economic Unit, the total earning capacity of each livestock unit (MLU) is taken to average R5 per annum, and the value of a bag of grain is assumed to be R3.50. Thus knowing the arable and grazing land available and its average productive capacity under existing conditions, the number of economic units can be arrived at by calculation.

It is interesting to note that the Tomlinson Commission (1955) envisaged the following two homogeneous agricultural regions, amongst others, as shown in Table I of the Summary:

Herschel D 2 - Stormberg Grazing Area with average grain yields of two bags per morgen and carrying capacity of three morgen per mature largestock unit, and each family requiring 63 morgen plus one morgen residential site, with 21 mature largestock units per family. The arable land allotment being two morgen. The estimated gross income is calculated to be R119. The largestock to sheep to goat ratio is 11 : 40 : 10 (approximately 1 : 4 : 1).

In the Coastal Region (H3), the average grain yield is taken as six bags per morgen, with carrying capacity 3.5 morgen per mature largestock unit, and an allowance of nine mature largestock units per family. Total land required 31 plus one morgen, with 3.5 morgen arable. Estimated total gross income is R118.7, and the suggested stock ratio 6 : 5 : 10 (Cattle : Sheep : Goats) which is approximately 1 : 1 : 2.

3.12 THE BANTU CISKEI REGIONAL AGRICULTURAL AND ENGINEERING SECTIONS:

On the agricultural side, up until the take-over by the Territorial Authority in October, 1968, the staff was as follows:

Control Agricultural Officers (2) and Professional Officers (1)

Chief Agricultural Officers (0), Senior Agricultural Officers (3)

Agricultural Officers (4), Agricultural Supervisors (3) and several Agricultural Overseers and Foremen.

The above posts were all European posts and an Agricultural Diploma is the minimum qualification for Agricultural Officers.

The Bantu held posts were as follows:

Senior Extension Advisers (3)

Extension Advisers Grade I (13)

Extension Advisers Grade II (81)

Extension Advisers Grade II on Planning (2)

At present, one Agricultural Extension Adviser is responsible for each ward and there are 116 extension wards. Each Extension Adviser has to work with between 550 to 600 families in his ward, on the average. A Senior Extension Adviser acts as a co-ordinator for the wards placed under his care. These Bantu Advisers fall directly under the control of a District Agricultural Officer, who is assigned the necessary Foremen, Overseers and Supervisors to provide for the work being carried out in his District. Several districts are grouped together, not necessarily on a geographical basis, and fall under the control of a Senior Agricultural Officer, who in turn is responsible to the Chief and Control Agricultural Officers.

With the emphasis on extension work in the Bantu areas, a special Chief Agricultural Officer has been appointed to undertake the organisation and control of this valuable work.

Now that agriculture falls under the Territorial Authority, a Department of Agriculture has been formed and is headed by a Director of Agriculture, under whom the above staff are organised.

Very much the same applies to the Engineering Section, which is an independent department in its own right and is controlled by a Director. Apart from the Regional Engineer (now the Director of the Department of Works) and the Regional Town Planning Engineer, the remaining staff do not hold engineering qualifications.

DISCUSSION AND CONCLUSIONS

4.1 THE LIMITING FACTORS IN ANIMAL, PASTURE AND CROP PRODUCTION:

As manufacture and commerce are at a minimum in the Bantu areas of the Ciskei, the main reliance of the economy is destined to fall on agriculture for many years to come. Widespread agrarian reform and planning is thus a basic requirement in the activation of economic progress in these underdeveloped areas. The productive potential of such areas where subsistence agriculture predominates, needs to be assessed as a pointer to the future. In an assessment of the latent agricultural potential of the Ciskei, the natural and human limitations, which exercise mild to severe adverse influences on animal and crop production, thus need to be known or estimated. With this in mind, it is proposed to discuss the limitations militating against optimum biological and/or economical production in terms of animal, pasture and crop production, with particular emphasis on animal production.

4.1.1 Limitations Imposed on Animal Production:

According to Bisschop & Groenewald (1963) the animal industries of African countries pass through successive stages as indicated below, and the Ciskei is no exception:

(i) Phase of endemic and epidemic disease control.

(ii) Phase of numerical stock increases due primarily to item (i) and overstocking invariably results.

(iii) Phase of overstocking when soil fertility, productivity and carrying capacity rapidly decline with consequent deterioration in livestock health and productive capacity. This phase is the stage reached by the Bantu farmers in the Ciskei today, and is both a "negative phase and the inevitable climax" due to the Bantu way of life and to Bantu traditions.

(iv) Phase of balanced conservation farming. There is no evidence that Bantu farmers are anywhere near this stage of development.

As far as possible, animal production limitations will be discussed in order of importance based on personal observations in the areas under review.

A. Human Resources:

As this will be discussed later in terms of animal and crop production, little will be said here. Human resources are generally considered to be one of the main limiting factors of production in the Ciskei. Schultz (1964) gives this aspect its rightful position when he concludes that "The man who is bound by traditional agriculture cannot produce much food no matter how rich the land. Thrift and work are not enough to overcome the niggardliness of this type of agriculture. To produce an abundance of farm products requires that

the farmer has access to and has the skill and knowledge to use what science knows about soils, plants, animals and machines". Swynnerton (1963) states that "traditional systems of cultivation, land tenure and use were evolved for an age when the main resource, land, was plentiful", and points out that the transhumance or nomadic forms of agriculture allowed nature to restore her resources.

B. Nutrition:

Basically the problem centres around the severe competition for available feedstuffs which consist predominantly of veld grazing in all districts. Grazing pressure in the Bantu Ciskei averages out at approximately 2.5 morgen per mature largestock unit, while Clarke (1940) assessed this area as lying between 3.5 to 4.0 morgen per unit. In effect, the area is overstocked by at least 29 per cent on the 1967 annual stock returns, the latter being by no means absolute. As the main reliance in animal nutrition is on the veld, the overall position can be regarded as being comparatively serious. Without adequate and readily available feed supplies, livestock improvement is no longer feasible, especially where the level of management is low. This view is supported by Verbeek (1968) amongst other animal scientists. The animal industry in the Ciskei is based predominantly on an extensive pastoral system with its inherent quantitative and qualitative seasonal fluctuations in nutritive value, and which is subject to infrequent but disastrous and financially crippling droughts. As indicated in Figure 13, Du Toit et al (1940) have investigated this seasonal change in the composition of the pastures in the Ciskei, and based on levels of adequacy of crude protein and phosphorus at the five and 0.10 per cent levels respectively, periods of deficiencies occur. In a reasonable rainfall year, it appears that there is adequate protein, on a dry basis, in the natural pasture to meet the needs of the lactating cow producing less than two gallons per day, with the exception of the four winter months in the Herschel District, namely May to August. Cellulose digestibility and digestion rate are substantially reduced in ruminants when the crude protein content of the diet falls below five per cent (Lishman, 1965), and thus efficiency of veld utilisation is consequently affected. In terms of phosphorus, it is apparent that all districts of the Ciskei are subject to regular deficiencies essentially in the winter seasons. In the Glen Grey, coastal plateau and coastal belt regions, the critical months are August and September, with several other months being somewhat borderline. In the Herschel District, June, July, August and September are the months when the phosphorus content of the veld is marginal or totally inadequate in meeting the requirements of the cow (Du Toit et al, 1940). Arising from a discussion on the nutritional value of the veld in the Ciskei, as it pertains to existing levels, is the fact that no long term

analyses of the vegetation have been undertaken in the past, and that over 28 years of overstocking have passed since the above pasture trials were executed. It is by no means unrealistic to question whether the deficiency periods are of a longer duration today than in former years.

In a trial with beef calves grazing at Armoedsvlakte over a period of 23 years, the deficiency of phosphorus in the natural pasture was never less than 20 per cent, being equivalent to 3.00 grams of phosphorus or one ounce of bonemeal per head per day. In the winter of the worst pasture year, this figure increased to 87 per cent, being equivalent to 12.33 grams of phosphorus or nearly four ounces of bonemeal per head per day, with the overall intake deficiency varying from 40 per cent in summer to 78 per cent in winter (Bisschop & Groenewald, 1963). These authors conclude that "the phosphorus intake curves show, apart from seasonal fluctuations, distinct upward tendencies, indicating that the deficiency in steers was worst after weaning and became progressively less with increases in age and in liveweight". Up to weaning-time the majority of calves in the Ciskei are somewhat undernourished in view of the inadequate supply of milk available, and on the weaning of such calves, a severe nutritional impact on the growth is expected, as per the above findings, but no actual work has been carried out in the Ciskei to determine the exact nature, extent and intensity of such deficiencies. Other conclusions drawn from the Armoedsvlakte trials, were that at no time during the first post-weaning year, did the average veld provide sufficient digestible protein for growth purposes, varying from 30 per cent and less of requirements in winter, to 90 per cent or more of requirements; even in the best pasture year, protein intake for growth was only sufficient during seven months of the year. In the case of breeding cows, the average pasture was unable to supply the maintenance, pregnancy and lactation protein requirements for eleven months per year, the actual intake by the beef cows varying from 39 to 83 per cent of their requirements. Where the pasture was assessed as being the best in the 23 year period, there was a positive intake by the beef cows for a period of eight months. However, in the worst pasture year, sufficient protein was provided in only one month of that year, with less than 25 per cent of requirements being supplied in an additional five months of that year. Sodium deficiencies in the average pasture were such that on the average 73 to 80 per cent of total requirements were obtained from the veld (ibid). The position, as indicated by the survey carried out by Du Toit et al (1940), is reputably not as serious in the districts of the Ciskei as mentioned above for Armoedsvlakte. However, Du Toit et al's work did not cover a period of over 20 years and could presumably have been carried out in a good or the best, pasture year, as the results do not appear to reflect the prevailing position in the Ciskei districts

surveyed.

Using figures based on Clarke's work (1940), it is clearly demonstrated in Table 21 that there is a substantial discrepancy in practically all districts of the Ciskei, between the estimated annual requirements per morgen, based on the maintenance, for one year, of all grazing stock that are carried in an average year, and the estimated annual production. In terms of estimated dry matter, digestible protein and net energy per morgen per annum, it appears that Herschel District is the only area capable of satisfying the requirements of the herbivorous livestock population, the other districts falling lamentably below demand.

Apart from the Zwelitsha irrigation scheme where Kikuyu grass is grown under irrigation, and one or two experimental plots in other districts, no improved pastures are grown to stimulate livestock production. Supplementary feeding to livestock, even during the normal dry seasons, is rarely carried out with the exception of autumn and early winter grazing of harvested maize and grain sorghum lands. These crop residues are wastefully utilised by cattle in particular in that a high percentage of the stover is lost to animal nutrition. The dry matter yield of a good stand of maize stover has been shown to be in the vicinity of 8, 500 pounds per morgen which yielded 5, 372 pounds of total digestible nutrients (Swart, Niemann & Biel, 1967). On the basis of an average of 71, 000 morgen being planted to maize each year, and assuming that the dry matter obtained is half of that indicated by Saunders (1930) and about two-thirds of that indicated by Swart et al (1967), an estimated 250, 000 tons of stover would be available in a good rainfall year, but indiscriminate grazing of this stover probably reduces the total amount actually utilised by between 30 to 40 per cent. That is, by as much as 100, 000 tons. No silage is produced and hay, other than lucerne which is mostly sold outside the area concerned, is seldom made in significant quantities, for example, 30 tons only were produced in the 1967 growing season. Other fodder crops do not contribute significantly to livestock nutrition. As stated by Hofmeyr (1968): "The widespread cultivation of fodder crops which constitutes the greatest stimulus to animal production in western countries is a sadly neglected aspect on this continent where the availability, nutritive value and seasonal nature of the natural pasture creates serious nutritional problems". Such a stimulus is even lacking in the high rainfall regions of the Ciskei. Excluding drought years, the normal winter weight losses in practically all areas, appear to be such that are required to be made up by at least two to three months of good pasturage each year (Brown, 1956). In the over-wintering of 700 to 900 pound steers on veld, Van Marle (1968) mentions that about 22 per cent of the autumn weight is lost which represents nearly 180 pounds. According to Verbeek (1968) 20 per cent or more of the peak summer weights on the average can be

lost during the normal dry period or during periodic droughts. That this weight loss can be partially or wholly overcome, has been demonstrated by, inter alia, Raath, 1941; Schoeman & Lishman, 1965; Von La Chevallerie, 1965.

Concentrate feeding is rarely undertaken in the supplementation of the diet of ruminants, being utilised primarily in the nutrition of pigs and poultry of the improved varieties.

From the above, emphasis is thus placed on the fact that production is predominantly dependent on the available grazing. Where this is decidedly poor both from the quantitative and qualitative viewpoint, as experienced in winter and during the periodic drought periods, all forms of production, along with growth and development, are considerably depressed. In milk production, several factors play their part in the determination of the ultimate yields, but the main consideration by far, is nutrition. As the latter is primarily in the form of grazing, rainfall is obviously a dominating influence on milk yields, albeit indirectly. This indirect relationship is adequately demonstrated in Figure 14, together with the fluctuations encountered in the monthly milk supplies to local dairies. Calves are also subjected to initial stunting brought about by an insufficient milk allowance and indifferent grazing together with endo-parasitic infestations, and, in some cases, possible inbreeding effects. Mentz (1968) concludes, from studies made on severe growth retardation in calves for a period of 25 weeks, that the growth potential is not lost on these calves being rehabilitated. Remarkable recovery of the calves after being rehabilitated, was apparent, and this was also the finding of Van Zijl (1968). A further conclusion (Mentz, 1968) is "that stunting for longer periods after birth, is more detrimental to the development growth of calves, than inhibiting livestock growth at a later stage". However, it is important to note that such rehabilitation was based on the feeding of a well-balanced ration. In the Bantu areas, calves are initially dependent on residual milk, and later, on the available pasture. No special rearing practices are followed up to weaning, and for that matter throughout the life of the animal, the calf being initially dependent on the amount of milk remaining in the udder after milking which largely depends on the whim of the milker. From this early stage up until weaning, the calf relies on nutrients derived from a restricted milk allowance and natural vegetation. After weaning, the young animal is wholly dependent on the available grazing with its seasonal qualitative and quantitative fluctations as indicated earlier. A comparatively slow rate of gain is apparent in the young stock, but, in spite of this, heifers are reported as first calving down at between two and a half to three years of age (see Table 26). Since the 1963/1964 season, veld growth has been severely limited in most areas due to prevailing drought conditions. Continued dry conditions causing periodic inanition

of the calves and young stock over the past four years, have resulted in the subsequent stunting of these groups. Mature stock, while suffering at the time, have, with the onset of general rains, recovered to a major degree based on visual observations. Mortality from severe drought conditions can be as high as 50 per cent in unplanned locations, but with the advent of wider planning, losses from drought are not expected to go above about 30 per cent. It is of interest to note that while great losses, comparatively speaking, have been experienced in the past due to periodic droughts, it is only when the local water supplies have evaporated that livestock, especially largestock, die at an unprecedented rate.

In terms of meat production, the annual slaughter rate or take-off, does not exceed eight per cent. Rose (1964) estimates the annual potential take-off of the "traditional" herds in Zambia to be not more than nine per cent, compared with the 30 per cent average in the principal beef producing countries. "The low levels of management, nutrition and disease control, coupled with the reluctance on the part of the traditional producer to sell cattle results in low calving rates, high mortality, slow growth, low carcass weights, and, because of these many varied factors limiting production, a low take-off. The communal ownership of land and cattle in the traditional areas aggravates the situation and leads to over-grazing, bush encroachment, soil erosion, and further deterioration in the environment. The universal use of oxen for draught also detracts from a high take-off" (Rose, 1964). The above quotation adequately describes the overall position in the Ciskei and the high degree of similarity between the two areas, indicates the universality of the problems facing the governments in the underdeveloped regions. A high age at slaughter has also tended to limit the number of animals sold annually, although the dominating factor could fairly be laid at the door of nutrition coupled with the important side effects of disease and parasites. The reluctance of the Bantu farmer to part with his cattle until absolutely necessary, is well known, and is an associated factor. Verbeek (1967) has noted this high age at slaughter in Madagascar. Of the management points affecting nutrition, night-kraaling, which severely reduces the possible daily grazing time, and the tendency of the Bantu to give preferential grazing treatment to their draught oxen, should be mentioned, as both factors must necessarily restrict animal production.

The majority of the points mentioned above are equally pertinent in the case of the other livestock species, when mutton (growth), wool and mohair are considered. In the specific case of wool, there is a reduction of between 13 to 18 per cent in wool weights during a relatively severe drought period, while in the case of other products, the effect is undetermined. The fact that there are

over 13, 500 equines in the Bantu areas of the Ciskei which represent approximately 3. 5 per cent of the total mature largestock population, means that there is less grazing available for the more productive species. However, it is recognised that riding, work and transport considerations cannot be ignored, but the numbers should be expressly tailored to meet basic needs. In terms of overall animal nutrition, there is little integration of the animal and crop husbandries, nor any appreciation as to why this should be desirable from the point of view of production.

C. Animal Management:

Attention has already been drawn to the deplorably low standard of management in the herds and flocks of the Ciskei. Fundamentally, the problem revolves around the human factor which is steeped in eons of traditionalism and superstition, including ancestor worship. In more recent times, the determination of boundaries, that is, reserves, while playing a major part in the level of animal nutrition, has also influenced traditional management adversely due to its very sedentary nature. Verbeek (1968) has adequately reviewed the management factors which are of particular importance in Southern Africa, those of prime importance being the provision of food and water and supplementation of the diet when necessary; handling; disease and parasite control; planning of production systems; marketing and animal breeding. Briefly, the position is as follows in the Bantu areas of the Ciskei:

(i) Feed and Water Provision: Apart from grazing, which has only recently been subjected to a planned system of deferred grazing, very little express provision has been made for fodder or grain production for animal production. Crop residues, as previously indicated, are practically the only source of additional food with the exception of a comparatively small quantity of lucerne hay used annually. Where lucerne and other fodder crops are grown, the Bantu farmers are, for all practical purposes, under the jurisdiction of the local European agricultural officer. The latter provides the initiative and entrepreneurship in most production systems of note. The provision of supplementary feeds to livestock, which would nutritively balance the fluctuations which occur in the natural pastures between, and within, seasons, is thus strikingly foreign to the Xhosa and Fingo stockman. A similar trend is noticed in the case of feeding facilities which are rarely encountered, and where they are provided, they are decidedly primitive. Normally ground-feeding is practised with its concomitant inefficiency in feed utilisation. Ground-feeding is also noted in the feeding of penned pigs and poultry, although it is now common practice to employ half-tyres or tins as feeding utensils when grain or meal is provided.

In the past, natural stock watering points were utilised, and as would be expected, residential sites and kraals were situated in the vicinity of what could be considered to be permanent sources of surface water. Today, the position has changed in that the provision of dams and boreholes has enabled logical production and grazing systems to be introduced. However, there is still a great need for the wider spread of stockwatering points to enable the maximum possible efficient use to be made of the major feed resource in these areas. Inadequate watering points, coupled with the need for an intensification of grazing control through the medium of fencing or other restrictive measures, has led to deterioration of both the quantity and quality of the grass sward and to soil loss through mechanical damage. Bush encroachment in some districts such as Keiskammahoek, has considerably reduced the available grass cover, and in many cases, is the direct result of the chopping of firewood.

(ii) Handling, and Handling and Holding Facilities: Reference to the care and attention bestowed especially on their cattle, is made by the early writers such as Kay (1833), but such reports are apparently incompatible with present practice. From reports and personal observations the least points considered to be absolutely minimal for the reasonable care and handling of animals, are seldom exceeded. In the majority of cases, incorrect handling of livestock is due to ignorance, traditional practices and the partial or complete absence of handling facilities. The latter facilities are to be seen at the dipping centres and sale-yards in the various districts, apart from those available on the Trust-owned and operated farms. While admirable for the function they are designed to serve, the handling yards and crush pens leave a lot to be desired when a recalcitrant bull needs to be restrained in order that appropriate treatment can be applied. The absence of well located handling facilities, in effect means that there is a tendency to delay effective medication or treatment until the complaint assumes serious proportions and production suffers accordingly. Experience clearly demonstrates the fact that timeous handling and treatment of the majority of livestock complaints constituting a hazard to general health and consequently, production levels, causes least upset or retrogression to the animal. Inoculation and dosing programmes could also be extended more readily where adequate facilities existed, provided that the extension services could pave the way for more general participation in such schemes in the Bantu areas.

The night-kraaling of both large and small stock is a practice which is generally volubly condemned, although it is chiefly the offspring of necessity to overcome the nuisance factor during the cropping periods, straying and the possibility of stock being stolen. At present, with over half the grazing area in the Ciskei under a planned system of management, night-kraaling is practised

by at least 50 to 60 per cent of the livestock owners. This practice not only limits the time available for grazing, especially under conditions of scanty pasture and high ambient summer temperatures, but is also a favourable environment for the spread of disease, for example, Tuberculosis, scab and mange, and other undesirable conditions such as infectious opthalmia and foot-rot. Seath & Miller (1946) and Bonsma (1950), in studies on environmental climatology, have conclusively demonstrated the effect of climatological factors on the physiology and grazing habits of cattle in the tropics and sub-tropics. The fact that during the hot months of summer over 60 per cent of the grazing is done at nights where cattle have free-range through out, means that forage intake must be suppressed during the day. Where kraaling occurs and stock are released and driven to grazing at approximately eight in the mornings and return at five o'clock in the afternoons, then the grazing-duration is one of nearly nine hours. Where climatological stress on the grazing animal reduces the tendency to harvest the available pasture, then it becomes apparent that growth and production must automatically suffer.

The effect of night-kraaling on sheep is noticeable in that wool yields are drastically affected since 25 to 50 per cent less scoured wool is produced in the Bantu areas compared with adjacent European areas, where night-kraaling is not practised.

(iii) Disease and Parasite Control: As previously mentioned, the number of stock dying annually in "normal" years, that is, excluding drought periods, does not appear to exceed six per cent. It is most likely that this figure is an underestimate in view of the fact that a large number of the cattle that die are consumed by the local population. Where disease symptoms are few in number or absent altogether, the chances are that such an animal would be used as a source of protein, and the true position confounded. Unfortunately, there is not much accurate information available in respect of animal diseases in the Ciskei. Tick-borne diseases are notable in practically all districts of the Ciskei, but to what extent respiratory and reproductive diseases play a part, is difficult to gauge. In the case of the latter, from experience in the Ciskei, it is expected to find that the breeding diseases play a major limiting rôle in the production of both meat and milk. Calving percentages are notoriously low no doubt due to breeding diseases, parasites and poor nutritional levels. Chemotherapeutic techniques are seldom applied, and if they are, in many cases such treatment is too late.

In the treatment of infected animals, lack of knowledge, tribal customs and the relatively high cost of medicines, which are not readily available, play a decided part in livestock losses due to disease. However, the influence of

some tribal customs affecting livestock production, appears to be on the wane. Mortality is excessively high in calves and lambs, and malnutrition and diseases are the root causes. Furthermore, comparatively few stock are inoculated against prevalent diseases. While the cost structure of these vaccines contributes, to the general disinclination to inoculate, the underlying reasons for the very restricted use of vaccines, appear to be ignorance and the difficulty in making these vaccines readily available in each location. It has been noticed that an owner, for example, will dose or inoculate his stock one year, obtain good results, but fail to repeat the performance in the following years.

Parasitic infestations, especially in the more humid zones of the Ciskei, are responsible for both direct and indirect losses. Taking all aspects into account, in a large majority of the herds and flocks in some years, the stock-owner finds it difficult to maintain herd size. This is apparently the position in most developing countries, according to Andrews (1964), and contributions by this livestock sector are uniquely low (Phillips, 1964). Little dosing for endo-parasites is undertaken, in spite of the fairly major limiting rôle that they play on health and reproduction. As Lee (1959) points out, "these infestations may cause death or ill health when nutritional levels decline at the end of the rains and during the subsequent drought periods. ..... Finally, certain traditional features of management commonly practised in non-migratory systems involve localized concentration of stock on heavily contaminated land. Thus there is a tendency for the smaller ruminants and pigs and poultry to wander at large round the village where they feed mainly on fouled land. ..... stock are constantly exposed to heavy concentrations of infective material".

Dipping for ecto-parasites is carried out in the compulsory dipping areas, while it is most erratic in the non-compulsory regions. As shown above, the incidence of tick-borne diseases is generally reported to be fairly high in most years according to Agricultural Officers and Annual Agricultural Reports for the Ciskei, but no statistics are available to substantiate these reports. Altogether, there are 159 cattle dips and 155 sheep dips distributed throughout the Ciskei. On the average, this means that there are approximately 1, 291 head of cattle, and 4, 384 head of small stock per cattle and sheep dip respectively. Regular dipping of these numbers at frequent intervals would impose a strain on the dipping tanks and local staff.

In summation of the above inhibiting factors on production, it is apparent that both endemic and epidemic diseases contribute to a high mortality, apart from overall effects on:

(a) Milk and fibre production, through debility and death.

(b) Meat production in that there is a considerable reduction in

the number of animals available for sale annually.

(c) Selection and hence progress since in some years there is virtually no choice of replacement stock.

(d) Age group progression through no replacement stock being available in some years.

Endo- and ecto-parasites also affect mortality rates, cause a reduction in milk and fibre production; affect growth and development adversely, and seriously handicap feed utilisation efficiency. The latter is not only affected directly by consumption of digested feeds, but also causes severe physiological damage to the intestinal epithelium and other parts of the body. Cysticercosis is a problem of considerable magnitude occurring in 7.5 per cent of Bantu-owned cattle, and the cost to the districts concerned, in terms of wasted food, labour and capital is unnecessarily high. There is also the ever present danger that the infected meat can have on the human population.

(iv) Production Systems and Livestock Marketing: With exceptionally few planned animal production systems operating in the Ciskei, inco-ordination to the extent of being haphazard, is discernible. Planned production schemes, such as dairy and poultry schemes, do exist but these are under the guidance of local agricultural officials, and without such help, it is doubtful if many of these existing schemes would be operating today. Carefully planned schemes under knowledgeable leadership and supervision, would certainly pave the way for greater and more efficient production systems, which is by no means the position at present.

As the satisfactory marketing of livestock or livestock produce, on a regular basis, is the key to improvement in animal production (Eiselen, 1967; Hamburger & Waugh, 1968; Hamburger & Reyneke, 1969) the distribution and efficacy of such schemes should serve as an indicator in terms of progress. As shown in Tables 28 and 29, the number of cattle sold at auction sales in the Ciskei in 1967, amounted to over 6,500, and these were auctioned in 11 different districts. The total number disposed of in 1967, however, amounted to 6.29 per cent of the total cattle population, and when compared with other countries such as Zambia, with a maximum potential of nine per cent (Rose, 1964), Australia 20.4 per cent and the United States, 40 per cent (Harwin, 1956), there can be no doubt that the maximum potential take-off has, by no means, been achieved. Thus the strategic placing of additional auction centres and the increase in the tempo of sales, would ensure greater production, assuming that breeding and nutrition levels were raised. There are, as yet, insufficient livestock disposal centres in the Ciskei, and a similar analogy can be drawn for the proper channeling of dairy produce, wool and mohair, and hides and skins, although improve-

ment schemes are beginning to attract attention in the case of some of the latter products. So far as the producer is concerned, marketing is the end point in a production system, and where this is inadequate, then the confidence of the producer is in jeopardy, and personal interest sacrificed. As Dumont (1966) states "The profit incentive is the key to peasant agriculture, and it is the main motive behind the care which is lavished on livestock and crop alike, especially on the former. Even so, the argument applies only when the farm unit is not uneconomically small". The question of the small, uneconomic production unit is one that needs serious attention being paid to it, as the profit incentive no longer is capable of exciting initiative. Such production units can only survive where the landholder or some of his family act as emigrant breadwinners, to the detriment of farm production.

In the handling and marketing of livestock produce there are certain anomalies which detract from the value of the commodity. Wool, for example, is shorn at five to seven monthly intervals, and this results in over 85 per cent of the wool being of the short wool type and of a lowered market value because of the limited demand for this speciality wool. Other characteristics, such as the style, the high percentage of foreign matter and excessive staining of the wool, the latter the result of night-kraaling, reduces the overall value of this wool by as much as 20 per cent. Over 60 per cent of the Bantu wool clip is sorted by brokers, and a large proportion of this amount is marketed through the traders and this represents a direct loss to the producers. When a comparison is made of wool sold by the individual and by the co-operative schemes, as indicated in Table 37, there is over a 50 per cent increase in the value of the wool handled and sold communally. Wool is looked upon by a large proportion of farmers, much in the same way that the commercial banks are viewed, in that when personal economic pressure is such that money is required, one or more sheep are shorn regardless of the condition of the wool, the state of the market or prevailing climate. Table 39 represents a comparison of average wool prices, yields and qualities of Bantu and European origin wool. Not only are prices and yields of Bantu origin wool lower, but there is a far higher percentage in the inferior classes resulting from breeding, management, handling and disposal systems. It is expected that similar circumstances surround the marketing of mohair, but accurate statistics are needed before such an assumption can be established. In the specific case of hides and skins, the advantages of improved marketing methods are clearly demonstrated, in that hides and skins marketed under the improvement scheme received 33 and 49 per cent higher prices respectively than those sold on the individual basis. Unfortunately, only 6.5 and 7.4 per cent respectively of the hides and skins sold in 1967, were in fact marketed under the

improved scheme and the monetary loss involved amounted to an estimated R4, 590. The quality of the hides and skins leaves a great deal to be desired, being influenced by poor nutrition and management of the animals involved and unsatisfactory handling of the hides and skins.

The production system commonly used in the case of pigs, is the extensive scavenging system whereby the pigs of all age groups are mainly responsible for satisfying their own feed requirements. As these pigs naturally include human excreta in their diet, a tremendous wastage of pork occurs at the abattoirs, apart from any effect on the health of humans consuming such measle-infected meat in the locations. Table 47 reflects the position in respect to infected meat at the East London Abattoir where, as previously mentioned, one carcass in every seven to eight, is infected with measles. The lower grades obtained at the same abattoir are shown in comparison with the overall grades awarded, the majority of Bantu-origin pigs falling in the grade three porker class, or in the sausage class (Table 46). The Bantu-origin sausage pigs compared with their European counterparts, have a minimum of subcutaneous and depot fat, and this is a pointer to their relatively low nutritional level.

(v) Protection of Animals: In the heavily bushed or wooded areas, as for example Keiskammahoek, predators exist but there is little information available in connection with livestock losses. Some losses from thieving are experienced in practically all districts especially near the Bantu townships. Very little provision for the protection of animals against inclement weather conditions has been noticed in the Ciskei, and the same applies to the shielding of stock from the effects of solar radiation in the summer months. These factors of general management, where not applicable, could detract from greater production being obtained.

(vi) Breeding Practices and Selection: Very little planned mating is carried out in the case of Bantu livestock. That is, breeding is haphazard and incidental and there is the possibility that inbreeding can occur, especially in the unplanned locations. The effect of inbreeding and the use of improved sires in sheep breeding has already been referred to in an earlier section, where 40 per cent fewer improved sheep gave the same fleece weights as the parent stock. The cattle population is, generally speaking, a heterogeneous one in most districts with the Bantu-type cow and Brown Swiss types predominating. Selection of breeding stock and the culling of low-producing stock is seldom, if ever, carried out. All heifer calves that survive to puberty are automatically incorporated in the breeding herd, indicating that the reproduction rate is too low to allow a culling programme to operate. The reproductive capacity, cattle particularly, is decidedly low and without a reasonable level of

reproduction, productive capacity must automatically suffer. The biological aspects of reproduction are indicated in a later section. From the point of view of economical production, reproductive rate ranks high on the list of important factors to be considered. Not only can selection of replacement female stock be practised at a higher level of merit (Bogart, 1959), but livestock production changes from the subsistence to the market economy form.

With the exception of those areas with subsidised sires, the sires generally remain with the herd or flock throughout the year, and little seasonal breeding is practiced. Seasonal breeding, especially where a dual-mating season is employed, facilitates livestock management as has been shown in the Alice District (Victoria East), while Bonsma (1951) has indicated the advantages under cattle ranching conditions. One of the main problems associated with the control of breeding, and the adoption of defined breeding periods universally in the Ciskei, is the small size of the average herd (Table 23) with a low number of reproductively active female breeding stock, and secondly, the camping system whereby there are inadequate numbers of camps or paddocks available for stock segregation purposes. In many cases there is one bull maintained for use in a small herd (Table 24) and with the communal system of grazing being practised, it has been practically impossible to control mating. Where an improved sire has been purchased communally, greater control of the use of the sire is commonly accepted.

"Good management demands constant supervision and a sound knowledge of animals and their requirements is necessary to ensure correct practice" (Verbeek, 1968). Unfortunately, as will be discussed later in connection with the human population, the supervisory aspects of animal management, and knowledge of animals and their requirements, are sorely lacking.

D. Climatological Factors:

Excluding rainfall, with its over-riding indirect effect on the animal via the plant, ambient temperatures prevailing at certain times of the year, influence production in the Ciskei. In the hot summer months when the daily temperatures exceed 26.5^{o} C, temperate breeds have been shown to cease grazing and seek shade (Seath & Miller, 1946) and this will apply in the case of high grade exotics in the Ciskei. The hardy, but productively low, "Native" cattle, which predominate, from observation, are apparently unaffected. Where night-kraaling is practised, this cessation of grazing assumes greater importance than would otherwise be the case. The direct affect of solar radiation on the animal body thus imposes a restriction on animal production. Findlay (1950) has reviewed the literature on the effects of climate on production and quotes Espe (1946) has having recorded a 23 to 34 per cent drop in milk production when

temperatures increased from 26.5 to approximately 37° C. As can be seen from Figure 8, the absolute maximum temperatures are well above this latter maximum for one or more days per month in several months in each year, in many areas. Several of the inland regions show mean monthly maximums which are in excess of the figures quoted above.

On the other hand, cold weather, especially accompanied by wind and/or rain, also shortens grazing time (Tribe, 1955). At zero ° C, Jersey cows have been shown to produce milk at a slightly lower level than usual, based on the work of Brody and his associates (Findlay & Beakley, 1954), but in view of the quantitative and qualitative state of the veld in the winter months in the Ciskei, this factor hardly bears consideration. On the high lying areas, snow has been responsible for livestock losses and for periods when grazing has been obscured, but other adverse effects have not been recorded.

Table 9 reflects the hail frequency in the Ciskei, but no records are available to indicate the effect of hail on livestock through damage or direct losses.

E. Genetic Material:

The "native" type cattle are, productively speaking, inferior and this can be said of sheep, goats and pigs also. Due to natural selection brought about chiefly by the rigours of the environment in past years, and to inbreeding practices, there has been an overall degenerative effect on size, in the first instance, and production in the second instance. However, the unimproved or "native" stock, have an advantage in that they are hardier and more able to withstand higher degrees of nutritional stress in times of drought than the improved types, and are able to recover and breed up in numbers when general rains have fallen. They also appear to have a higher foraging capacity (Phillips, 1959). Hamburger & Reyneke (1969) also make reference to constitutional and breeding recovery in a study of the livestock industry in Lesotho. While the unimproved cattle lend themselves to being used for grading-up schemes, the successive generations of improved cross-bred stock will inevitably require progressively higher levels of nutrition to meet the needs of the higher producing stock. In this connection, the breed chosen for sire subsidisation, the Brown Swiss, while undeniably suited to varying ecological areas, need not necessarily be adapted to meet the prevailing conditions existing in all climatic zones of the Ciskei. The placing of the best suited cattle breed in a given ecological region obviously has economic advantages. Bonsma & Joubert (1957) state that "The whole concept of regionalised animal production rests on the assumption that the ruling price relationship will favour that particular branch of livestock farming which is advocated on ecological grounds". In effect this means that the system

of animal production should be soundly based on ecological grounds, and the breed which most adequately measures up to the selected production system, should be chosen. In the Eastern Province sourveld areas, the Shorthorn "possesses great potentialities", with the Ayrshire breed fulfilling the needs of the dairy farmer, while in the more mountainous regions, the Brown Swiss is advocated (Bonsma & Joubert, 1957). In the Coastal Plateau region, dairying is indicated together with beef production and should be incorporated in a mixed farming basis. Bonsma & Joubert (1957) further recommend that cross-bred dairy calves be raised and store cattle be fattened to assist in introducing the animal factor into the area to improve soil fertility. In the Coastal Belt region, intensive dairying for fluid milk and fresh cream production using such breeds as Jerseys and Guernseys, is advocated as being the best form of regional production (Bonsma & Joubert, 1957). While the choice of breeds for the various ecological areas may be in dispute, the point is clearly made that these authors do not consider that one cattle breed can fulfil all production requirements. "Any system of permanent animal production depends upon a harmonious co-ordination between the biological forces controlling animal life and the environmental conditions peculiar to different regions of the country" (Bonsma, undated). It seems reasonable to assume that such "harmonious co-ordination" cannot be expected to exist at the ideal level for the same breed but in different ecological zones.

In connection with other species, livestock regionalisation as recommended by Bonsma & Joubert (1957) is as follows:

In the higher lying areas, such as Herschel and the Midlands districts, woolled and non-woolled mutton sheep are advocated and include the various mutton Merino types in the lower altitude and rainfall zones of these districts, with the long-woolled British breeds, for example, the Romney Marsh, in the higher lying and rainfall areas. In the Coastal Plateau areas, the most suitable breeds, include the British and Merino types, while for the Coastal Belt, it is stated that "Sheep can hardly play any rôle due, primarily, to lack of suitable grazing". Pigs can be introduced to advantage where they fit in with other production systems, such as dairying.

Again the approved or subsidised breed, the Döhne Merino breed, is officially considered for introduction in all areas, and as for cattle above, it is reasonable to expect that they will not be adapted to meet the prevailing conditions of all areas of the Ciskei. A breed which is partially adapted to a given ecological zone is therefore, not fully in harmonious balance with the prevailing environment and cannot, under such circumstances, give of its best in terms of production.

From the reproductive point of view, Dassat (1965) is of the opinion, because of the low genetic variance and heritability (approximately 10 per cent) of fertility and fecundity, that improvement in both aspects is best effected by the avoidance of inbreeding and the controlling of both hygiene and nutrition.

If a concerted animal improvement scheme were to be undertaken in the Ciskei, the number of superior sires that would have to be supplied to meet the needs of the female population, would be as estimated in Table 62.

TABLE 62: ESTIMATED NUMBER OF SUPERIOR SIRES REQUIRED IN THE BANTU CISKEI

Total number	Estimated number of breeding females	Ratio of males to females	Total sires required	Approx. number of sires required annually	Av. number of sires introduced per year in recent years
Cattle: 205, 232	(at 40%) 82, 093	3 : 100	2, 464	500	70
Sheep: 448, 946	(at 40-50%) 179, 538 to 224, 473	1 : 40	4, 488 to 5, 612	1, 496 to 1, 971	83
Goats: 230, 556	(at 40-60%) 138, 334	1 : 40	2, 306 to 3, 458	770 to 1, 153	-

There is a decided difficulty in arriving at an accurate estimate of the actual productive female population and the above figures are based on actual livestock counts mentioned earlier. As can be seen from the above table, the actual number of improved sires introduced into the Ciskei per year, averaged over a ten year period, falls woefully short of the number estimated to be needed on an annual basis. Even if financial considerations were not the main limiting factor in the acquisition of such improved breeding stock, it is doubtful if the required numbers of good sires could be supplied at the present time. Artificial insemination, if the operating problems could be solved, could well be the answer, but, at present no use is made of these advanced breeding techniques as is the case, for example, in Kenya.

The above problem is by no means unique to the South African Bantu Homelands in particular since a similar position has been reported in the case of Lesotho (Hamburger & Reyneke, 1969). In the latter country, financial resources would have to be considerable, and even if available, from the physical point of view, it is doubtful if the required numbers could be obtained (Hamburger & Reyneke, 1969). In the Ciskei alone, the financial commitment is large and

would involve not less than an annual amount of R103, 000 using minimum figures of R100 per bull, and R20 for rams and bucks. Such figures are unrealistic assuming that good breeding stock is a basic requirement, but serve to illustrate the enormity of the monetary implications associated with livestock improvement. These figures are based on the acquisition of male breeding stock, on the assumption that grading up of the "native" type is widely accepted as the solution. The opinion has been expressed that there is already a shortage of suitable female breeding cattle in South Africa as an aftermath of the droughts (Verbeek, 1967), and thus the acquisition of such stock in large numbers, can be ruled out as a proposition, at present.

4.1.2 Limitations Imposed on Pasture Production:

As stock numbers have been the cause of costly damage and retrogression in the natural pastures of the Ciskei, the effect of livestock on the pasture and the many interactions, will be discussed here. In common with the rest of the world, where it is estimated that arable and permanent grasslands will shrink from 3.38 acres per person in 1960, to 1.69 acres per capita in the year 2000 (Phillips, 1967), the Ciskei will experience a population "explosion" unless additional land can be rapidly acquired for settlement. However, the fact that land is being more intensely settled, implies that a greater land area will be reserved for residential sites and for other such unproductive usage as kraal sites, roads, recreational, educational and commercial areas. In 1967 it was calculated that there were 2.61 morgen of land per capita in the Ciskei, and this includes all areas. In terms of rainfall per annum, 55 per cent of Bantu Ciskei enjoys 635 mm or higher with 17 per cent receiving less than 508 mm (Moolman, 1955). The variable intensity, erratic nature within a season, high summer temperatures and hence evaporation, erosion and the seasonal dry periods of fairly long duration, collectively tend to reduce the effectiveness of the rain. Grazing is operated on a communal basis, and this very fact apparently relieves the individual of any responsibility in connection with the use of such land, since overstocking and overgrazing characterise this sytem of tenure. "Denudation of the surface alters the environment because of an increase in temperature, acceleration of run-off and reduced water penetration. This retards the establishment of plants and eventually leads to poorer vegetal cover" (Verbeek, 1968). The estimated carrying capacity of the veld, as indicated in an earlier section, at three to four morgen per mature largestock unit, based on the existing condition and total available grazing area, should be between 215, 000 to 290, 000. On the basis of the modified Talbot system, the present livestock population is in the vicinity of 343, 000 units. In effect, the veld is overstocked by at least 50, 000 units. A former stock-inspector in the Bantu areas, basing

his opinion on carefully maintained dipping records, estimates that the annual stockcounts are at least 20 per cent underestimated in most districts. This percentage represents stock owned and grazed in an area, but which are hidden from view on stock-counting days. Several Agricultural Officers commented on the possibility of this occurring, and their opinions support the above view, but they were not prepared to hazard a guess at the actual percentage. A Senior Agricultural Official estimates the stockcount numbers to be under-assessed by about 10 per cent, but is emphatic that when all districts are fully planned and operating according to the plans, this surplus stock will disappear.

On the basis of there being 10 per cent additional stock, an extra 20, 000 to 34, 000 units are thus utilising the grazing in the various districts, and this brings the total number of units in excess of the estimated existing, overall maximum carrying capacity to over 80, 000 units. The latter figure represents nearly 28 per cent of the estimated total carrying capacity. Livestock, especially cattle, which died in the past, were, of course, consumed, and it then became the owner's aim to seek out another animal to replace the deceased one. This still applies today, except that in the planned areas it is illegal to import stock into such an area without a permit, and stock delimitation tends to keep the numbers down. At circumcision ceremonies, there is a tendency for speakers to exhort the young men to purchase cattle and not to waste their money on clothes, houses and other such items (Wilson, Kaplan, Maki & Walton, 1952).

As is so definitely pointed out by Phillips (1959), over-stocking triggers off "an intricate meshwork of change". Retrogressive changes occur in the sward composition, reverting to the pioneer stages, and a further limitation is imposed on the numbers that can be grazed without serious weight losses. The necessity of mineral and protein supplementation of livestock during at least half of each year (Du Toit, et al, 1940; Bisschop & Groenewald, 1963), and which is seldom carried out by livestock owners, depresses production still further. It appears that energy is not a factor to be reckoned with in the grazing of natural grassveld in winter (Van Niekerk, 1968) providing there is sufficient material to meet the needs of the grazing animals.

The correct balance between the various classes of livestock also affects the efficiency of utilisation of practically all veld types "and the proper and optimal exploitation of natural grazing resources" (Hamburger & Reyneke, 1969). For instance, the placing of sheep in the tall grassveld zones would lead to inefficient use being made of the available sward, whereas a combination of large and smallstock, would engender an improvement in the overall use made of such pasture. In the Queenstown/South Herschel area, the recommended stock ratio is 7 : 15 : 15 (cattle to sheep to goats), while in the mountainous regions it is

11 : 40 : 10 and 9 : 16 : 9 in the Keiskamma thornveld area (Commission, 1955). The "correct relative proportions" of the Bantu areas in toto, is stated to be 8 : 9 : 13. In the Ciskei as a whole, the ratio is calculated to be approximately 1 : 2 : 1 or one cattle unit to 3.31 small stock units, ranging from 10 : 1 : 2 for East London to 1 : 6 : 1 on the average for Whittlesea. While the above proportions do not agree with the figures given by the Commission (1955) in that they err by having a higher proportion of cattle to smallstock, it is doubted if this would affect the grazing efficiency significantly. Where the smallstock figures were excessive, it is possible that efficiency could be affected. Where there is a preponderance of shrubs, as in the Keiskammahoek District, then the increased number of smallstock could possibly make greater use of the vegetation. Bush encroachment is also responsible for limiting production in districts such as King William's Town.

Droughts have also caused mild to fairly serious veld deterioration, not to mention the interference in grazing systems. Such deferred grazing systems in operation in the Ciskei have to be disrupted due to grazing or water shortages or both. This disruptive effect is demonstrated in the Mgwali Reserve, where nearly 1,392 morgen of rested camps, had to be used in 1967-1968, and in the Whittlesea District, where 17,586 morgen of grazing had to be grazed two to three months before the end of the rest period was reached in 1968. Animals in poor condition are reported to be more destructive when grazing veld compared with stock in good condition (Drought Investigation Commission, 1923). Available veld is thus subjected to greater abusement by Bantu-owned stock in the Ciskei. In "normal" years a set-stocking system of deferred grazing is needed throughout larger areas of the Ciskei to overcome the effects of continuous grazing, which through selection of the more palatable species, has brought about a marked deterioration in the nutritive value of the sward and a decrease in plant vigour. The harvester termite (Hodotermes mossambicus) has also been responsible for veld denudation in many parts of the Ciskei, such as Victoria East, but the extent to which it occurs in these areas and the amount of damage it causes, have not been assessed.

Erosion, brought about chiefly by overgrazing but also by the cultivation of unsuitable land, has played its part in affecting production, as is the case for crop production, and has been indicated in the section dealing with mountain catchment areas in particular. Limited vegetative cover, together with a lowered infiltration capacity of the soil, means greater run-off and scouring-power and hence erosion, not to mention the damage done by flooding. The drying-up tendency of streams and boreholes is a pathetic testimony of the present unhappy, and untenable position in many districts. With the over-exploitation of grazing areas which in turn has resulted in the erosion and deterioration of the soil supporting

plant life, encroachment of the veld by weeds, has become a feature of veld composition in many districts. Senecio and Moraea species amongst others, are particularly noticeable at certain times of the year and are responsible for the loss of several animals each year.

As Verbeek (1968) writes: "Strong emphasis is placed on the delicate balance existing between environment, the natural vegetation, the animal life and land use in arid regions, and the ease with which this balance is disturbed and the serious consequences of such disturbance". While especially applicable to arid areas, this is relevant to the Ciskei as a whole, and more particularly to the sweetveld regions.

4.1.3 Limitations Imposed on Crop Production:

As is the position for livestock and pasture production, the main limiting influence in the path of enhanced crop production, is the human factor. This aspect is discussed, in relation to animal and crop production, in a later section where its importance in respect of the overall infra-structure can be better assessed.

The Influence of Natural Factors on Crop Production:

(a) Land: Arising from a study of population growth in the Bantu areas over a 47 year period, the population increase appears to be in the region of 3.1 per cent per annum, based on figures mentioned in the Tomlinson Commission's Report. Over a ten-year period in the Ciskei the increase in population is in the order of 2.7 per cent per annum and this is calculated from statistics quoted in the Annual Agricultural Reports for the Ciskei in 1958 and in 1967. However, doubt can be cast on the figures mentioned, in that, for physical and economic reasons, it is apparent that it is almost impossible to keep track of every individual and birth in the Ciskei. On the basis of there being an increase in population of 3.1 per cent per annum, then it can be expected that the rural population will increase by between 10 to 12 per cent by the turn of the century, that is, to 452,700 souls. It is well known that a rise in the standard of living of a people, apart from other consequences, inevitably results in a decline in the birth rate (Freedman, Whelpton & Campbell, 1959). Associated with such a decline, is that the death rate decreases, especially the infant mortality rate, and longevity increases (Freedman et al, 1959). Most underdeveloped countries show annual increases in population of between 2.5 to 3.0 per cent compared with the United Kingdom with 0.4 per cent, and the United States with 1.8 per cent (Benham, 1964). Any such discussion of population and population growth must, of necessity, include the question of land available for food production, residential sites and other uses of importance to man's welfare. Sufficient, suitable arable and grazing land to meet the requirements of the rapidly in-

creasing rural population, is said to be one of the chief limiting factors in overall agricultural production in the Ciskei. This view is held by several senior Agricultural Officials. Logically, as more and more people settle on the land in a given area, less land becomes available for actual productive purposes, since more land is required for residential sites, schools and other community commitments. The production of raw materials to meet the needs of potential local industries, is necessary, so that human pressure on land, especially arable land, can be relieved. In fact, Benham (1964) is emphatic that "agriculture must develop simultaneously with, if not in advance of, manufacturing", and this is the first solution to the problem of overpopulation. The second solution is that an accelerated land purchasing programme needs to be implemented so that additional Trust land can be made available for the use of proven farmers. Both these solutions will embrace the use of considerable sums of money which the economy of the country could possibly ill-afford to implement over a five or ten-year period.

The actual size of the land constituting an economic unit, that is from three to 12 morgen of arable and with grazing for eight to 24 mature largestock units, could well be a factor limiting agricultural progress. As seen in Table 61, while the economic units are as mentioned above, the actual number of full units in the hands of Bantu farmers in the planned locations under dryland conditions, amounted to approximately nine per cent, with 29 per cent half units and over 61 per cent having less-than-half units. The fact that the "uneconomic" units predominate, must necessarily affect both crop and animal production, and the apparent solution, more land per genuine farmer, seems insoluble without rapid development of the secondary and tertiary sectors of the economy.

Absentee labour also adversely affects production in that many of the able-bodied men leave their holdings to work in towns, and the land, in many cases, is ineffectively cultivated. This state of affairs has been highlighted in the Keiskammahoek District where up to 35 per cent of the rural population can be absent at any one time (Hobart Houghton & Walton, 1952).

(b) Climatic Factors: Prevailing climate and soils, and hence the ultimate choice of a farming system are markedly influenced by relief. Over 54 per cent of the total Bantu Ciskei lies at altitudes of over 1, 000 m (3, 281 feet), and in Herschel District, both Herschel and Sterkspruit villages for example, lie at altitudes in excess of 1, 400 m (4, 593 feet). Extreme cold and severe frosts, and occasional snowstorms, are experienced in winter in these high lying areas. Consequently, a growth period of between 150 to 200 days when ground temperatures are sufficient for seed germination and for the growth of frost-sensitive crops such as maize and grain sorghums, is common. However,

late spring rains and periodic droughts shorten this period considerably and invariably late planted crops do not reach maturity before the onset of frosts. In the coastal belt, which is mostly frost-free, winter cold is not a crop-limiting factor of any great importance, except that cold winds have damaged the Furcraea crop, a sub-tropical crop, to the extent that the plants suffered a severe setback in 1964, as indicated in the Annual Agricultural Report, and as witnessed in 1968. Frost also has an effect on the quality of the veld grazing and its early onset in autumn reduces the nutritional value of the pasture (see Figure 13) especially sourveld. Frost is also an important determinant in the choice of a suitable crop for a given area.

Snow has a slight direct effect on winter crop production in the mountainous areas of Herschel, Glen Grey and some parts of Whittlesea.

Both wind and hail play a small localised rôle in affecting crop yields by causing damage to the growing plants, or loss of grain or by causing the crop to lodge. The former is of more consequence in the coastal areas where, accompanied by heavy rain, wind can cause up to five per cent or more damage to standing crops. Hail, frost and wind are estimated to cause approximately 10 per cent damage to crops growing in the Glen Grey District each year. The hot, dry and so-called Berg winds, especially if protracted, cause extensive crop damage to spring and summer grazing and to early planted crops. In several districts, especially Whittlesea, high summer temperatures affect the development of the germinating maize seeds planted in November and December, and a poor "stand" results according to the Agricultural Officer of this District. High temperatures prevailing at the time the maize plants tassel in the Middledrift District, and presumably in other coastal plateau areas, affect yields adversely, in the experience of the local Agricultural Officer.

Rainfall is one of the biggest single limiting factors in crop production throughout the whole of the Ciskei, and the lower-lying coastal belt as well as the midlands area, with lesser quantities and incidence of rainfall, are particularly vulnerable to seasons of low precipitation. The amount of rainfall per annum, accepted as being sufficient at the lower limit, for a "reasonably assured" annual crop yield, is 500 mm or approximately 20 inches (Moolman, 1955; Whitmore, 1957 a). This means that districts like Peddie, Fort Beaufort, the lower altitude portions of Victoria East and Middledrift, some areas of King William's Town and Glen Grey, and especially Whittlesea, are, based on the Weather Bureau average rainfall statistics up to 1960, marginal for general crop production. As between 61 to 78 per cent, that is 60 to 70 per cent for all districts with the exception of Herschel with 70 to 80 per cent (Weather Bureau 28, Part 8) of the rain falls during the spring and summer months October to

March, it is normally only in exceptional years that good winter crops can be expected. The erratic distribution of rainfall over the summer months, undoubtedly has a marked effect on stable crop production, and all these districts experience drought periods of short or protracted duration during most growing seasons. The coefficient of variability for rainfall, even in the highveld areas such as Herschel, is seldom less than 40 per cent during the most favourable months, while in the lower-lying, and comparatively lower rainfall areas, this coefficient is well over 50 per cent (Whitmore, 1957 a). The lower the rainfall of a district, the higher the variability, and its susceptibility to drought increases (ibid).

The problem of defining the meaning of the word "drought" arises, and Monkhouse & Wilkinson (1964) accept it as referring to a period of 15 or more, consecutive rain-free days in a high rainfall or moist climate. Obviously, such a definition can only apply to a very circumscribed area of the Ciskei. The Drought Committee (1965) accept the definition of drought as referring "to veld grazing and indicates a period during which grazing becomes scarce or assumes such a nature as a result of the lack of rain or of abnormal climatic conditions that losses occur among livestock dependent solely on grazing". While applicable to livestock farming, this definition can be used as an indirect measure in crop production. Klages (1954), applies the term "drought" to "moisture deficiencies deviating sufficiently from the phenological mean to interfere with the normal life processes of plants to the extent that the balance of nutrition is shifted far enough in an unfavourable direction to result in material reductions in crop yields". Whatever the definition, the disastrous effects of drought are too well known today, these periodic droughts "not only affect the farming community but also the entire economy of the country and, above all, the supply of food" (Drought Committee, 1965). Such periods are all too frequently experienced in the Ciskei and result in severe crop reductions, if not complete crop failures. The District Agricultural Officials variously estimate drought frequency to be one in three to four years to one in five years. The Annual Agricultural Reports of 1964 and 1965 record the occurrence of droughts in the 1964-1965 summer season and the 1965-1966 summer and winter seasons, while in the 1967-1968 summer season, crop production suffered an almost complete setback and practically no crops were harvested in many districts. Over the last five years, there have been three summer seasons which have been affected by droughts of varying intensities. The Report of the Fodder Bank Committee presented in 1949, indicates that an average of one year out of every four to five years, is a year of serious drought in South Africa (ibid), and is substantiated by the figures mentioned above.

Rainfall intensity determines, to a large degree, the amount of rain available for use by the plant, but the infiltration capacity of the soil, also plays a large part, being affected, not only by soil texture and structure, but also by the organic matter in the soil, cultivation practices, soil depth and the type of vegetation covering the soil surface (Whitmore, 1957 a). Not only are cultivation practices, in the main, incorrect but the other factors mentioned, such as organic matter and vegetation, are limited and the amount of silt in the streams and rivers during periods of heavy rain, testifies to the lowered infiltration capacity of the soil, with few exceptions, throughout the Bantu Ciskei.

The effectiveness of rainfall for plant growth purposes, not only depends on the amount of water infiltrating into the soil, but on the difference between the amount of rain and the loss of moisture from the soil by evapo-transpiration. The latter is in turn affected by the high summer temperatures which prevail generally in the Ciskei between the months of November and March, humidity and wind. As previously indicated, over 50 per cent of the summer rain falling on maize lands is lost by evaporation (Whitmore, 1957 b). This annual loss of soil moisture can be conserved by various means, but chiefly by sound farming practices, which are all too rare in the Ciskei. However, as Klages (1954) points out, "Transpiration-ratio studies show that plants must transpire large quantities of water to produce limited amounts of dry matter. It takes water to make the desert bloom".

(c) Soil Fertility and Erosion: Phillips (1959) assesses the position as follows: "From the European - as mentor, master or as both - the local African has taken his cue. But unfortunately, often lacking in art and resources, he has been even more successful than his exemplar in impoverishing what originally was land of fair quality".

From observations, the soils of the Bantu Ciskeian areas are generally in a poor to fair condition, although from a soil fertility point of view, they would rate most probably, as "poor". The main reasons are, firstly, monoculture to a large extent, and continuous cropping, and secondly, that during grazing or cropping, nutrients are removed from the soil via the vegetation, and practically nothing is ever returned to the soil in the form of organic matter or chemical fertilisers. As De Wilde, McLoughlin, Guinard, Scudder and Maubouché (1967) state "The consequences of low soil fertility are aggravated for large areas by the erratic nature of the rainfall which may deprive livestock of grazing, wither crops in the field, and thwart the absorption of nutrients supplied in the form of artificial fertilisers or manure". While the latter effect is as would be expected, it was not so apparant in well fertilised and manured maizelands in the Victoria East District during the 1968 drought as reported elsewhere, and the

interpretation can be made that the organic matter in the soil probably retained sufficient moisture in the soil to meet the immediate needs of the developing plants, as well as to provide for translocation of the plant nutrients in the fertiliser. It is thus unfortunate that manure in the form of cattle dung is used for purposes other than for fertility regeneration. Cattle dung is collected from the veld and other sites, for several purposes, such as for the plastering of floors and walls of the huts, and for fuel, the latter more especially in areas where firewood is at a premium. In the Victoria East and Middledrift Districts, where there is still some firewood available, only about 18.5 to 19.5 per cent of the families used the open-type fire place for cooking purposes, presumably using wood, while between 45 to 49 per cent used open-type fires as a source of heat (De Vos, 1968). It can be assumed that both firewood and dung were used in the latter fires, but data on the extent of the use of either, is not available. In certain parts of the Glen Grey District, notably Umhlango and Macibini Locations, dung and wood usage is at a minimum because of the freely available supply of coal occurring in the river beds and elsewhere, which is employed for cooking and heating purposes. The actual amount of dung removed increases largely according to the cold factor, for example, in Herschel, Glen Grey and Whittlesea Districts, up to 50 to 60 per cent of the available cattle dung is probably utilised as above, while in other areas, not much more than an estimated five to 10 per cent is used (Schulze, 1968).

On the basis of each bovine in the Ciskei producing an average of at least three tons of excreta per annum, then cattle in the Glen Grey and Herschel Districts are estimated to average about 1,100 to 1,200 pounds of excreta per morgen of grazing, while in the East London District, the figure is calculated to be over 2,500 pounds. According to Morrison (1956), approximately 0.5 per cent of the weight of this dung consists of nitrogen and 0.1 per cent of phosphorus. While these amounts probably occur at a much lower rate under South African conditions, the fact remains that a reasonably valuable source of nutrients is lost to the soil each year through other miscellaneous uses, apart from its value as an organic material in the soil itself.

Only an average of 2.2 per cent of the total arable land was manured, and 1.3 per cent chemically fertilised during a four-year period (refer Table 55). Famine predictions, as a result of the population "explosion", have been made by eminent research workers since the forecast made by Malthus in his "Essay" published in 1798. In 1964, Ewell, quoted by Moseman (1967), stated that if Asia, Africa and Latin America did not use agronomically adequate amounts of fertilisers by 1980, these countries would be engulfed in widespread famine. Bennett (1945) refers to the application of compost or cow-dung to "erosion-

exposed subsoil" which is associated with an almost immediate increase in maize yields, from the previous nothing, up to five bags per acre.

Topography determines the amount of suitable arable land available in an area, apart from other determinants, and in the hilly or mountainous Ciskeian territories, land is accordingly limited. Arable land comprises some 13 per cent of the total land area, and because of the population pressure on land generally, unsuitable areas have been ploughed without any soil conservation measures being taken, or without any regard to the direction of ploughing as long as the oxen could be manoeuvred easily. Erosion of all types, affects up to nearly half of the total land surface, being practically under control in some districts such as Stutterheim and causing difficulties in others, such as Glen Grey, Herschel and Middledrift. The exploitation of the soil, which has brought about erosion varying from mild sheet erosion to serious donga erosion, has also made such lands marginal, or even sub-marginal, for cropping purposes in many locations. The numerous discarded, badly eroded but once arable areas, bear mute testimony to man's unabiding, and possibly unrealised, exploitation of the land he endeavoured to farm. Continuous, protracted erosion in the Whittlesea District for example, has reduced soil depth considerably over the years according to the Agricultural Officer, who has had long experience in this area. The number of old lands that had become so badly eroded that they had to be discarded as of little value, is exceedingly high, and unfortunately, the majority of these lands lie in the valleys, and once were renowned for their fairly deep, alluvial soils with a high cropping capacity. As the noted world authority on soil erosion is past years, Bennett (1945), wrote about South African conditions: "The harmful effects are accumulative, and finally disastrous, as the valuable topsoil - the principal feeding zone of plant roots, and the farmer's principal capital - is gradually cut away and washed down to relatively unproductive, unabsorptive, intractable subsoil, or, what is still more disastrous, until bedrock is exposed at the surface to end for all time the usefulness of that particular piece of non-recoverable land".

An estimate made prior to 1945, of the fertility of South Africa's agricultural land, rated the fertility of the soil at 75 per cent of its former condition (ibid). In the Bantu areas of the Ciskei, this loss in fertility probably exceeds 40 per cent today. The causes and results of soil erosion, are too well known to be repeated here, but suffice it to say that crop yields, veld grazing capacity, and water resources have all been affected to varying degrees, some seriously, in the districts of the Ciskei. Erodability of soils and subsoils is fairly high in most districts, particularly Herschel and Glen Grey, where, once the soil covering has been removed, the soils erode fairly rapidly. Even where conservation

works, in the form of check walls, have been planned and solidly built, the tendency for the water to work under or round these walls, is ever present. It has been noted that once conservation works, in many areas, have been constructed and are functioning, they appear to be very seldom inspected in later years, to correct inherent defects or to repair damage or overcome problems that have arisen since construction.

(d) Soil Preparation: As mentioned, some arable land is ploughed in autumn or winter after removal of the crops, and this land is not so difficult to prepare in the following spring for summer crops. On land that has not been so prepared, and which has been consolidated by grazing, ploughing is much more difficult in the following spring. Added to the compacted nature of such lands is the poor condition of the oxen at the onset of the first spring rains particularly in the uncamped areas. Physically they are unable to exert much draught-power in the plough-span. This is by no means a phenomenon of the Ciskei as the same problem occurs elsewhere and is reported as a factor of some importance in limiting production in Tanzania (Ruthenberg, 1964). Spring grass is by no means able to supply all the needs of the animal in poor condition and required to work. The composition of very immature, green Themeda triandra on a wet basis, for example, is approximately 15 per cent dry matter, 0.9 per cent digestible protein and 8.4 per cent total digestible nutrients (Schneider, 1947). By the time the oxen have ploughed the lands, the first cycle of rains is frequently over. After drought years, the oxen are generally in poor condition and require months to rehabilitate themselves. In many cases, the ploughing units are too small to cope with the area to be ploughed and planted. At Mgwali Location, Stutterheim, at the number three village for example, nine landowners out of a total 21, owned seven oxen between them and had to plough some 190 morgen, and thus had to borrow oxen or resort to tractor ploughing. The first solution meant a loss in time, assuming that these oxen were required to plough their owner's allotment first, and the second solution embraced a cash or kind outlay.

Many families have their able-bodied men away as emigrant labourers, and those that do return at ploughing time, return soon afterwards to their former employment. This applies particularly to the "Greater" Ciskei where industrial concerns operate in the vicinity. As Hobart Houghton & Walton (1952) state in their survey report of the Keiskammahoek District: "The people ..... are seen to be dependent upon the earnings of emigrants for their very existence, and it is poverty which forces them out to work. But this very exodus is itself a potent cause of the perpetuation of the poverty at home, for the absence of so many in the prime of life inhibits economic progress and certainly account in

no small measure for the low agricultural productivity of the District. In many cases land is not ploughed for the simple reason that there is no one to do the ploughing. Of that which is ploughed, one field in three is not ploughed by the menfolk of the homestead but, in their absence, by relatives and friends. Prima facie it might be supposed that large emigration from the Preserve would be of benefit in easing the pressure of population; the emigrants, however, are not a cross-section of the community but consist mostly of the active and able-bodied members; while those that remain are the infirm, the aged and the children". They estimated that not more than 10.4 per cent of the total cash income in any village, was derived from farming activities.

Where tractor ploughing is not undertaken, shallow ploughing (three to five inches deep) is, invariably the rule, with very little change in depth of ploughing from year to year, and the consequent formation of a plough-sole. This has deleterious effects on plant growth much as is the case with shallow soils where rapid desiccation or oversaturation of the topsoil has an effect on the plant roots. As, approximately, less than a quarter of the total arable land is tractor ploughed, the implication is that nearly 76 per cent of these lands are shallow ploughed. Also, a morgen of land would take between three to four days to plough based on Hobart Houghton & Walton's (1952) figures at Keiskammahoek. Soil fertility and fertilisation practices have already been discussed, and all that is necessary is to draw attention to the high cost structure of chemical fertilisers which, inevitably means that, where they are used, insufficient quantities are placed in the soil. The question of their ready availability is also a factor which has to be considered.

(e) Choice of Crops and Planting Time: The first choice of a summer crop to grow is maize, which, between 1964 and 1967, averaged 76 per cent of the total area cropped. Grain sorghum was next in importance, averaging 22 per cent of the area cropped, and was followed by beans, which averaged one and a half per cent of the area cropped between 1964 and 1967. In the low rainfall regions, as in parts of Middledrift, Peddie, Fort Beaufort, Whittlesea and other areas, maize is an annual gamble. One reasonably good crop, taken as being over 60 per cent of the possible crop, would be harvested in each cycle of four to five years, with the other years lying between 25 to 40 per cent of the possible optimum production. An occasional crop failure, once in five or more years, can also be expected in severe drought years, and this is applicable to practically all areas of the Ciskei. In the more sophisticated districts, small areas comparatively speaking, are down to grain sorghum, and the reasons given are that it is not a favourite food and that the grain is readily eaten by birds, and with the children going to schools and wives working on occasion,

the crop cannot be adequately protected. While the "bird-proof" varieties can be grown to combat this problem, the grain is unpalatable. Thus, with the exception of erratic seasons when the rainfall characteristics are practically ideal in nearly all areas, maize is by no means the best crop to grow from the ecological adaptation point of view.

The relatively high cost of good seed is a definite limiting factor, assuming that rainfall conditions are average, since most Bantu farmers buy from the traders' bins rather than pay a higher price elsewhere for certified seed. In some cases it is a question of ignorance. In the King William's Town area it is estimated that 80 to 90 per cent of the farmers purchase "poor" seed, while at Whittlesea, it is about 20 per cent. The traders' seed is either of the "native" type or is second-from-hybrid seed, the former being low-yielding, variegated in colour but hardy, while the latter causes wide segregation to occur with resultant low yields. In Herschel District about 90 per cent of all maize seed is purchased from the local traders. Seed quality is a definite limitation in crop production, but an appreciation of the value of improved seed is gradually beginning to gain ground. No information is available on the viability of the seed used at planting time. In the larger districts, such as Glen Grey, the question of ready availability of good seed needs to be noted.

A practice which has been in operation for many years, is that farm labourers from the Herschel District in particular, working on nearby Free State European-owned farms, are paid "in kind" at harvest time, and for every 100 bags reaped, they receive about four bags as payment. This maize is sent back to the Herschel District and plays a rôle in that less land need be cultivated in that, or the following, season.

All available information points to maize being planted at a depth of about two inches, which is correct in the non-sandy areas, according to Sellschop & Stead (1957). Peas, on the other hand, are generally broadcast and ploughed under in many districts with consequent low yields due to poor germination.

(f) Cultivation: The majority of holdings are, by White farming standards, poorly cultivated. At Heckel Trust Farm about 50 per cent of the farmers cultivated well, while at Mgwali Location, only about 20 per cent maintained their lands in a reasonable, "clean" condition, and the latter is probably representative of most districts, especially the unimproved localities. Weeds used as food (mfino) are, of course, purposely left in the lands, but these and other weeds not only remove soil nutrients, but utilise the soil moisture required by the grain crop.

Hand-hoeing predominates in most regions and by the time the first crop of weeds has been wholly or partially removed, a second crop is, invariably,

flourishing and this is especially so in a good rainfall year.

(g) Plant Population; Diseases and Pests: Little information could be obtained on plant populations per morgen, particularly in the case of maize, due to crops having been severely ravaged by drought during the 1967-1968 growing season. In the irrigation areas of Keiskammahoek, where the maize is planted in rows two and a half feet apart, with nine inches in the row, there are approximately 48, 000 plants per morgen in a good season. On dryland, it appears that the usual spacing is about three feet between rows with one foot in the rows, which means that there should be about 30, 000 plants per morgen assuming that all survived to maturity. However, due to poor germination, insect damage and other inhibiting factors, it is doubtful if the "stand" exceeds an average of 10, 000 plants in a good rainfall year, except in a few isolated cases. Under dryland conditions, plants which reach maturity are few and far apart, and maximum possible production, under these circumstances, cannot be achieved.

Plant diseases occurring in wheat are rust in the moister, coastal regions, and smut (probably Puccinia maydis) occurs in the King William's Town District and both are limiting factors. Ergot has occurred in the East London District on sorghum but the extent of the damage caused, is unknown.

The insect pest causing most damage to plants in all areas, is the stalk-borer (Busseola or Calamistis fusca) which is estimated to damage about 10 per cent of the South African maize crop in some seasons (Barnard, 1957; Smit, 1964). In the Bantu areas, it appears that the extent of the damage in certain years, is in the region of 20 per cent (Schulze, 1968). Cutworm (Euxoa segetis) is the second most important insect pest in South African maize (Smit, 1964), but the extent of its action in the Bantu areas, has not been assessed. The American Bollworm (Heliothis sp.) is not only a factor to be reckoned with in cotton production, but according to the Glen Grey Agricultural Officer, has been responsible for up to 50 per cent damage to a grain sorghum crop.

Bird-strike results in slight to serious losses in grain, especially sorghum.

While little or no loss occurs during harvesting, there is apparently, a slight overall loss in stored maize due to weevil (Sitophilus spp.) and rodent attack.

In summing up the overall position in the Ciskei, the interrelationships between the climate, soil, vegetation, man and his animals, cannot be overlooked. Phillips (1959) writes that: "The interplay of climate, vegetation and soil is intimate. While the master control often is climatic, the soil, as modified by the vegetation, is influential in conditioning the details of the nature of the climax. In agricultural and related development the intricate interplay of aerial and soil

factors, biotic reactions and the influence of man and his animals must be appreciated".

Planning can be drastically affected by the vagaries of the climate, as in the case of the crop production scheme in the Herschel District, where drought reduced not only crop yields but also the confidence of the participants. The effect of continuous cropping on actual production also needs to be considered, since nutrients are removed from the soil more rapidly than they can be reconstituted naturally (De Wilde et al, 1967). Since very little effort, comparatively speaking, is made to bolster up the soil fertility level by artificial means, crop production levels are correspondingly low. There is also a tendency, under conditions of continuous cropping, to find that the more resistant weeds are encouraged to develop and severely compete with the crop plants for the available soil moisture and nutrients. This is said to be a problem in African countries generally (De Wilde et al, 1967).

A part of the problem in crop production, is that Bantu agriculture is somewhat characterised by the absence of implements, draught power and shelters or sheds, and very few of the holdings can be referred to as "economic units". Such subsistence agriculture is also noted for the diversity of crops that are produced (Dumont, 1966) to meet the needs of the farm families, and in the main specialisation is of little consequence. There is also a strong tendency to overlook the possibility of integrating crops, pasture and livestock into a harmonious production unit guided by a completely rationalistic approach backed by adequate knowledge. The rational use of livestock as an annual "cash crop", is still very much in its infancy, and in view of the nature of the climate, soils and topography in relation to cropping in the Ciskei, needs to be strongly advocated. Benham (1964), in reference to Tanzania, is of the opinion that such a development of the livestock industry is necessary in bringing about a structural adjustment in agriculture. The question of credit facilities, land tenure and human resources will be dealt with in subsequent sections.

4.1.4 Capital and Credit Facilities and Land Tenure:

The lack of capital in the rural areas, and the inability of the farmer generally to obtain credit, must necessarily play a rôle in limiting production. As Rowland (1964) says, in reference to the African Reserves in Rhodesia: "I turn now to the Achilles heel of the rural community, the population in the Reserves. Without capital; without title or ability to pledge the land for loans; they remain small pieces of land unable to contrive development ..... The shortage of money not only precludes land development, but it puts even such correct practices as payable dressings of fertilisers on crops out of the reach of the cultivator".

There is little need to elaborate on this theme, except to endorse the statement made by Rowland (1964) as being applicable to the Bantu areas of the Ciskei. Some land, approximately four per cent, is in the hands of private owners on a quit-rent basis, but these lands cannot be mortgaged, and the same applies to these areas as for the Trust-owned land. Long (1964) is of the opinion that variable capital for short term investment purposes in agriculture, would lead to increased productivity and quotes India as an example of an undeveloped country where a considerable response was recorded. However, he does sound a warning by saying that a credit system "often holds farmers in total bondage to the moneylenders". Experience in Uganda has shown that the main obstacle in encouraging peasant farmers to change to a market-economy system of crop production was the provision of "credit facilities to finance even small capital improvements. This latter factor is aggravated by the prevailing system of land tenure which in Busoga is based on a form of collective tribal ownership" (Evans & Phillips, 1962). These authors also refer to the "absence of legal title to land (which) deprives the farmer of the type of security which forms the basis of practically all agricultural credit in more developed countries".

One of the fundamental problems relating to credit availability in Africa generally, is that its chief resource, soil, has been ill-treated to the extent that it needs tremendous amounts of capital to return it to its former productive capacity. Viljoen (1960) refers to this aspect as follows: "Much of the development that has taken place throughout the African continent has also been at the expense of the soil. African agriculture in most countries has indeed been put in a dilemma - it cannot become more productive without greatly increased capital investments, but it cannot produce the capital until it has become more productive". Broadly speaking, this is also the position in the Ciskei today.

One of the few sources of credit available to farmers in the Ciskei to date, has been provided indirectly, and can be considered to be more in the nature of grants, by the South African Bantu Trust, but Lombard (1956) says of the result of such credit: " ..... agriculturally-speaking, the return for the grants and investments have been meagre if not actually negative". With few exceptions, this certainly appears to be the position in the Ciskei which is agriculturally and economically backward because of the lack of entrepreneurship to a considerable extent.

As previously indicated, the ability to obtain credit, both short and long term, is, in the majority of the Western countries, inevitably associated with land ownership. In the Ciskei, where approximately 96 per cent of the total area is communally-owned, or more accurately, Trust-owned, the ability to obtain credit by pledging the land, is not feasible. It is interesting to note that

there are two schools of thought in connection with land ownership, those in favour of the land being vested in the tribe, that is communally owned, and those favouring an individualistic approach to land title. Hamburger & Reyneke (1969) are of the opinion that the greater security engendered by individual ownership, need not necessarily guarantee increased agricultural production. Other authors, notably Evans & Phillips (1962), Swynnerton (1963), Rose (1964), and Long (1964) inter alia, are in favour of individual, legal title to land. Apart from the farmer being in a stronger position in the acquiring of credit facilities, other factors are mentioned. The Commission (1955) pointed out that one of the factors causing deterioration in the Bantu Homelands is the "system of land tenure and the haphazard allocation of land in the past, before the system of co-ordinated planning was introduced; nor can there be pride of possession of land in which there is no ownership in the full sense of the term, vested in the person using it" Hofmeyr (1968) also refers to the problems associated with tribally owned land: "General observation and experience in Africa, lead one to the conclusion that under prevailing circumstances the evils of communal land tenure not only outweigh the possible advantages of the system but promote the deterioration and erosion of soil resources through over-cropping and over-grazing. Furthermore, communal land tenure destroys initiative and incentive of the peasant farmer particularly insofar as undertaking of conservation measures is concerned". De Wilde et al (1967) consider land tenure reform to be an essential prerequisite in the improvement of agriculture in that a feeling of security may be created which they consider to be essential in the proper development of the land. The only warning that they sound, is that where land is fragmented, as in Kenya, there may be an impairment in "flexibility in re-allocating or regrouping land in the interest of promoting its better use". The working of fragmented lands, that is, lands in different places worked by the same family, does not appear to occur in the Ciskei, and thus the above warning is of no consequence.

Several agricultural students at Fort Hare in past years, have commented unfavourably on arable land being communally owned, the opinion was expressed that if one farmed well and built up the soil so that one was rewarded with good average yields, the chances of this land being re-allocated to an influential tribal member, were greatly increased. This good land would inevitably be replaced by a poor land and thus the incentive factor was destroyed virtually at its source.

A lesson from experience gained in other countries, is that "the greatest gains in agricultural production usually do not come from an improvement in a single practice, but from the interaction of a suitable combination of improved

practices" (Bradfield, 1964). So the latter must be expanded on a wide and continually advancing front for genuine improvement to be noted.

4.1.5 The Human Factor in Animal and Crop Production:

The District Agricultural Officials are almost unanimous in saying that the most difficult hurdle to overcome in making rapid progress in all fields of agriculture, is the human one. One Agricultural Officer estimated that this was about 70 per cent of the overall problem in his district, while in the irrigation areas, the human factor was considered to be the main limiting factor in production. In the Keiskammahoek District, only about 10 per cent of the settlers used the available water efficiently.

In a lecture to the Fort Hare Economic Society in 1966, Hobart Houghton remarked that if the population of the Transkei could be replaced by the same number of Japanese, he was positive that there would be a viable economy within a matter of years. The tremendous exploitation of natural and developed resources by the Japanese within a limited period, prompted this remark.

Hobart-Houghton & Walton (1952) in reference to the Keiskammahoek District, mention that the Bantu peasant shows his greatest deficiency in his entrepreneural ability: "economic entreprise and initiative are most noticeably lacking", and point out that this is the greatest obstacle in the path of improvement. Lombard (1956) maintains that the economic backwardness in the South African Bantu areas can be attributed chiefly to the attitude of the Bantu themselves. "The rational mental process rules a much smaller sector of the social life of the average Bantu than of the average European. ..... Whereas leisureliness and restfulness are still characteristics of the life of the Bantu areas, the meaning of time, and its pecuniary value has been brought home to their consciousness" (ibid). While it cannot be denied that progress in many directions has been made, the above statements are still largely applicable over 10 years later. A high value is placed on leisureliness even today in the rural areas and the time factor, from an agricultural production viewpoint, is relegated to a relatively low level of importance. At Fort Hare, it is clear that the students are involved in a struggle to overcome the lack of time-consciousness, and this where time plays a major rôle in controlling practically all activities. On the farm, it is apparent that if it is a question of the correct time or stage to undertake a production activity, then this can be superseded by social considerations, such as festivities and funerals. Unfortunately, it is not purely a question of hours that such important work will delayed, but invariably days. Failure to operate without regard to climatic, physiological and other important factors, must inevitably reduce yields. Not only are the Bantu in the Ciskei tied to traditional concepts in agriculture and stock husbandry, but time, as mentioned

previously, and making provision for the future for his family and livestock, play but a small part in the life of the farmer. Schultz (1964) maintains that: "The man who is bound by traditional agriculture cannot produce much food no matter how rich the land". De Wilde et al (1967) are of the opinion that "for many Africans security is a more important consideration than the possibility of increasing income" and this is supported by the sustained insistence that all basic feedstuffs for the family, should be forthcoming from the holding. This basic need to be in possession of land, especially productive land, is not confined to the Bantu peoples only as is indicated by the unprecedented demand for farm land generally throughout South Africa.

A point frequently raised by Agricultural Officials, is what De Wilde et al (1967) refer to as the "target income mentality" in crop production. It is widely known that where there has been a particularly successful summer or winter grain crop, the area sown to grain crops at the subsequent planting is considerably reduced. This has also been mentioned in connection with a bumper crop of potatoes in the King William's Town District, and by Venter (1969) in respect of a similar incidence in Swaziland involving a good crop of maize. Personal experiences in Kenya in regard to coffee plantations, also substantiate the general occurrence of this form of thinking, where a certain yield level is regarded as meeting all family commitments at that time. The fact that the extra coffee trees planted would have brought in a much larger financial return, could not be reconciled with the harder working conditions involved, or the fact that extra labour could have been employed to reduce the arduousness of the extra harvesting and cultivating tasks. This decreased desire for additional income or crop return, beyond a certain level, is largely inexplicable but is probably rooted in traditionalism and history of the Xhosa-speaking people. De Wilde et al (1967) however, state that where an increased income is obtained, and is "devoted largely to the purchase of alcohol or articles of "conspicuous consumption", such as radios and items of this nature, this usually indicates that a regular pattern or standard of consumption and a strong desire for more income have not yet developed. The same condition may be drawn when a significant part of additional income is used to buy cattle, reflecting the desire for greater security and, perhaps, prestige".

The Bantu farmer's ability to understand and appreciate modern farming concepts and techniques, is on the whole, superficial, especially when applied to the basic, simple steps involved, not to mention the finer and more complicated points of agriculture. Generally speaking, their understanding of bacterial infections and hygiene, animal and plant diseases, chemical fertilisation of the soil, basic nutritional concepts, and mechanics, to mention but a few, is far too

superficial and confused with traditional and spiritual concepts, to be of much value. His knowledge of human nutrition bears witness to the above statement, in that protein and niacin rich beans and peas are mostly sold, and it is these feeds which could help overcome the high incidence of Pellagra and Kwashiorkor amongst the Bantu population. Malnutrition is most certainly the result of man's inability to adapt himself to his environment, and the Bantu in the Ciskei, is no exception. Not only is an unnecessary amount of public money spent on hospitalisation, but there is overwhelming evidence to the effect that malnutrition during the first two years of life of the human, when brain growth is most active, results in permanent reduction of brain size and intellectual development is restricted (Smythe, 1968). This could, in effect, mean that progressively more low intelligence Bantu will develop, and the future landowners be less able to grasp the significance of their position as landowners and food producers. A vicious circle is forecast, unless malnutrition in the Ciskei, and other Bantu territories, can be overcome by an overall improvement in farm production systems and yields per morgen. Malnutrition could be responsible for a limited output per worker in many instances, and while the Bantu, generally speaking, is adversely disposed especially to self-imposed work, part of this reluctance to work could be due to malnutrition, or rather, nutritional imbalance. Traditional eating customs, although on the wane, are also partially to blame for malnutrition, more especially in the young. Alcohol can also share some of the blame for inefficiency on the part of Bantu farmers in husbanding their holdings, not so much from inebriation, although this is a factor in some areas, but from the many ceremonies and festivities which lure them away from their farming activities.

As mentioned earlier, enthusiasm rises and falls according to the difficulties that have to be overcome, especially those imposed by the environment, and the number of dairy schemes started compared with those in existence in 1967, and the Tugela Production Scheme in 1967-1968, are but two examples of this, except that recent droughts have played havoc with the dairy schemes in most parts in recent years.

The natural conservatism of most Bantu farmers is also well known, and is, in part, a reason why rehabilitation and other measures aimed at benefitting the Bantu community, have taken so long to be universally adopted, or are in the process of being adopted. The Bantu's fatalistic approach to life is not only common to the Xhosa and Fingo, but to the Zulu, Swati, Matabele, and many of the East African tribes. This "what-will-be, will be" approach, while providing peace of mind in its very acceptance, cannot be applied <u>in toto</u> to a dynamic, and highly important agri-business which produces the very food

of life, or raw materials for industrial development and expansion. Some of the conservatism might well be due to family and tribal pressures especially where risk-taking is involved. Long (1964) in dealing with this aspect of risk-taking, explains some of the aversion by saying: "The difference between 50 and zero is much greater than that between 50 and 100 - if 50 is the minimum necessary for survival. And although the greater family or tribe shields the individual from losses caused by circumstances accepted as beyong his control, it does not normally do so for losses caused by his playing with new and therefore unsanctioned ideas". Agricultural students in past years have specifically mentioned some of the difficulties involved in endeavouring to institute changes during the lifetime of their respective fathers, and in some cases the local chiefs or headmen, apparently resent a qualified agriculturalist setting the lead in an area. There is probably an idea that such progressives will undermine the authority of the local dignatories.

While ability is obviously present in the inherent make-up of the average Bantu farmer, his lack of initiative, general difficulty in grasping and understanding new agricultural techniques simply explained, his traditions and customs, and his level of education, all militate against reasonable levels of production being achieved. Added to this list, could well be that of the lack of trained personnel throughout the agricultural structure - Ruthenberg (1964) reports that, in Tanzania, one of the main obstacles facing an improvement in agriculture was "not so much a lack of money, of technical know-how or of interest by the peasants, but lack of personnel". The ability to learn by observation is somewhat restricted. Board (1962), in reference to the early German settlements at Frankfort, Hanover, Braunschweig and other places, points out that the Bantu residing on allotments in these areas, apparently had their agricultural practices "little influenced by the example of the adjacent settlers". While this attitude still persists in the majority of areas, there is, today, a greater tendency to learn by example. The abovementioned points, associated with the fact that practically all field work is carried out by the womenfolk and children, apart from the work of ploughing and planting, makes it even more imperative for education, at all levels, to be boosted. It is really only in recent years that education among the Bantu has generally become broader in concept, and greater emphasis has been laid on agriculture, although as yet, only a very small proportion study agriculture at the College and higher levels. At the University College of Fort Hare over the past 11 years, only 26 students have been awarded the Higher Diploma in Agriculture, which is, in reality, an agricultural teacher's diploma. The attitude of some of these students, when they proceed to the second year of study, that is, at the commencement of the

teaching of agricultural subjects, is along the lines of "there is little we have to learn about agriculture - we have been associated with it all our lives!"

Bradfield (1964) refers to several lessons which have been learned through experience in agricultural development, and the one concerning education reads as follows: "Returns from an investment in education and research in agriculture, although very large eventually, do not come quickly, but often require a generation or more for full fruition". He also points out that the higher the level of general and higher education amongst the people, the less the effort required to bring about an improvement in agriculture.

Short courses, in various phases of crop and animal production, and engineering, for the Bantu farmer, have not, as yet, been instituted, apart from farmers' days and demonstrations. Degree courses have only been offered in agriculture as from the commencement of 1969 and the immediate need for well trained Bantu in research, extension and education services cannot be over emphasized now that the Transkei and Ciskei have their own Departments of Agriculture. For example, there are vacancies for nine agriculturalists and six veterinarians in the Transkei (Backer, 1969). Also associated with the personnel side, is the level of emoluments paid to all qualified agricultural officials. It is felt that the salaries are inadequate in this day and age for the qualified, experienced and dedicated men on the staff. Also the commencing salaries need to be more attractive to encourage the best possible people to apply and in sufficient numbers to meet all requirements. From the questions asked at the Fort Hare Symposium on the Economic Development of the Transkei, the salary structures play an important rôle in attracting the best people. Diploma in Agriculture graduates from the University College of Fort Hare have helped meet some of the teaching requirements in South Africa, but a fairly high percentage, not yet determined, have moved to neighbouring countries where they are in demand. Especially in the case of Bantu farmers, it is important that they get to know and trust Agricultural Officials in the area, and the system of promoting proved and accepted Officials out of the area, sometimes out of the ethnic region, must cause some setback to agricultural progress. In the past, local Bantu Affairs Commissioners have influenced the rate of progress either slightly or substantially depending on their personal interest in agriculture.

It is most unfortunate that the status assigned to agriculture and people connected with agriculture in past years, has been low, and that there has been a tendency to attach a stigma to working as a Bantu Agricultural Demonstrator in the Ciskei. At Fort Hare, it has been accepted that up to the institution of the various degree courses in agriculture, the Department of Agriculture received those students who were either not qualified to take other courses, or

who really were dedicated to agriculture. From experience, it would seem that more of the former, less dedicated men from an agricultural viewpoint, have received diplomas in past years. Bradfield (1964) also refers to this being generally the position in other developing communities, where sons of peasant farmers seek education as a means of escaping from the degrading occupation of farming. At higher levels of education, they will accept any other training and only resort to agriculture as a last chance.

It is estimated that when all the Bantu Extension Advisers' posts are filled, on the basis of one per ward for the 116 wards, together with one Senior Extension Adviser per district, the number of families per adviser, in the dry-land areas, will vary from 201 to 930. It is anticipated that the larger wards will also be sub-divided in the future. The average number of families per Extension Adviser will eventually be between 450 to 500. However, in 1968 there were 93 Extension Advisers, excluding two on planning and one on fibre projects, and three Senior Extension Advisers, and the number of families, on the average, served by each Extension Adviser is high. Bearing in mind that it will take a period of three years for the Fort Cox Agricultural College to supply trained advisers, based on a through-put of 12 students per year, at present, and for several years to come, there will be insufficient trained men in the field to meet the requirements of the rural population.

This Extension Service and other agricultural and engineering services, would not function efficiently, if at all, if it were not for the dedicated European officials guiding and accepting the final responsibility. As the Commission (1955) pointed out at the time, "the Bantu Agricultural officers are not yet capable of carrying responsibilities attached to the posts filled by Europeans. ..... Responsibility is, however, not a quality that can be acquired through a course of instruction at an agricultural school". While the time has arrived in the Ciskei for the Bantu to fill higher posts, the question mark still hangs over the Bantu's acceptance of responsibility as applied in the European sense of the word. As Viljoen (1960) so rightly stated, that "of the complementary factors of production, by far the most important are the human resources of a country".

In conclusion of this section, the fact that a large number of housing units are required, should not be obscured, since from a purely agricultural viewpoint, the greater the number of people housed in townships, the greater the chances there are of improving agriculture in all its facets. General progress could be retarded due to a shortage of housing in the rural, and also the urban areas. It has been estimated by a group of Departmental Engineers in 1968, that 300, 000 houses will be needed by the year 2000, and this means building an average of 9, 500 houses per annum. Again the under estimated population

numbers will mean that an additional number of houses will be required to be constructed each year.

4.2 THE AGRO-POTENTIAL OF THE BANTU CISKEIAN TERRITORIES:

"Millions of acres of our land are ruined, other millions of acres already have been harmed. And not mere soil is going down the slopes, down the rivers, down to the wastes of the oceans. Opportunity, security, the chance for a man to make a living from the land - these are going too. It is to preserve them - to sustain a rewarding rural life as a bulwark of this nation, that we must defend the soil. ..... The point is stressed that lasting accomplishment - a permanent agriculture - can be achieved only by coordinating the knowledge of many sciences toward a common objective".

H. H. Bennett, in the preface to his book "Soil Conservation", 1939.

Theoretically the agro-potential of a given country or area is based on the human and natural resources of that particular piece of land, as they exist at the time that an assessment is made. Such an assessment needs to take into consideration the traditional and social background of the human population, all natural resources, and the utilisation of both so that perpetual, economic and high production levels are achieved. On the other hand, such production assessments include all the existing human and natural limitations and are thus representative of the present. For the purpose of this discussion, it will be assumed that the development and utilisation of the natural resources is undertaken on a soundly-planned ecological basis, with bio-economic efficiency being the aim. The realisation of the above must be achieved in as short a time as possible, otherwise it is doubtful if the Ciskei could, agriculturally and industrially-speaking, become a viable and dynamic unit, fully capable of meeting most of the materialistic requirements of the existing population plus anticipated growth. It is accepted that, as expressed by Kamark (1967), rapid improvement of agriculture "must be the central part of any development programme".

The assessment of the agro-potential of the Ciskei is, as far as possible, based on actual trials carried out within its territorial boundaries, although it is not possible to rule out speculation completely in a discussion of this nature. Where practically and logically possible, the means by which higher production averages can be achieved, will be mentioned.

The rational land use and ecological approach, as stressed by Phillips (1959), should at all times be considered in relation to any improvement or development schemes envisaged in the Ciskei. There are many opinions as to how to approach this problem of raising farming standards and hence agricultural output. Hamburger & Waugh (1968), for example, are of the opinion that "present inhibitions, restrictions and problems can only be overcome by an evolutionary approach and not a revolutionary one", and point out that time is needed, and that there is no short cut in overcoming the problem involved. They further state

that this "evolutionary process can probably be guided and accelerated to a certain extent, provided sound methods and techniques are employed". This hypothesis is readily accepted, but the problem of time is, by no means on the side of the policy-makers and agriculturalists. Verbeek (1968) and Hamburger & Reyneke (1969) support the view that only evolutionary changes should be made in the traditional tribal land tenure systems, and rule out the introduction of revolutionary changes. However, after a serious consideration of demographic pressure and the underestimate in population in the Ciskei, together with the urgent need for human-food production, it is felt, therefore, that agricultural planners and extension services will need to devise ways and means to short-circuit and overcome the problems associated with rapid advancement. A dynamic, super-evolutionary, and in certain respects, even revolutionary, approach is urgently required which will incorporate only those traditions and beliefs which do not have an inhibiting effect on food production. Venter (1969) is of the opinion that a revolution in agriculture is needed "to set the ball rolling" in the Transkei. Substantial inroads have already been forged into the traditional Bantu patterns of thinking, and their social, economic and political life and activities, that the time has now arrived when an accelerated development cycle is earnestly needed. The difficulty is in arriving at a solution as to how this can best be accomplished, and it appears that this is where education of all kinds, and at every possible level, can play a definite rôle in developing the Bantu areas of the Ciskei into a viable, economic entity. In this process of educating the traditionally-orientated peasant farmers, the educator must be either a well-trained and capable Bantu, or a European with an intimate knowledge of Bantu values and motivational forces. The difficulty in bridging the cultural approaches is apparent, and the problem revolves round the acceptance of modern, but in most cases, foreign farming techniques which will lead to greater production and economic stability. In this respect, it is imperative that respected and responsible educators, with the right personality, be chosen to further the essential agricultural development of the Bantu territories. Such personnel would be more readily obtained where salary and service conditions were made more attractive. As Dumont (1966) says, in reference to education, "standards of professional training are of particular significance, for successful intensive agriculture demands a very high level of competence". The quality of education, in schools, colleges and universities, is important, in that the youth of a country are the key to unlocking the potential of a particular region (Bradfield, 1964). Education not only increases one's store of knowledge, but more important still, develops one's capacity to learn(ibid) and this is of vital significance in regenerating the agricultural resources and obtaining high-

average production statistics. The availability of trained men is thus of prime importance, especially in the extension field initially.

Additional land, and the immediate increase in the size of the holdings to an economic-unit level, will also be required to meet the demands of the rapidly increasing population, apart from satisfying the existing population which is now thought to be at least 35 per cent greater than indicated by previous census statistics (Els, 1968). However, the question of land and land rights is an extremely involved and emotional issue, and it is not proposed to go further into this aspect.

4.2.1 Livestock Potential of the Bantu Areas of the Ciskei:

As over 80 per cent of the Ciskei consists of grassland or veld, and the likelyhood of increasing the area under cultivation being remote, it becomes obvious that ruminants must play a major part in the realisation of the agro-potential. All that is required is to persuade the inhabitants of the Ciskei to universally adopt a rationalised or market economy form of livestock production based on the correct use of the chief resource, pasture. Associated with such a development, is the rationalised utilisation of all livestock in the Ciskei, in order to achieve high-average production. While such an achievement sounds simple in theory, in practice it is more difficult to bring it to a satisfactory culmination point. Specialisation, based on ecological and consumer considerations, needs to be encouraged in the livestock industry, so that a sufficient income is the logical outcome which can then be used for the purchase of the necessary human foods, which in turn will avoid the necessity of having to cultivate marginal and sub-marginal lands. As Ruthenberg (1964) opines, the aim should be to develop animal husbandry to the point where it can be considered as a cash-crop. This presumes that the veld will, both quantitatively and qualitatively, be able to support a high number of grazing animals, that is, have a high carrying capacity. Breeds and breeding, management and nutrition, the latter applying particularly to supplementary feeding in times of deficiency, are all thus required to be raised to high levels in an endeavour to realise the animal and pasture potential, and in conjunction with such development, is the necessity to improve stock watering facilities. The Ciskei is in almost an identical position to that which prevails in Lesotho, where it was considered that "if treated and utilized judiciously the pastures of Lesotho must be regarded as its main natural resource which could serve as a platform for future sound economic development of secondary and tertiary industry" (Hamburger & Reyneke, 1969). However, the overriding factor in the correct utilisation of land and husbanding of livestock, is the human factor, and here it appears that education of the "adult farmers by extension techniques and the education of farm youth by conventional techniques",

especially where there are insufficient extension advisers available (Bradfield, 1964), could well be the actuating factor required.

A. Human Potential:

In view of its importance in bringing about the realisation of the agro-potential in terms of both livestock and crops, it is proposed considering this aspect here. The development of the agricultural resources up to an optimum level, and maintaining this level without retrogression, is entirely dependent on the human resources of the Ciskei. Bonsma & Joubert (1957) include the human factor, by saying "A stabilised farming system is dependent upon the co-ordination between the physical and biological controls, and upon the economic and human factors determining agricultural production". In the Bantu Homelands, a great deal more emphasis can be placed on the human resources. At this stage in Bantu development, it is apparent that Bantu agriculture will not progress as it should without European guidance and, obviously, financial help. In arriving at such a conclusion, the inherent traditional approach of the Bantu to agricultural matters or problems, must not be excluded in any such assessment of his capabilities.

Bonsma & Verbeek (1963) state that "the achievement of a harmonious relationship between man and his environment is largely influenced by his own attitudes and qualities, his social and religious institutions and, in recent years, more and more by political dictates of individuals and nations". These authors feel that the problem of population increase and hunger, should be approached initially via social anthropology, and point out that livestock improvement "will depend upon the ability of stockowners to adjust their social, religious and tribal customs to scientific methods of livestock production". While concurring with these sentiments, it is felt that all tribal customs and beliefs which have an adverse or retrogressive influence on agriculture and livestock production, must be changed or eliminated, so that subsistence agriculture is changed as rapidly as possible to business or market-economy agriculture. While Herskovits (1962) points out that African farmers are no more conservative than farmers elsewhere, especially where changes are to their benefit, he feels that any change should not "involve too radical departure from established canons of social organisation, beliefs and modes of behaviour". However, this statement is a generalisation for the whole of the African continent and is certainly not as applicable in South Africa as elsewhere, especially where the area concerned has had a long contact with White farmers and administrators.

Agricultural education, at all levels as previously mentioned, can play a major contributing rôle in the acceptance of new standards by the Bantu, and the importance of such education cannot be overstressed in this age of fantastic popu-

lation growth. Family-planning education must also be included as an essential part of the overall programme so that the benefits of a controlled population growth are brought fully to the consciousness of the Bantu. The apparent miscalculation in projected population estimates for South Africa for the turn of the century, amounting to nearly nine millions, means that education, especially that concerning scientific food production, assumes a rôle of vital importance to all South Africans. At the lower levels of agricultural education, a sound but essentially practical approach is needed with the accent being on audio-visual demonstrations and practical instruction, where theory can be incorporated to the required degree. It is of value to note that material of a local nature, in the case of films especially, arouses a marked response in the audience. Partly for this same reason, the value of local demonstration farms should not be lost sight of, although Ruthenberg (1964) from experience gained in Tanzania, feels that they must be small enough to be of value to the people they serve.

All trained Bantu agriculturalists need to be classified as "white-collar workers" by their people, so that status, which is of particular importance in this association, is achieved. But, under no circumstances, should this detract from a wise and essentially practical approach being maintained in dealings with the farmers. It is also felt that all progressive farmers in a district, should be afforded maximum assistance and encouragement as these are the people who can show the way and help establish the agro-potential in that environment. These holdings can then serve as examples of what can be achieved by Bantu farmers, for the bulk of the farmers in that area. To endeavour to get all farmers to progress towards a common goal at the same pace, is illogical and devastatingly frustrating in the case of the progressive farmers. Hence, it appears that extension work needs to be undertaken at two levels, one to get the progressive farmer as far along the path of modern agriculture as possible, and secondly, to get the poorer-type farmers to follow in the footsteps of the progressives as closely as possible, based on example. In connection with the progressive farmers, Bradfield (1964) states that "most countries have, however, a small group of farmers who can be reached by such methods (extension). They are eagerly sought out as cooperators by both extension and research workers". Another way in which these progressive farmers could well serve the community, is by taking in apprentice farmers, but it is essential to have the farm and the farmer approved of by the requisite authority beforehand. The local demonstration farms could also play a similar rôle in the training of practical agriculturalists. The "rapid spread of technical progress in peasant farming is of key importance in developing agriculture 'cheaply' "according to Ruthenberg (1964), and the importance of applied agricultural research within

each agro-ecological zone, needs stressing. However, such research must be relevant and linked to the area's needs, and as far as possible, should involve local farmers (Long, 1964) so that a wider interest is generated within the given area. Weitz & Rokach (1968) summarise the foregoing by saying:

" ..... with modern technology, investments in people bring relatively better dividends than investments in natural resources. The modernization of cultures, the provision of education and technical knowledge becomes a predominant target for investment and is therefore acquiring increasing importance in national budgeting. Once technology enters a society, its demands for skilled and educated personnel make ignorance a limiting factor in development: the nation quickly reaches a stage at which, without mass education, development can only limp along.

"There are two conditions necessary for the application of technology at the farm level: that the farmer must know and trust the processes sufficiently to use them, and that he should be connected to a supply source which enables him to obtain the materials needed for their application. These two conditions have wide implications.

"Knowledge and trust are dependent on education and agricultural extension, a social framework which allows enquiry and acceptance, and instructors to whom the people will listen. It also means that new methods should be fully practical and thoroughly tried out under local conditions so that the farmers will not only be able to use them but that they will work satisfactorily".

Demographic pressure on land in the Ciskei needs to be relieved, and only industry and commerce can do this, even with the additional purchase of land by the Trust. While numerous small projects, of the home industries type, such as the weaving of mats, baskets and hats, pottery-making and beadwork, making skins into mats, and wood-carving, are in operation to one degree or another, and could be extended to meet the needs of tourism, the emphasis is on large industrial development. Large, labour-intensive factories, such as the Good Hope Textile Factory near King William's Town, which employed 3, 268 Bantu in 1967, are required if they are to make a significant contribution to reducing the human pressure on land. However, while Bantu workers have taken over positions formerly considered to be "above them", the Personnel Manager at the Factory, reported that most Bantu holding senior positions, are unable to make on the spot decisions or make up their own minds, but need continual help and backing. This, no doubt, is a passing phase. On the other hand, annual labour turnover, although it has decreased over the years since the inception of the factory in 1947-1948, is high. In 1950, this turnover was 105 per cent, and in 1967 it was approximately 36 per cent, but has never been less than 31 per cent as was the position in the year 1964. In connection with such industrial schemes, it should be noted that it requires on the average between R5, 000 to R7, 000 of capital development to provide employment for each worker (Hobart Houghton, 1969).

Barker (1966) reports on allegations made during a survey of East London industrial development, that young Bantu workers are becoming increasingly

"work shy" and put this down, in the first place, to the "lack of employment opportunities at the time of their initial entry into the labour market". Large numbers are said to shun employment on the mines "and would rather join the growing ranks of the unemployed than accept jobs which they consider too exacting or too hard". Barker (1966) also refers to the lack of labour stability and indicates that labour is more stable in the winter months than in summer, when "numbers of African males ..... return to their homes in the Reserves to tend to their crops". Lack of adequate industrial training facilities for Bantu, is one of the points raised by industrialists, and with limited training and where workers "receive due consideration from those in authority over them, their efficiency and stability are remarkable ..... The full commitment of labour to an industrial society requires a complete break with tribal affiliations, and the system of migrant labour and the perpetuation of a dual society is an obstacle in the path of rapid industrial development. Traditional loyalties are strong among the Xhosa-speaking Africans and they have not been subjected to the disruptive influences of other ethnic groups".

Silberbauer (1968) also dwells on the need for those in authority to understand the background and customs of the Bantu worker in the industrial field, and points out that the mental approach to any subject by the Bantu is vastly different to that of the White man. Invariably, the factor motivating the Bantu to work, is a drought or the desire to purchase livestock, property, a wife, and other such items, and thus, when the requisite amount of money has been saved up, he is liable to return to his rural home (ibid). This "target income mentality" has been mentioned previously.

This "dual society" referred to above, presents difficulties on the agricultural side, apart from those experienced in the industrial sector, as large numbers of able-bodied men are away from their holdings for a good portion of each year. In the Herschel District in 1967, it was estimated by the authorities, that 20,000 people were away working outside the District. This represents nearly 31 per cent of the total District population. The apparent solution to this problem, is to retain the true farmer on the land, and the remainder should be accommodated in towns or villages near or at industrial and commercial centres, and once this is achieved, agricultural development and increased production would follow. While theoretically simple, there would be considerable difficulty in applying this in practice owing to the annual population "explosion", and the escalation in total number, apart from the fantastic and immediate industrial development required. The Commission (1955) makes numerous recommendations regarding industries and commerce, and repetition of these is not necessary here.

Strong, government intervention in production schemes, according to Makings (1967), generally ensures greater productive success in agricultural undertakings compared "with the broad stream of independent activity at present

low levels", and this assessment is based on the fact that the worker is "better directed and combined with the other production factors in a more effective combination". However, the tendency is to develop agriculture on an individual land-tenure basis, but to further communal farming systems to which the Bantu farmer seems particularly suited. Communal farming envisages the utilisation of the more expensive farm equipment, improved sires, community dairies, and sheep and wool schemes amongst others, and the marketing of all products to best advantage. The system of agricultural training employed in Israel, would seem to offer a sound basis for the preparation of prospective farmers. In effect, this is a form of in-service training which has proved to be particularly successful under the conditions prevailing in Israel. "The exploitation of the agricultural potential by means of variations in the pattern of social and co-operative land settlement" is one of the factors attributable to Israel's agricultural development (Bonsma, 1960). "The Kibbutz movement is a child of necessity and the key to absorbing immigrants into agriculture. This system is only possible where the land is State-owned or (owned) by a national organisation, such as the Jewish National Agency" (ibid). The Kibbutzim were initially established as agricultural settlements commencing in 1909, but a recent tendency is to develop industrial enterprises on some of these Kibbutzim (ibid). Other systems peculiar to Israel, and which could be used as a pattern in the Bantu areas, are the Moshav, "a co-operative small-holders settlement", the Moshav Ovdim and Moshav Shitufi. The Moshav is similar to the existing system in operation in the Betterment Areas in the Ciskei in that the size of the land is based on a family unit, and the residential sites are separated from the agricultural areas (ibid). In the Moshav Ovdim settlement schemes, no hired labour is allowed, each holding being worked by the member and his family, while the Moshav Shitufi settlements combine "the collective economy of the Kibbutz and the private and social life of the Moshav" (Bonsma, 1960).

The system applied in Kenya prior to independence, whereby prospective farmers, under the settlement scheme, were required to work for two years on an approved farm, or complete the nine month's Certificate Course at the Egerton Agricultural College, could well be of use in ensuring that future Bantu farmers would have an appropriate agricultural background. Such selection of farmers for settlement or re-settlement schemes, would inevitably increase yields in the future. Providing a farmer has proved himself on his own holding, then it is felt that there should be no restriction in obtaining additional land, which actually infers that the "one man, one plot" approach would fall away and land would then have an economic value in relation to its productive capacity. The chances of inflated values setting the tone, are unfortunately possible but

this would be in keeping with other areas in South Africa.

The human potential, as seen from the foregoing section, is great, agriculturally speaking, but the problem of ever-increasing population numbers, overshadows a great deal of the latent potential of the people and land in the Ciskei. Family-planning coupled with betterment schemes, improved agricultural practices and industrialisation, could indeed portend the beginning of an earnestly needed revolution in livestock and agricultural production. However, the full potential cannot be realised until all farmers in the Ciskei have adopted the improved measures, and this in turn appears to depend on the rapid extension of all educational facilities, more readily available credit facilities and the further development and improvement of marketing schemes, the latter to further stimulate the incentive factor so necessary to participation in the betterment schemes. The 1968 Annual Report of the Xhosa Development Corporation, has this to say in connection with the above:

"It seems clear that the economic development of the area should rest largely on agricultural and livestock production, but agriculture, in all its aspects, is not a productive industry at present. Despite the high agricultural potential of the Xhosa Homelands and favourable weather and rainfall conditions which have been supplemented by the Government in the form of the requisite technical infra-structure such as planning, fencing, control of stock diseases and pests, extension officers, demonstrations, subsidying of sires, etc., and despite the continuous and painstaking devotion and energies of the officials concerned, the output is below the potential of the area and is below that of comparable areas of the Republic. Consequently the creation of industries based on agricultural production is not developing as fast as desirable. The technical infra-structure is, of course, a pre-requisite for higher agricultural production, but the Corporation is of the opinion that provision of credit facilities for agricultural and economic motivation of the broad masses of the Bantu population by education, guidance and example merit early consideration".

B. Nutrition:

As the natural pastures can be considered, together with bush browse in some districts, to comprise up to 99 per cent of the available feed resources in most areas, it is clear that any improvement in the veld must be reflected in increased animal production in the case of the herbivors. Improvement of the grazing areas, which comprise over 80 per cent of the total area of the Ciskei, will thus have vital and far-reaching effects in the case of the animal industry. As Verbeek (1968 b) declares, "regeneration is a pre-requisite to stabilising and improving animal production", and points out that to maintain vigor and productivity, most vegetation requires a minimum of at least half of the sward or top growth. Over 52 per cent of the total grazing in the Ciskei now falls under a planned veld management scheme, but recent prolonged droughts have tended to obscure the overall value of these schemes, although the Agricultural Officials point to the lower livestock mortality in these areas compared with the non-planned regions, as proving the systems used without

doubt. The various camping systems as recommended by Scott (1955), and the non-selective grazing (N. S. G.) system, with its short but concentrated grazing coupled with periods of long rest, as reported by Roberts (1967), are the obvious answer to improving productivity. The fact that merely resting the veld in the Ciskei, has led to the return of grass species which had not been seen for several years, means that with several seasons of favourable rains, together with the camping systems already in operation, grass cover can be regenerated. This will also depend on the advantageous spacing of watering points and on stock limitation and grazing control. Verbeek (1968 b) refers to the destructive selective effect of continuous light grazing and points out further that the maintenance of plant vigour is dependent on deferred grazing with the necessary complete rest. This healthy grass cover also effectively prevents the bush encroachment problems found in certain districts. The problem centres to a large extent on encouraging the sub-climax or climax grasses in an area to regenerate as rapidly as possible. The various methods of seeding, as advocated by Pentz (1955), could well be employed in the furtherance of this aim. These methods are, the pellet hay-seeding and the "thatching" methods, the latter being particularly successful in the revegetation of worn out arable lands. Pentz (1955) further reports that it is a "certain and cheap method" and that bare areas can be completely rehabilitated in a period of 18 months.

The Drought Committee (1965) state categorically that soil conservation and the application of sound farming systems "are a basic prerequisite to biological and financial stability in stock-farming". Accelerated soil reclamation and conservation measures thus need to be undertaken in nearly every district of the Ciskei, but especially in the Glen Grey, Herschel and Whittlesea regions. Once the stocking rate has been reduced to correct and manageable levels, and grazing management schemes become fully operative and effective, the carrying capacity of the coastal areas will be in the region of three morgen per mature largestock unit. This assumes that bush encroachment is controlled, and is based on an assessment by Pasture Management Officials at the Döhne Research Institute. In the higher altitude and rainfall regions, such as Stutterheim, Herschel and portions of Glen Grey, an ultimate stocking rate of two to two and a half morgen per mature largestock unit could be achieved (Hildyard, 1968). It is unlikely that much more than 320, 000 units could be carried on the veld, once correct grazing management systems are universally applied. However, where supplementation of the veld, through hay-feeding or integration of the cropping system either wholly or partly, or by boosting veld growth by means of fertilisation practices, could be undertaken, this figure could be greatly increased with safety. In the case of veld fertilisation, based on trials

carried out at the Döhne Research Institute, animal production could be increased three to four-fold (Hildyard & Van Niekerk, 1968). The use of Eragrostis curvula, similarly fertilised to the veld, and used as a ley crop, has also increased yields by much the same degree (ibid). The practicability of such schemes, needs to be carefully considered, and while they would, in all probability be rejected initially, they could well be employed in future years to further boost production once general nutritional and management levels have been raised out of all proportion to existing levels. It is interesting to note that if only one-third of the veld in the Ciskei were fertilised and managed correctly, an increase of up to 100, 000 mature units could result. As already indicated, as a practical proposition at the present time and in the immediate future, it is of doubtful value.

Erosion due to daily trampling by both human and animal populations, needs to be controlled by the building and maintenance of an adequate network of roads, and the use of the sledge should be unconditionally banned. At the same time, a subsidy should be made available to Bantu farmers in order that wheeled transport can be purchased, as was the position in the erstwhile Southern Rhodesia prior to 1960.

Where dryland and irrigated lucerne can be produced, (see Crop Potential), milk production levels would rise considerably especially if improved cattle breeds were prevalent, and cattle would be ready for the market at a much earlier age than is the position at present, since the deficiencies in the grazing could be more readily evened out. Leguminous hay fed in conjunction with nutritionally re-inforced cereal by-products, will facilitate livestock production greatly. It has been estimated earlier that there would be approximately 250, 000 tons of maize stover available in the Ciskei in a good rainfall year. On the assumption that this quantity would be reduced to 170, 000 tons with the possible excising of the marginal and sub-marginal maize areas, it would be advisable to operate regional wafer or biscuit-making machines. Such material could be proteinised, vitaminised and mineralised, and the resulting wafers could then be used to supplement the local grazing throughout the year, but more especially so during the winter period and the periodic droughts. Based on average liveweights of 825 pounds, and each animal consuming 20 pounds per day of the fortified product, then using a 200 day feeding period, 80, 000 or more such cattle units could be well fed. Where the amount fed is reduced so that it supplements the available grazing, then many more cattle units could be maintained over the winter months. Such "wafer" - making machines, could also be used in times of plenty to process all surplus roughages, and the product would require far less storage than the original material, and would be considerably easier to transport. Because of the initial cost involved and other processing costs, such a machine could only be

operated by at least a co-operative financed by the Territorial or Regional Authorities. There are numerous difficulties inherent in such schemes, but such projects could have modest beginnings, and could be extended as conditions improve in the various regions.

Tayler (1969) reporting on feeding trials involving the feeding of young Friesland steers with "chopped and wafered" Perennial Ryegrass compared with the feeding of "chopped and fed loose" Perennial Ryegrass, mentions that there is an increased intake of dry matter (1.4 to 7.9 per cent), a more rapid liveweight gain (12 to 20 per cent), and an improvement in the efficiency of conversion of grass into liveweight gain (up to 22 per cent) in favour of the chopped and wafered material. These trials were carried out under English conditions, but there is no reason to expect fundamentally different results in South Africa.

The production of supplementary feeds for winter and drought feeding periods, such as silage, grass hay for example, Eragrostis curvula and Chloris gayana, saltbush, spineless cactus, green oats, barley and other adapted crops, will help prevent the significant drop in liveweights during such nutritional-stress periods, as well as facilitating production. It should be reiterated that Hofmeyr (1968) considers the universal production of fodder crops to be the dominating factor in stimulating animal production. With increasing populations and an increasing shortage of sufficient, suitable arable land to meet human needs however, it does not appear to be logical to grow special fodder crops for animal consumption. Also, the specialised production of fodder crops, for example hay, while they can be used to great advantage, are expensive when compared with the conservation and treatment of crop residues, which have already met human food requirements. In all areas, the provision of urea or biuret/molasses licks, or the treatment of forage with such ingredients, must result in improved animal production from both natural and established pastures. Lishman (1965) has demonstrated that a small weight loss (mean 7.2 pounds) ensues in cattle wintered on relatively sour-veld areas where the diet is supplemented with urea and molasses. Other results show similar trends (Schoeman & Lishman, 1965; Von La Chevallerie, 1965), and where the use of such non-protein nitrogen compounds is widespread, a tremendous boost could be given to the livestock industry in the Ciskei, not to mention the more efficient use of the veld. Such supplementary feeds, as mentioned in this discussion, would help eliminate the wide nutritional variation experienced between summer and winter feeding levels.

Maize stover on its own, without any nutritional fortification, can be used as a satisfactory wintering feed, but should be supplemented by leguminous hay for best results (Saunders, 1930; Morrison, 1956). Saunders (1930) esti-

mated that a morgen of green maize could produce nearly seven tons of dry fodder per annum. Even based on four tons per morgen, and grown on an average of 70, 000 morgen, this represents supplementary feeding for as many as 140, 000 head of cattle, or, as estimated in the case of the fortified wafers, sufficient for the wintering of nearly 80, 000 head assuming very little or no grazing is available. This means that nearly 41 and 23 per cent respectively of the total mature largestock population, could be wintered entirely or partially, and where lucerne hay could be made available, it is certain that maintenance requirements as well as part or all of the nutritive requirements for growth or average milk production, could be satisfied. Fertility, in terms of increased calf-crops, and the reduction in "weaning shock", would be the natural outcome of such supplementary feeding. A further advantage would be the ability to maintain the work-oxen in a reasonable condition during winter so that at the onset of the first spring rains, these animals are able to cope with the greater activity expected of them. The wheat straw obtained from an average annual area of nearly 10, 000 morgen, can also contribute to improving animal production, especially where it is treated, or supplemented by the feeding of four to five pounds of lucerne or other legume hay (Morrison, 1956). The 20, 000 morgen planted to sorghums, could also provide a substantial amount of supplementary roughages, which could be enriched, as in the case of maize stover and wheat straw.

The employment of supplementary feeding would also facilitate the carrying out of correct veld management practices in every location, and help in restoring the natural pastures to their former productive level. Supplementary feeding, commencing in autumn and continuing into spring, could relieve the pressure on veld during two critical periods in veld growth. Hence, additional numbers of stock could be carried in future years on the basis of sound agricultural practices being followed. The provision of a phosphatic supplement in the diet of livestock, would improve production and reproduction as shown by Bisschop & Groenewald (1963). Apart from salt, which Morrison (1956) considers necessary for range and roughage-fed cattle, and which Skinner (1964) found to be unnecessary in the sweet-bushveld areas, it appears that no other minerals are required, but this will need verification in future years when production will have reached higher levels, and deficiencies will be more likely to manifest themselves.

Blood analyses carried out on six Friesland heifers over a period of a year in the Victoria East District, indicate that the natural herbage in parts of this area, can apparently meet the requirements for growth since these animals received no supplementary feeding. The lowest average blood-serum

calcium recorded was in October, 1965 (9.63 mgm per 100 ml), and the highest in March, 1966 (12.16 mgm per 100 ml). Average phosphorus content was lowest in July, 1965 and April, 1966 (4.86 mgm per 100 ml) and highest in March, 1966 (5.63 mgm per 100 ml). Range fed Shorthorns in Oklahoma, averaged 10.88 mgm calcium and 4.85 mgm phosphorus per 100 ml of blood-serum over a two-year period (Long, Van Arsdell, MacVicar & Ross, 1952), and, while not strictly comparable, these figures serve as a general indication of normality.

The question arises as to whether crops should be grown for human consumption or whether intensive animal production should take place on land suitable for cash crops. As clearly shown by Hofmeyer, Kotzé & Smith (1968), one acre of good soil can yield one and a half tons of wheat, or nearly 10 tons of potatoes, or up to one ton of animal products. However, in the Ciskei, suitable arable land is at a premium and it is unlikely that such land would be used for other than crops for direct human consumption, nor is intensive animal production, on a large scale outside the irrigation areas, possible in the foreseeable future.

From the production point of view, the Bantu Homelands, such as the Ciskei, could become important reservoirs of meat, and for that matter, cream or industrial milk. A tremendous increase in the purchasing power of the Bantu is foreseen, and this alone would ensure that the majority of the locally produced items would be consumed within the Homelands to a major extent. In the marginal crop producing areas, a system of weaner production is advocated, since the calves produced in spring and early summer could be marketed at attractive prices prior to the onset of winter, and the problems associated with this period. The demand for weaners of the right type in the European areas, is expected to escalate in future years. Verbeek (1968 a) reports on a beef fattening scheme used in Malawi which could well be adapted for use in the Ciskei. In the first place, a 20 foot long by 10 foot wide stall ("khola"), sufficient for two steers and made from poles and with a thatched roof, is necessary. Then applications are made by Malawian farmers for steers which have been purchased by the Ministry of Agriculture officials, financed by the Cold Storage Commission. After a three-month feeding period, during which they are fed on grass, maize stover, banana leaves and bean plants, with a concentrate mixture included in the diet, the cattle are slaughtered by the Cold Storage Commission. The initial purchase price, together with interest for the period during which the cattle were fattened, is recovered by the Commission. The difference between the initial cost plus interest, and the market price, belongs to the farmer. The demand for cattle to fatten is so great that the supply is the limiting factor in

this scheme. A milk scheme is run on similar lines and fairly high yields result.

For any beef weaner or fattening scheme to be successful, the incidence of cysticercosis must be eliminated or greatly reduced, and the universal encouragement in the general use of latrines, is necessary.

Planned cross-breeding, for the commercial production of beef weaners, and in some instances for milk production, could also be considered, but the problem of random mating would have to be initially overcome. Planned cross-breeding or out-breeding systems can greatly influence production economics and can result in the production of superior beef animals. Heterosis, which results in hybrid vigour and general uniformity of the first-generation cross-breds, varies in its effectiveness according to the breeds employed in such a programme. Lush (1949) indicates further, that heterosis "is not apt to be larger than around two to eight per cent increase over the average of the parental breeds for such things as size, growth rates, fertility, or other complex physiological traits". In terms of the percentage offspring reared of those born, that is, vitality, heterosis gives comparatively outstanding results (Lush, 1949). There is also an apparent improvement in metabolic efficiency and absorption of dissolved nutrients from the digestive tract (Van Marle, 1968 b). According to Sievers (1965), and quoted by Van Marle (1968 b), the first generation cross-bred Charolais/Afrikaner had an 18.9 per cent advantage in weight at three years of age compared with the pure Afrikaner, with the Hereford/Afrikaner having a 11.9 per cent advantage. These trials, carried out at Neudamm Experimental Farm in South West Africa, further indicate that the Aberdeen Angus/Afrikaner crossbreds had only a 1.1 per cent advantage over pure Afrikaners. Results from the McGregor Research Center indicate that cross-breeding of the beef breeds results in increased weaning weights of between 11 to 17 per cent (ibid). It has been calculated that the overall improvement in meat production by cross-breeding (Hereford and Brahman breeds) is in the vicinity of 24.7 per cent at little or no extra cost in the case of intensive beef production systems (Van Marle, 1968 b). Cross-breeding schemes could either embrace the production of first generation hybrids, or criss-crossing or rotational crossing, with the latter two having liveweight advantages of 15 and 20 per cent, and higher, respectively (Van Marle, 1968 b). In the hands of the Bantu farmers, only the simple cross-breeding system can be recommended initially, as the latter two schemes would prove to be too complicated. Verbeek (1968 b) on the other hand says that "Hybrid vigour offers little potential under prevailing conditions in Africa since it tends to reduce the adaptive advantage of the indigenous animal to environmental stress factors and increases its susceptibility to the diseases and the parasites

in Africa". This opinion would not apply in any large measure to the Ciskei where grazing and management conditions are being improved, and where the "native" type is being graded up by the use of exotics.

In the case of pork production, the penning and correct nutrition of the young pigs could make an important contribution to meat supplies within the Bantu areas in particular. Intensive egg-production schemes are contra-indicated at present due primarily to each family owning their own poultry, and to the generally depressed markets outside the Bantu areas. With the development of Bantu townships, feeding of poultry for both egg and table-bird production, might well be worth investigating.

C. Animal Management:

The availability of feed and water are obviously key factors in the improvement of animal production in the Ciskei. Much has already been said in connection with veld and supplementary feeding, and the desirability of establishing more permanent watering places so that more efficient utilisation of the grazing areas can be made. Water is also important in-so-far as it affects the animal directly in times of water scarcity. Depriving an animal of water for periods, adversely affects the appetite, which in turn influences the rate of growth, milk production and reproduction (Bonsma & Van Marle, 1967). These same workers point out that where animals have to walk three miles per day back and forth to watering points, as much as 75 per cent of the energy requirements for maintenance are utilised in this exercise. An accelerated tempo in the fencing-in and further sub-division of the grazing areas, is also a basic requirement in so far as efficiency of utilisation and exacting management of the veld are concerned. The ultimate size of these camps will be determined by the size of the herds and flocks and the period that they will be required to graze such camps. Whatever the size, no part of the camp boundary should be much more than half-a-mile from a reliable source of water, and 100 head of cattle and flocks of 600 sheep are considered to be maximal in the grazing of such paddocks (Scott, 1955). Associated with this camp development would be the wide-spread provision of shade and shelter trees in some districts, which will reduce the effects of solarisation in summer and the cold winds in winter and will also enhance production. The increased establishment of woodlots will indirectly play a rôle in that indiscriminate use of cattle-dung for fuel purposes would be reduced to negligible proportions.

Improved animal management practices require the use of reasonable, but readily available, handling facilities for the undertaking of routine handling. The latter includes inoculation and dosing programmes and the treatment of livestock for various complaints. Extended dipping and/or spraying facilities,

would be included in the above requirements.

Once adequate fences have been erected to the ultimate, or possibly pen-ultimate, plan, it should be possible to eliminate the highly undesirable practice of night-kraaling to a large degree, and thereby, significantly improving yields.

Inoculation or vaccination programmes and the control of parasites, both internal and external, rank high in management improvement systems in the Bantu areas, the Ciskei being no exception. The annual inoculation of livestock against prevalent diseases, such as Brucellosis and Quarter-evil, together with effective and regular dipping and dosing programmes, will play a major part in realising the livestock potential, in terms of actual production, increased efficiency and a lowered mortality. An accurate assessment of mortality due to diseases and parasites, is not available, but assuming that there is a 35 per cent reduction in deaths due to correct inoculation and dosing being employed, then this would represent nearly 2, 880 head of cattle. This latter figure is based on statistics quoted by Bisschop & Groenewald (1963) for European and Bantu cattle, and on the fact that 28 per cent of cattle deaths were the result of diseases (Commission, 1955) during the years 1946 to 1952. The early and correct treatment of diseases, would also contribute to a considerable reduction in the overall losses, but this has been partially accounted for in the above figure. Cysticercosis in both bovines and pigs, can be effectively controlled by the simple expedient of using latrines, or by fencing off well-bushed areas for human use, but in practice this is by no means easy to control. A good deal of extension work amongst all sections of the population in the Bantu areas needs to be undertaken to draw attention to the financial losses involved and to the endangering of human life.

Production Systems and Livestock Marketing:

The beef production scheme in Malawi as reported by Verbeek (1968 a), and mentioned earlier, could well be adapted to the Ciskei with great success. However, where pasture improvement is considered to be priority number one, and better quality but fewer animals are retained rather than large numbers of poorer-type stock, production could be greatly increased within the bounds of available feedsupplies. The aim of these schemes should be to obtain younger, marketable cattle well-finished and rapid-maturing, which would command high prices when sold, and which could not possibly be condemned due to the incidence of cysticercosis. To ensure that any guesswork is removed when purchasing such stock, a scale should be made part of the sale-yard facilities, and all stock should be weighed prior to bidding commences. The confidence of the buyer at these livestock sales, must necessarily be maintained at the highest possible level,

for the healthy functioning of all marketing schemes. The effective growing-out of beef calves of the improved type for sale as weaners in the European areas, or for finishing off in the irrigation or high rainfall areas of the Ciskei, should not be overlooked, as beef-production will, apparently assume a position of vital importance in the economy of all areas of South Africa. This latter assumption is based on the present trends in both human and cattle populations, and the expected increased demand for good-quality beef. Rose (1964) reports on a comparison made in Zambia between beef-production in traditional compared with commercial herds where the output of beef per annum per 1, 000 head of cattle, was 12, 000 and 66, 000 pounds respectively. The difference between these two schemes represents an increase of approximately 450 per cent over the traditional method of beef-production. The estimated take-off was nearly 3. 5 per cent for the traditional herds and 15 per cent for the commercial herds, and represents a four- to five-fold increase in production.

(i) Dairy Production: The co-operative dairy schemes, as in operation in the Ciskei, have a great deal to commend themselves in that they are not only providing a fairly regular income to families in many areas, but they provide a valuable protein-rich by-product in the form of sour-separated milk. The limiting factor in milk-production in the Ciskei is most certainly nutrition, and it is here that all existing and future schemes can be improved. The provision of supplementary feeds has already been mentioned, and this should be undertaken in conjunction with the reserving of camps for winter and drought grazing. A high standard of hygiene should be maintained to ensure that the maximum amount of cream, derived from these schemes, is graded as first - this is an effective way in obtaining greater returns for the producer. In future years it is envisaged that the demand for fresh-milk will increase, especially where Bantu townships have been, or will be, established, and co-operative fresh-milk schemes, on the lines of that at Zwelitsha, in the King William's Town District, could become important commercial undertakings. It is essential that the average milk yield per cow per lactation period be raised three to four-fold at least, so that fewer cows need be kept on the same grazing area than hither-to has been the position.

(ii) Stud-Stock: The breeding of stud animals for sale purposes, has already been provided for in the Ciskei, but as can be seen from Table 62, the number of sires required annually in the Ciskei alone, assures the stud-stock breeder a good income for well-bred stock. To produce nearly 500 bulls annually, between 4, 000 and 5, 000 good cows would be required, and this represents about five per cent of the estimated cow population in the Ciskei. As regards the problem of supply of sufficient numbers of sires, some Trust farms

could be used as breeding stations, and artificial insemination schemes could also be used in conjunction with such breeding projects in the future.

The breeding systems recommended for use in the initial phases of improving the cattle in Botswana (Bonsma & Van Marle, 1967), could be employed in areas of the Ciskei where the availability of finances and/or suitable bulls are limiting factors. Apart from the use of purebred improved sires and halfbreds, the latter where necessary, the identification and the keeping of records of fertility of well-grown, functionally efficient "native" or tribal cows, forms the basis of this scheme. The best bull calves from these selected cows, could then be purchased by the Territorial Authority at about eight months of age and kept on grazing and under good management conditions until about three years of age, when the final selection can be undertaken. Selection is based on weight-for-age and on conformation. There is much merit in this scheme where beef production is the primary consideration. In the case of the Brown Swiss bulls, the demand for good bulls at a reasonable price is high, and it is apparent that not all demands can be satisfied. From time to time, a bull which should have been castrated, is used for breeding purposes. Artificial insemination could well be introduced to great advantage, especially in the more densely, cattle populated areas such as for example, irrigation schemes. Breeding diseases, notably Brucellosis, which appear to influence production to a considerable, but undetermined extent, could also be brought under control. The problems to be faced are by no means insurmountable now that deep-frozen semen can be made readily available, and judging from experience gained in Kenya, Bantu inseminators can soon be trained and placed in the field where required. Rose (1964) is of the opinion that a grading-up programme combined with artificial insemination, is the answer to animal improvement in Zambia, especially as one proven bull could, if required, sire as many as 15,000 calves per annum where deep-frozen semen is used.

The general institution of livestock improvement centres, as in evidence in Lesotho where they were "very successful in their aims and were doing most important work in connection with the introduction of modern methods of management of flocks as well as promoting the use of well-bred sires by the stock farmers" (Hamburger & Reyneke, 1969), could play an important rôle in the Ciskei.

(iii) Equines: Apart from being used for transport, and in the case of mules, for draught purposes, there appears to be a reasonable demand for good riding horses, although stock limitation tends to place a curb on the numbers required. There is no reason why horse breeding on a small scale, especially of the Basuto Pony type in the Herschel District, cannot play a rôle by horses

being sold in the European areas, apart from supplying local needs. That such animals should be free from Dourine in particular, is self-evident.

(iv) Sheep: Improved production, in the case of all livestock, can be almost immediate and somewhat spectacular where nutrition and management standards are raised to reasonable levels. In sheep, while a definite improvement is noted in the growth and quality of the wool fibres, improved production practices will inevitably lead to a stronger-type Merino wool being produced, and the increased fleece weights will be partially offset by a decreased value per unit weight. By the simple expedient of shearing long-wool and handling the fleece correctly, the existing wool assumes an increased value. The universal use of improved sires, together with an associated improvement of nutritional and management practices, could lead to a high productive potential from both the fibre and meat point of view. However, as sheep are run pastorally, it should be stressed that they should be run in conjunction with the other grazing species in satisfactory ratios or combinations according to the types of veld being grazed (Verbeek, 1968 b). It is advocated that a better quality animal be bred up; the numbers be reduced so that the best possible utilisation of the available veld is made by all grazing species, and that stud breeders be encouraged to operate within the different ecological zones of the Ciskei to help satisfy the ram requirements in such areas.

(v) Goats: A noticeable improvement can be brought about by raising the relatively low standards of breeding, feeding and management as in the case of the other livestock species. Education, and primary and secondary extension methods, are today aimed at improved crop, pasture and animal production, and the problem is, as already indicated, more a human one than one of poor agricultural resources. As Makings (1967) so rightly infers, apathy is one of the worst obstacles to be overcome by the extension worker, and this is partly influenced by the conditioned-acceptance of long standing hardship and malnutrition associated with subsistence agriculture. These latter statements apply in all livestock and agricultural undertakings, and not only in the specific case of goats. Goats could be graded-up by using purebred Boerbok or Angora sires, while, in some areas, the specialised dairy goat breeds could play a minor rôle.

(vi) Pigs: The African Hut-pig, once penned, no longer serves as a scavenger and a comparatively cheap producer of meat, and where penning is resorted to, the improved pig breeds, especially the hardier bacon-type breeds such as the Tamworth and the Minnesota No. I, would be more suitable. However, the choice of breeds will depend primarily on the plane of nutrition and level of management prevailing in the various districts. While the Hut-pig continues to roam at large, the incidence of cysticercosis needs to be curtailed,

and this can only logically be carried out by the universal usage of latrines, or pills, or both. Once measles are controlled effectively, the value of these pigs is bound to rise since the buyer's confidence will once again be restored. In the case of both pigs and poultry, where grain forms a large part of the diet, the keeping of such livestock should be well integrated with crop production, especially grain production. The use of proprietary concentrate mixtures, could either supplement locally produced grains, or wholly replace the grains, but in the latter connection, intensive pork or bacon production is envisaged. Pigs, in particular, compete with humans for grains, and complete re-orientation in Bantu thinking needs to be achieved before highly intensive production schemes, as found in the European areas, can be introduced. Ultimately, as mentioned in connection with other intensive schemes, it becomes manifest that education, both conventional and that carried out by the extension services, is of prime importance in achieving a productive break-through.

(vii) Poultry: The Hut-fowl also serves a very useful purpose and is cheap to maintain, and only where more intensive egg or meat production is envisaged, and nutritional and management levels are reasonably high, should these fowls be replaced by the improved poultry breeds. Based on experience at Fort Hare, where an inbreeding programme has been in operation for the past four years, each hen is capable of rearing between 30 to 45 chickens and more, in some cases, per annum under good conditions. Where selection is undertaken along with improved living conditions, the Hut-fowl is destined to play an even more important part in the provision of human food in the Bantu areas.

(viii) Rabbits: In an endeavour to overcome the high incidence of human malnutrition, especially in respect to protein, the keeping of the improved rabbit breeds should be encouraged. Rabbits are at present being tested in Malawi to see what rôle they can play, but Verbeek (1968 a) is doubtful whether such a scheme can prove to be of value, basing his views on experience in South Africa. However, it is possible that the rabbit can play its part in providing much-needed animal protein. Apart from some concentrated feeds, a high proportion of edible weeds can be included in the diet, and in the lucerne-growing areas of the present and future, there should be very few problems in the nutrition of rabbits. Assuming that one family in every three had a rabbit-hutch, a substantial contribution could be made in overcoming malnutrition amongst the Bantu. The production of rabbits must be considered to be essentially for local consumption and not for sale purposes outside the Bantu areas, where there is already the possibility of oversupply.

(ix) Fish: Fresh-water fish can play a part in the diet of the Bantu. Indigenous fish in the Cape Province, apart from eels and a few other species, are generally of poor quality, according to Hey (1968 a). Fish culture has the advantage of being carried out in second-grade water, for example, brack water, and in Israel, in the marginal crop areas, 2,000 pounds weight of fish is produced per acre per annum using such water (ibid). In Zambia, 6,000 pounds of fish per acre per annum has been produced using factory waste-water. Tilapia species can only be cultivated in comparatively frost-free regions, and, while Tilapia mozambicus could be used in the coastal areas of the Ciskei, Tilapia sparrmani, a smaller sized variety, could do well in the coastal plateau areas (Hey, 1968 b). The latter yield approximately 750 pounds weight per acre per annum. At Tsolo, in the Transkei, Aischgrund carp, imported from Germany, were tried out in local dams, and individual fish attained a weight of seven pounds in a two-year period (ibid). Soft weeds, veld grass and other suitable vegetation, are used for feeding purposes. Hey (1968 b) is of the opinion that these latter two breeds could make a useful contribution in most of the Ciskei, together with four species of fresh-water eels, which, as yet, have not been exploited commercially. There is also a possibility that a local variety of mud-fish (Labeo umbratus), could be of value as a source of protein (Visser, 1969). American bass, trout, carp, eels, Tilapia and possibly mudfish, all have a rôle to play in the diet of the Bantu and, as the prejudice is rapidly being overcome in the Bantu areas, the potential nutritional contribution is high and remains to be developed and exploited. It is of interest to note that approximately 7,000 tons of eels are consumed annually in Britain alone (Hey, 1968 a). Stocking of rivers in the King William's Town and Herschel Districts with trout and bass, has been carried out in the past by the Department of Bantu Administration and Development, according to Annual Agricultural Reports in past years.

It has been estimated that the Bantu mine-workers already consume some 40 pounds of fish, that is, sea-fish, per capita per annum, while the Bantu city-dweller consumes slightly less, with the rural, non-mine worker, eating less than three pounds on the average, fish being the cheapest animal protein available in South Africa up to 1968 (Dreosti, 1968).

(x) Game: In the distant future, it is not impossible that the use of domesticated indigenous ungulates, such as the eland (Taurotragus oryx oryx) and kudu (Tragelaphus spp.) could be of value in supplying protein, and would be a way of boosting animal production in the drier, open woodland areas of the Ciskei. In Rhodesia, in a game-cropping system, it was estimated that the annual take-off amounted to nearly 25 per cent, compared with 16 per cent for cattle (Ledger, Sacks & Smith, 1967). Verbeek (1968 b) points out that game

animals are more resistant to diseases than domesticated stock, although the hazard remains that, while unaffected by certain diseases, these can be transmitted to domestic animals. Whether or not such game species as the eland can contribute to the protein resources of the Ciskei, will, no doubt, be determined in future years. As far as the eland's feeding habits are concerned, Lamprey (1963) classifies it as a "mixed feeder", that is, a grass or plant, or portion of plant, feeder. Van Zyl (1965) made observations in the Western Transvaal Lombard Nature Reserve on Dry Cymbopogon/Themeda veld, and recorded that the eland's diet consisted of 23. 5 per cent veld and 76. 5 per cent shrubs, and this would be, within narrow limits, representative of the kudu as well. While greater use could be made of available vegetation due to browsing, the acceptance of the idea that wildlife belonged to an individual or corporate body, would take a great deal of time for the average Bantu to assimilate.

(xi) Hides and Skins: In eliminating, as far as possible, the drastic losses which are a concomitant of the hide and skin trade in the Ciskei, it appears that two approaches could resolve the position. Firstly, the extension services could campaign so that the use of the correct methods is more widely appreciated, and secondly, that prices paid for a well prepared product are higher than those paid for a poor quality article so that the incentive to produce a better article, is there. Associated with the latter factor, is the need for more disposal centres, which could possibly operate as an adjunct of each tribal authority. With the general improvement in grazing and supplementary feeding conditions throughout the Ciskei, the quality of the leather obtained from the hides, would be far more acceptable to the trade than is the case at present.

(xii) An Evaluation of Organised Marketing Schemes in the Bantu Areas of the Ciskei: The focusing point of modern agriculture is on organised markets or outlets, and this particularly true in the Bantu areas. As Hamburger & Waugh (1968) so rightly point out, "proper and reliable" outlets or markets are necessary to encourage active participation in all sales, especially stock sales. Hamburger & Reyneke (1969) further indicate that "such facilities are actually a basic requirement and a prerequisite to the development of a healthy industry". To make such schemes more attractive to the sellers, the agent's commission is paid by the purchaser. As reflected in Table 29, there has been a decline in the total number of cattle slaughtered or sold since 1958, although the number slaughtered privately is based on estimates made in the various districts. However, the real success of these stock sales can be gauged by the numbers sold on the organised stocksales, 1, 028 in 1958 compared with 6, 520 in 1967. This represents an increase of over 500 per cent in numbers sold, while the average price per unit has increased by nearly 82 per cent. Similar

trends have occurred with smallstock sales, where 117 were sold in 1958 compared with 5, 939 in 1967, although the average price paid has tended to drop slightly. Stock sales are an unequivocal success in so far as cattle and smallstock are concerned in that they have enabled the livestock owner to establish the true monetary value of his stock, and have encouraged him to appreciate that quality can also be assessed in terms of money. Pig sales, on the other hand, have been disappointing latterly. The buyers' wariness in purchasing Bantu-owned pigs and the low prices offered, are the main reasons for this state of affairs. The reluctance of the buyers is based on the fact that one pig in every seven or eight will be detained or condemned at the abattoir, and this factor alone is a major deterrent.

The co-operative dairy schemes have, unfortunately, had their overall affect obscured by drought years since 1964. In 1958 there were 78 schemes in operation with a total of 1, 430 participants milking 2, 859 cows during the year. In 1967, only 47 schemes were in operation with a total of 762 participants milking 1, 393 cows. However, as nearly 87, 000 pounds of cream were sold in 1967 at an approximate average price of 15 cents per pound of cream, the amount realised, R13, 050, indicates the extent of the successfulness of these dairy schemes, although the average annual return in 1967, per producer, was less than R20. Contrary to initial policy, most, if not all, of the cream is forwarded to creameries in the towns.

The success of the co-operative wool marketing schemes is also not as obvious as the figures indicate. Since 1964, there has been a tendency to market wool individually rather than co-operatively. In 1967, of the total wool sold, that is 1, 353, 039 pounds, only 9. 3 per cent was sold by the marketing schemes. Apparently, more wool, which is better prepared and presented, is being marketed directly than in previous years (Norton, 1968). When the two methods of disposing of the wool are compared (see Table 37), it is obvious that the communal shearing and marketing schemes process sheep with higher individual fleece weights with wool of a better quality. This was the position over the four year period 1964 to 1967.

The improved marketing schemes for hides and skins, while only dealing with 6. 5 and 7. 4 per cent respectively of the total hides and skins marketed, has also proved to be a success. Higher prices were obtained for both items when compared with those sold individually.

Since the organised marketing schemes in the Ciskei also cater for the sale of fruit, vegetables and other items, it is proposed to mention these here. Organised markets for the sale of fruit, vegetables, handcrafts, and other home-produced items, have been in operation in several districts of the Ciskei. In

the three districts of Whittlesea, Keiskammahoek and Middledrift, for example in 1966, 94 sales or markets were held at 27 different marketing places, and produce to the value of R1, 556. 82 was sold. In 1967, twenty such sales were held in the Middledrift area and realised R422. 15. Unfortunately, the droughts appear to have had a drastic curtailing effect on these markets, but their value is undoubted. One of the problems associated with these schemes, is the lack of constancy of supply due to normal and abnormal dry periods, and also possibly to the lack of transport facilities. As is the position with the majority of agricultural commodities, organised marketing on a fairly wide scale, needs to be extended on a co-operative basis in the majority of districts, depending on the potential of the area for producing such saleable material.

All the afore-mentioned schemes in the various districts of the Ciskei, have a definite and important rôle to play in developing the agro-potential of these areas. These schemes not only encourage the sale of the various commodities by providing organised facilities, but increase the seller's awareness of the monetary value of his produce thereby providing the catalyst for further development and production. The awareness of the commercial value applies particularly in regard to the quality of both his stock and produce, and the realisation of increased prices must be the incentive which will eventually lead to improved livestock and produce being the rule and not the exception. The importance of hygiene is demonstrated to the milk supplier in the case of cream sales where there is a difference of two cents per pound of butterfat between each of the three grades, the difference between the first and third grades thus being 6 cents. For each 1, 000 pounds of butterfat being graded first instead of third, an additional R60 is at the disposal of the producer.

The success of livestock sales, and no doubt other sales, is due in no small measure to the local agricultural officials, but also to the fact that the seller is paid out in cash immediately the bid has been accepted. There is thus little delay between the time the seller knows what he will receive, and the time the money is actually paid out to him. To the Bantu farmer this is definitely an important aspect of the selling of his livestock in particular. In reality, this short-term financing by the auctioneers, contributes to the increasing popularity of local stock sales. Perhaps more should be said about the rôle played by the agricultural officials in each district, but suffice it to say that, these schemes would not have advanced as readily as they have in past years, were it not for the fact that these men were held in high regard by the local farmers.

That these marketing schemes are the pathway to realising the inherent potential of the region, cannot be denied, and their further development, based on sound commercial lines, is imperative.

D. Climatological Factors:

Certain aspects of the climate can be modified to better render the Ciskei a more productive region. As already stressed, the provision of shelter to shield livestock from the effects of summer solarisation and consequently high body temperatures, can be tempered by the provision of shade, either artificially supplied or by the growing of suitable trees. In winter, the above can also provide the necessary shelter from the cold, and occasionally wet, winds which have a deleterious effect particularly on young animals and productive stock. In the areas where snow can be expected in the winter months, the provision of cheap shelters with adequate feeding facilities and reserve feed materials, will help eliminate losses due to sudden cold snaps.

E. Genetic Material:

While the existing "native" type of cattle, which predominates in the Ciskei, generally has a low productive capacity, there are certain qualities of hardiness which should not be ignored until such time as the environment has been improved to such an extent that more productive breeds can be maintained without deterioration. In Rhodesia, it has been reported that, while the first cross of the British breeds with "native" cattle was superior in many ways, further use of the exotic bulls resulted in progressive degeneration (Vorster, 1964). Where the "native" cattle are properly cared for, there is the distinct possibility that the "native" cows can produce more calves compared with British breeds under similar environmental conditions (ibid). The foraging ability of the "native" stock has already been remarked upon (Phillips, 1959). The wisdom of the selection of one cattle breed for practically the whole of the Ciskei is debateable, since no one breed can meet all requirements of the Bantu farmers within the different ecological zones. Because of family commitments and economic considerations, the selection of a dual-purpose breed is probably the obvious solution. Whatever the breed or breeds selected, there are certain requirements pertaining to the choice of such breeds when the Bantu farmer is considered:-

(i) Fertility: All livestock should be able to calve each and every year without difficulty. It is assumed here that the nutritional and management levels are positively improved to meet reproductive and other requirements. Kelley (1959) refers to a "high level of fertility for an adequate number of years" as being a basic requirement for a breed to produce in a tropical environment, and the same would apply in sub-tropical climates.

(ii) Adaptability: Animals should be adaptable to the varying conditions experienced in the Ciskei, and should display a certain measure of hardiness to overcome the vicissitudes of the environment. There should thus

be a high resistance, as reflected chiefly by a low mortality rate, to unfavourable conditions.

(iii) Size: The breed should be preferably a medium sized one, which in practice, means that maintenance requirements will be on the low side comparatively speaking. Smaller breeds are commonly earlier maturing than larger ones, and Kelley (1959) is of the opinion that there should be sufficient early maturity in the selected breed to allow for the production of a steer, off the veld, having a carcass weight of approximately 600 pounds prior to three years of age.

(iv) Weight-gaining Ability: Cattle should be able to grow out well within a reasonable period, usually two-and-a-half to three years stated above, so that a quicker turnover is consequental. Assuming that it is possible to reduce the age at which cattle are sold by 25 per cent, then the annual turnover would increase significantly.

(v) Milk Production: The aim should be to average between one to two gallons of milk per day over a sufficiently long lactation period, being not less than about seven to eight months duration. This would boost the amount of milk available and ensure a greater regularity of supply, and lead to greater stability in the dairy industry. More important, would be the favourable effects on growth of the calves, since there should be an adequate supply of milk for all needs.

(vi) Mobility: A reasonable draught animal which is tractable and which has good foraging ability and stamina, is required.

(vii) Constitution: Livestock should have a high degree of longevity so that a lower annual replacement rate is achieved.

(viii) Numbers: The breed should be numerous enough to supply sufficient well-bred sires to satisfy the requirements of the Bantu farmer. As indicated in Table 62, the number of bulls required annually is in the vicinity of 500.

As shown by the above, it is not easy to find a single breed which could satisfy all the above requirements in all ecological areas of the Ciskei. In a study of livestock regionalisation, Bonsma & Joubert (1957) mention the Brown Swiss as being suitable in the more mountainous regions. Given improved nutrition and management standards, the Brown Swiss should prove fairly satisfactory as it meets many of the above requirements, but under the prevailing conditions of mismanagement and malnutrition, the latter being greatly enhanced by drought effects, the high-grade Brown Swiss has been adversely affected. One of the deciding factors in the choice of this breed appears to be that it is dual-purpose and that reasonable quality bulls are available at realistic prices.

On the other hand there are breeds which can satisfy all, or nearly all, the above requirements and in addition, would fit in more logically with the Bantu pattern of living. One such breed is the Drakensberger which certainly satisfies all the requirements mentioned in the choice of a breed, and in addition, is black in colour and is noted for its longevity and hardy qualities, and which should most certainly be considered for at least the high altitude areas. There are approximately 4,000 stud Drakensberger cows and these are capable of producing approximately 800 bulls per annum (Van Marle, 1969). The Drakensberger is, in many respects, the ideal breed for the Bantu regions, and will not be refuted on the basis of colour, as is the position with the Brown Swiss. In the lower altitude areas, especially near the coast, the Nguni breed, of an improved strain, again would be a better proposition than the Brown Swiss in being able to withstand the rigours of the environment. While it is accepted that the Brown Swiss has a rôle to play in the Bantu areas, it is by no means the ideal, universal breed. According to the climographs for Aliwal North and Queenstown (refer to Figure 9 A), and which can be accepted as being nearly representative of the conditions experienced in the Herschel and Glen Grey Districts respectively, mountain breeds are the best suited to the prevailing climatic conditions. Both the Drakensberger and the Brown Swiss qualify as mountain breeds, but the former will most definitely fit into the existing traditional farming system, and can also satisfy the requirements of the progressive farmers of the present and future. The climograph for Lovedale, which can be taken as representing the coastal plateau region, indicates that, while the mountain breeds will "fit" into the climate zone, there is a period of four summer months when the mean monthly temperature is unsuitable for such breeds. The Drakensberger, with its Zebu inheritance, is unlikely to be affected. The climograph for East London, taken as representing the coastal belt, indicates that the climate is such, that for all but one month of the year, imported or exogenous breeds should do well. Again the human factor must be taken into consideration, and it is doubtful if these breeds would do so well in the hands of the Bantu as, for example, an improved Nguni type. When the plane of nutrition, as presently existing, is considered, the exogenous breeds are at a distinct disadvantage compared with indigenous stock for example. Even under an enhanced nutritional level, the improved Nguni would be a proposition worth investigating. This claim is based on work carried out at the Mpisi Experimental Station in Swaziland (Brown, 1956). Other breeds could well be considered for the various ecological zones and would depend largely on the degree of specialisation required. For example, the Afrikaner and Brahman breeds could contribute greatly to meat production in the lower altitude regions especially, and

where a grading-up programme is resorted to, it is unlikely that any retrogressive factors will manifest themselves in the early stages of this breeding policy.

Smallstock:-

In the case of sheep breeds, and according to the hythergraphs for Aliwal North and Queenstown (refer to Figure 9 B), it appears that both the Merino and British breeds would be suitable, while that for East London indicates that the British breeds would be more suitable. In these hythergraphs, there are months when the climate is considered to be too hot for the woolled breeds, and in such areas the hairsheep breeds would be preferable. From practical experience, it appears that the Dorper would be a wise choice for the coastal belt areas, while inland, the Dohne Merino is eminently suitable, as is the South African Merino, more especially in the high altitude regions. With the introduction of improved sires into the flocks, the improvement in the progeny is spectacular, as has already been indicated in the Sheep section of this study. Inbreeding, coupled with malnutrition and low management standards can be overcome by education and by supplying subsidised rams as practised at present. Trust farms, in each region where necessary, could well be used as stud-farms as mentioned, and sires could be produced and sold at cost price. Such farms will also serve as demonstration and research units similar to those in European areas.

It is somewhat more difficult to recommend a breeding policy in connection with goats, since, not only are there three types of goats in the territory, but production considerations are clouded by magical and ritual issues. It seems logical to expect that major improvements will occur in Mohair production on the one hand, and meat production on the other. The former will require the use of good Angora sires, which could also be bred up on Trust farms, while the latter will need the services of improved Boerbok sires. As the goats required for ritual purposes are white in colour, the Angora goats should be in a position to satisfy basic needs.

Realisation of the Livestock Potential:

In summation of the foregoing material, it is clear that the livestock potential can be realised by increasing the overall productivity per animal unit. This increase can be achieved by farming with adaptable animals which are capable of thriving within a given ecological zone, and which reproduce frequently and regularly, grow and develop rapidly and have a high and efficient productive capacity. They should also have a low susceptibility to unfavourable environmental and management conditions, and be long-living. Thus the functional efficiency of each and every animal unit should be raised to higher levels. At

the same time, increased turnover should be the aim, and this can be achieved through the higher fertility which results in increased calf, lamb and kid crops, a more rapid growth rate brought about by genetic improvement and by vastly improved nutrition programmes, and by employing superior management techniques which overcome many prevailing problems, such as parasites, and which result in lowered mortality rates. A combination of improved breeding, nutrition and management practices applied judiciously in the Bantu areas of the Ciskei, could result in a major and dynamic change occurring which could revolutionise animal production. The principal key to such revolutionary changes, appears to lie in education of all kinds and at all levels, so that eagerness to improve agriculture in all its facets, is developed. Unfortunately, rapid development of these areas, is coupled with the delicate problem of increasing the land area per family so that no sub-economic land units remain. This is largely dependent on the development of the secondary and tertiary sectors of the economy, and it is doubted if such development could be of the magnitude that it could make immediate and lasting contributions to reducing pressure on land.

4.2.2 Agronomic Potential of the Bantu Areas of the Ciskei:

A. Dryland Crops:

Effective erosion control and reclamation measures are needed to reduce the soil loss on arable lands to manageable proportions, and crop production, employing sound methods of cultivation and fertilisation, will increase accordingly.

In those areas experiencing less than 500 mm rainfall per annum, very little dryland crop production should be undertaken (Whitmore, 1957 a). However, to meet the traditional and immediate needs of the farmer, only the most suitable land should be properly ploughed, and the total arable area restricted accordingly. With normal manurial and fertilisation treatment, soil-moisture conservation practices, and the use of the best ecologically adapted crops were possible, the average annual yield could be as much as it is at present, if not more, but on a third to a quarter and less of the land previously utilised. As an example, Peddie in the 1966-1967 growing season, averaged approximately one bag of maize per morgen and reaped a total of about 2, 000 bags, and two and a quarter bags of sorghum grain per morgen, reaping a total of about 4, 500 bags. The effect of growing a more adapted crop is clearly illustrated, and the yield is much higher in spite of the activity of birds. If 200 morgen of the most suitable land were correctly fertilised and cultivated, that is, approximately one-tenth previously sown to maize, an average yield of 10 bags of maize per morgen could be realised. This average is by no means unrealistic since the Trust farms have actually averaged over 12 bags per morgen. However, it

should be reiterated that these relatively low rainfall areas are not generally considered to be cropping areas, and should be viewed essentially as grazing regions. In Mabandla's Location, in the Victoria East District, well manured lands, fertilised with a reported 400 pounds of granular superphosphate per morgen, averaged nearly 12 bags of maize per morgen in the 1967-1968 season, and this during a period of drought.

Under dryland conditions with proper soil tillage practices to promote maximum water infiltration, and seed-bed preparation and crop protection practices, the following average yields can be expected:

TABLE 57: EXISTING AND ESTIMATED POTENTIAL AVERAGE CROP YIELDS PER MORGEN UNDER DRYLAND CONDITIONS IN THE CISKEI

Crop	Present Average Yield per Morgen	Estimated Potential Average Yield per Morgen
Maize	1.56 bags	12 to 15 bags (20 in the high rainfall areas e.g. Herschel)
Sorghum	2.03 bags	6 to 8 bags
Wheat	2.30 bags	5 bags
Legumes	1.25 bags	3 to 4 bags
Roots	790 lbs.	2 to 3 tons
Lucerne Hay	2.80 tons	3 tons
Cotton	1,100 lbs. (i)	2,000 lbs. (possibly up to 3,000 lbs.)
Pumpkins	1 to 3 tons (i)	2 tons plus

(i) South African Bantu Trust Averages.

As seen in the above table, correct production techniques can account for a vast improvement in all crops grown in the Ciskei particularly in the case of maize and sorghum. It is noteworthy that Phillips (1959) considers that sorghum is one of the few crops worthwhile developing in a subsistence economy and possibly for commercial production purposes. The growing of legumes under improved conditions and over wider areas, could be of much assistance in reducing the incidence of Kwashiorkor, but such protective foods should first meet the needs of rural Bantu before any surplus is sold outside the Bantu areas.

Lucerne Production:

Dryland production certainly has a future in the higher rainfall regions receiving over 660 mm, although good results have been achieved in zones with as little as 508 mm of rain per annum in the Eastern Cape Province (Graven,

1962). Graven (1962) also suggests that in the latter areas with erratic rainfall, this lucerne would be valuable as a grazing crop and should be planted in rows 18 to 36 inches apart. Lucerne is also fairly tolerant of brack conditions (McKellar, 1957). In most of the Bantu areas of the Ciskei, lucerne could be regarded as a ley crop and planted to between a quarter and a third of the arable lands at a time, thus improving the soil structure and condition. At the same time, livestock production could be made more dependable, as in the region of 90, 000 tons of hay, based on two tons per morgen, could be made available annually in a good rainfall year, assuming the arable land total remains practically unchanged. Lucerne, according to Graven (1962), could be grown in practically all areas of the Ciskei. The chief difficulty would be to re-orientate traditional thinking in terms of growing feeds for stock use, and to use the money derived from livestock sales or produce, for the purchase of human requirements.

Fibre Crops:

The Commission (1955) makes recommendations concerning these crops especially sisal (Agave sisalana) and New Zealand flax (Phormium tenax), but these crops can really be regarded as labour intensive crops in the Ciskei, viewed from the production and local processing angle. The raw material could be processed into finished consumer goods such as baskets, mats and ropes. This processing assumes even greater importance now that severe price reductions have taken place.

Phormium tenax does best in those areas with little or no frost and a fairly even temperature, and the rainfall should be over 508 mm per year (Kirby, 1963). In view of the disappointing results with Mauritius hemp (Furcraea gigantica) and sisal, Phormium tenax is to be preferred to these latter fibre crops which should be discarded.

Cotton, in plot trials in the Middledrift District, has yielded an average of over 1, 100 pounds of seed-cotton per morgen. On a large scale, it is doubtful if an average of more than 2, 000 pounds could be obtained. Cotton requires a long growing season, about 180 frost-free days, and because of its deep taproot, is able to stand up to drought conditions better than most other commercial crops. Sandy-loam soils, especially alluvial soils, are best and a good crop can be produced with an average rainfall of 508 mm "provided it comes when needed" (Cardozier, 1957). However, American Bollworm (Heliothis armigera), cotton aphid (Aphis gossipii) and possibly other insect pests and diseases will need to be controlled (Agricultural Research Station, Barberton, 1957).

Flax (Linum usilatissimum) has given good results from the seed point of view in the Keiskammahoek area, where on three-quarters of a morgen, an equivalent of 1, 060 pounds of seed per morgen was obtained, plus an equivalent of over 2, 000 pounds of hay. Two crops per year are feasible. However, the fibre cultivars are not good seed yielders, while the seed cultivars have short stems (Sellschop, 1957). Also, retting of the plants has to be undertaken, but, unless the raw material can be processed into finished consumer goods locally, so that the maximum number of Bantu can be employed, it is doubtful if there is justification for the production of such non-food crops. The potential oil and oilcake derived from such undertakings, should, however, be borne in mind. Kirby (1963) considers flax to be a difficult crop to grow successfully in that seedbed preparation and cultivation must be at a high level and proper crop rotation systems need to be practised. The plants are also highly dependent on surface soil moisture (Klages, 1954).

Oil-bearing Seeds:

As these compete with food-crops for available arable land, justification in terms of higher economic returns, needs to be produced.

Linseed (Linum sp.):

The equivalent yield per morgen, mentioned earlier, was 1, 060 pounds of seed, and while this is promising, Sellschop & Leviseur (1957) indicate that 1, 600 pounds per morgen can be considered to be good. However, it provides by-products suitable for animal feeding purposes such as hay and oilcake meal.

Castor Beans (Ricinus communis):

Could also be considered, but the dwarf cultivar requires 120 days and the hybrids up to 200 days of warm, frost-free weather. Yields of 1, 000 to 2, 000 pounds of shelled castor beans are possible per morgen (Visser, 1957).

B. Irrigated Crops and Irrigation Schemes:

Existing yields and estimated potential yields are shown in Table 58.

Cotton was grown on one morgen trial plots at Middledrift and yielded up to 6, 000 pounds of seed-cotton per morgen (District Agricultural Officer), and gave a net return of nearly R300 per morgen. On a large scale it is doubtful if the average would exceed 4, 000 to 5, 000 pounds considering the necessary standard of supervision required. This crop has a great potential in the coastal areas where irrigation is possible, since not only one-third of the total weight of the seed-cotton is lint, but oil and cottonseed-oilcake meal can make a substantial contribution to border industries and the livestock industry.

It is interesting to note that in an African irrigation scheme in Rhodesia, average maize yields were 28 bags per morgen, wheat nearly 7 bags, beans

TABLE 58: EXISTING AND ESTIMATED POTENTIAL AVERAGE CROP YIELDS PER MORGEN UNDER IRRIGATION

Crop	Existing Average Yields per Morgen	Estimated Potential Yields per Morgen
Maize	42 bags	60 to 70 bags
Wheat	8.96 bags	15 to 18 bags plus
Roots	1.69 tons	10 to 12 tons plus
Lucerne Hay	4.41 tons	8 to 9 tons

approximately 14 bags, and cotton 5, 180 pounds per morgen. Gregory (1967) points out that this scheme has not realised the full potential, the problem being basically a human one, "not so much of ignorance as one of persuading people with a long tradition of subsistence agriculture, who 'put a high premium on leisure', to practice to the full what they know and what others are ready to reveal to them, and to make greater use of the available facilities".

Irrigation Schemes - Present and Future:

According to the report of the Committee appointed to investigate the future water requirements in the Ciskei (File N 512 - 13/2/67), the total possible area which can be irrigated is 19, 000 morgen, compared with the present 735 morgen. This does not include the numerous smaller, supplementary irrigation schemes which could be developed, and which, at a conservative guess, amount to 1, 000 or more morgen. The deep pools in the Kwelega River for example, could be used for supplementary irrigation purposes, and the local Agricultural Official, estimates that up to 100 morgen could possibly be irrigated. Conservation works, for example at Herschel, could be used until silted up, providing that a co-operative pumping service could be developed. Mgwali Reserve has several dam sites, and such dams could be utilised for supplementary irrigation purposes. Goshen Farm in the Cathcart District, also has possible irrigation sites. Although the cost factor for development of these smaller schemes would be high, in the long run the Ciskei would benefit handsomely in terms of food production and human and animal carrying-capacity. The future agro-potential of the Ciskei is inexorably bound to its irrigation potential, and this in turn, means that the necessary storage dams and canals and pumping stations must be built, and that maximum and efficient use will need to be made of all available and suitable, irrigation land. The use of overhead irrigation, although costly, could bring greater areas under irrigation, and the cost of operation could be reduced if run on a co-operative basis, and in conjunction with hydro-electric projects where-ever possible, even if only sufficient electricity is generated to pump water to the irrigation sites.

The question of the most suitable crops to grow, needs to be thoroughly investigated. Table 59 indicates the total possible land that could be brought under irrigation on a permanent basis, and is based on information received from the Regional Engineer for the Ciskei (Jordan, 1968). Full soil surveys have not yet been completed in some areas, or commenced in others, but the total suitable area is as estimated below.

TABLE 59: ESTIMATED PERMANENT IRRIGATION POTENTIAL OF THE BANTU CISKEI [1)]

District	Present Area - Morgen	Additional Possible Area - Morgen	Area or Location	Water Source
Herschel	nil	1,500	Upper Telle	Telle River
		400	Tyinindini	Tributaries of Telle River
		1,500	Sterkspruit	Blikana, Sterkspruit & Pelandaba Rivers
Glen Grey	nil	300	Mbinzana	Quamata Dam
		4,500	Bolotwa & Mbinzana	White Kei River
		1,000	Lady Frere & Cacada	Cacadu River
Whittlesea	380.5	200	South-east Locations	Oxkraal River
Victoria East	nil	200	South-east Locations	Tyumie River
		200	Sheshegu	Kat River [2)]
Middledrift	14.5 (20 Trust)	20 +	Ncera	Ncera Stream
		3,000 +	Fort Cox to Ann Shaw	Keiskamma River
		500 +	Ann Shaw to Dankden-Gouwerneur	Keiskama River
Keiskammahoek	200	60 +	Cata	Cata River
		600 +	Mnyameni	Mnyameni River
		20 +	Hamans & Ngudhle	Tributaries of the
		2,000	Lenye, Rabula & Zantokwe	Keiskama, Woolf & Rabula Rivers
Stutterheim	nil	50	Wartburg	Toise River
King W. Town	139	possible extension	Zwelitsha	Good Hope Textile Factory - Buffalo River

TABLE 59: (Continued)

District	Present Area - Morgen	Additional Possible Area - Morgen	Area or Location	Water Source
Peddie	nil	3,000	Tyefu's	Fish River
East London	nil	300	R. A. 33 near Hamburg	Keiskama River
CISKEI TOTAL	735	19,250		

1) Based on information from the Regional Engineer and on a Report on the Keiskama River Development - File N 8/20/2 of 7/12/65.

2) Depends on the flow available after use by European farmers up-river, and pumping would be necessary.

As in the case of King William's Town irrigation scheme, where partially purified effluent is used, re-use of water from towns and factories after treatment, as indicated by Stander & Funke (1967), for industrial and irrigation purposes, could boost both industrial and food production. Burger (1968) expresses the opinion that a major extension in food production will have to be contributed by future irrigation schemes to meet the needs of the increasing population, and also, points out that 77 per cent of the crude protein in human diets originated from plant sources. Weitz & Rokach (1968) recommend that where water is restricted in supply, only high value crops, such as fruit and vegetables, should be irrigated.

Kokot (1967) however, feels that irrigation is not necessarily the answer to increased crop production in South Africa, and proposes that industrial progress should not be sacrificed because of water shortages, while water is being used for irrigation purposes. The latter, he feels, is an expensive inducement to keep people on the land. Re-cycling and re-use of water, which means that the siting of towns and industrial areas where irrigation can be undertaken so that full re-use of the waste water can be made, is one answer to the problem. However, if the water running to waste from the Orange River into the Atlantic Ocean is any guide, there is more than ample water to meet all requirements in South Africa. As Tupholme (1966) indicates, the water emerging from the mouth of the Orange River over a period of a year, is sufficient to meet the needs of the Witwatersrand for a period of 30 years. It is also interesting to note that some 64,000 acre feet of silt is estimated to be lost each year from the Orange River.

In Matabeleland, a system of earth dams, built in the natural drainage-ways, were used to collect water for the irrigation of small patches of fodder. The idea could be usefully employed in the drier areas of the Ciskei. Earth dams could be used to catch and store water, and small garden patches could be cultivated in the vicinity of these dams. Such dams would enhance local water supplies, and could be coupled with local anti-erosion projects.

C. Fruit and Vegetable Production:

In the Herschel District, a small canning factory, as proposed by a previous Bantu Affairs Commissioner, could be established for the processing of both fruit and vegetables, which could be produced in increasing quantities over the years, given the necessary encouragement and guidance. Such a factory, it is felt, could operate on a profit-making basis, especially where vegetables could be cultivated under irrigation to ensure that the processing plant is kept in operation throughout the year. Fruit-flies are at a minimum as pigs and poultry eat all the fallen fruit, but once the pigs especially, are penned, these flies might well become a problem of some magnitude. Obviously the irrigation areas lend themselves to vegetable production, and where vegetables are grown, there appears to be a steady internal demand in existence. Fruit and vegetables are also sold on the Trust organised markets.

4.2.3 Credit Facilities:

Apart from short term credit facilities provided in the form of seed, fertilisers and other items (Commission, 1955), the Bantu farmer has to underwrite his own farming operations. Traders have also assisted in this connection in the past, but to a limited extent. Without unconditional ownership, except in the case of land abuse, of the land he farms, the Bantu farmer is most frequently unable to obtain the necessary money to fertilise and cultivate his lands properly. The Commission (1955) proposes that "planned farming units or portions thereof, as well as plots in villages and towns in the Bantu Areas should be sold to the Bantu" with full title deeds, and that this system of tenure should be substituted for all existing forms of land tenure. Such sales of farming land should be subject to sound farming practices being followed. It is further recommended inter alia, that the "one man - one plot" principle be abolished and that Bantu land boards be appointed to select propective farmers. Such proposals applied in practice, would have far-reaching affects, and only the best farmers would ultimately be retained on the land. Land could then be mortgaged to raise money, although an upper limit based on the value of the land farmed, would need to be determined so that, at this stage, the farmer could not borrow beyond his capabilities as an entrepreneur. The Commission (1955) gives full details of credit requirements.

The establishment of agricultural co-operatives or combines, modelled on that recently established in the Herschel District at Sterkspruit, would be of great value in aiding agricultural development. A European-owned company has provided the financial backing for this co-operative, which operates on a minimum profit basis. Bantu directors actually manage the concern and all items required in the area, are stocked including fuels. Other large concerns could well follow the lead of this particular company. Machinery and equipment, such as portable pumping apparatus and tractors, could be hired out together with trained personnel to operate specialised equipment, and the problem of individually-owned machinery being initially costly and subsequently poorly maintained, would not arise. The possibilities of co-operatives appear to be unlimited provided capital is available, and that entrepreneurs, who can accept responsibility, are forth-coming. Regulated or supervised credit loans, for short term financing of Bantu farmers, should be the function of the Xhosa Development Corporation or similar bodies. A Senior Agricultural Officer is of the opinion that co-operatives should be formed which could be financed by a Bantu Land Bank. Regional Authorities could have co-operatives registered in their names, and these could supply all the needs of the Bantu farmers in their regions on a hire basis in the case of tractors and implements, and on a purchase basis in the case of seed, fertilizers and other goods. This Officer further recommends that legislation be passed to enable the Bantu people to buy or sell their land rights, but such sales should be restricted to people residing in the same location. This land then assumes a commercial value which can be offered as security to the co-operative whenever working or developmental capital is required.

Co-operatives and farmers' associations appear to be a solution in stimulating greater initiative so that a much needed impetus could be given to the agricultural economy of the Ciskei, as well as to the following of approved methods of production. Senior Agricultural Officials are practically unanimous in supporting the idea that improved agricultural production techniques could be propagated through the medium of farmers' associations, and this could include co-operatives as well. In Kenya, credit facilities on a communal or co-operative basis, wereconsidered to be the solution in developing peasant holdings (Swynnerton, 1963). These co-operatives have played an increasingly prominent part in the growth of modern agriculture, but such growth has been greatly assisted by the Government's insistence that the marketing of certain products be controlled by the co-operatives (De Wilde, et al, 1967).

On the capital development side, vast sums of money need to be injected into the Ciskeian economy to develop agriculture as well as industry, and it is

here that the large development concerns have a major contribution to make.

4.2.4 The Rôle of Radio Bantu in Agricultural Development:

The current listenership, based on the 1968 daily listenership of Radio Bantu, is calculated to be over 1, 522, 000 Bantu adults, of whom about 434, 000 are Xhosa-speaking. During the six months prior to September, 1968, an average of 280, 000 letters per month were received by the Xhosa Service of Radio Bantu at King William's Town by Xhosa listeners. Since 1962, when 882, 000 Bantu owned radio sets, an amazing number of radio sets have been sold, and in 1968, the estimate was that 2, 119, 000 adult Bantu now have access to their own wirelesses (information supplied by the Assistant Director : Bantu and External Services, Johannesburg).

According to a personal communication received from the Xhosa Programme Organiser, King William's Town in August, 1968, an Agricultural Magazine Programme, broadcast on Tuesdays from eight to 8.30 p.m. and repeated again at between 12 to 12.30 p.m. on Thursdays, contains combinations of the following programme material:

(i) Agricultural talks originating from the Agricultural Division of the Department of Bantu Administration and Development.

(ii) Contributions by the Xhosa announcer covering soil conservation, soil preparation for planting seasons, planting hints, irrigation and water conservation, animal diseases and insect pests and their control, the use of quality seed, and the advantages of keeping quality livestock.

(iii) A weekly serial "The True Farmer" which portrays scientific farming methods.

(iv) Replies to Bantu farmers with problems, but relatively little use has been made of this service in the past.

(v) Interviews with progressive Bantu farmers who apply modern agricultural techniques.

(vi) Interviews with the Bantu Agricultural Extension Officers who give advice to listeners on a variety of agricultural problems.

As can be gleaned from the above, this Service could make an outstanding contribution to farming in the Ciskei especially, and reaches a large section of the rural population. Much more use could be made of this audio-medium of instruction and advice, to stimulate greater interest in scientific farming methods. Radio Bantu can thus play a primary part in realising the agro-potential of the Ciskei and other Bantu territories, but its potential in this respect, has barely been touched. It appears that the co-operatives could also stock portable radio sets for sale, apart from agricultural items and other goods, and not only help

meet the requirements of the people, but also aid in providing the means to bringing about the agrarian revolution so urgently needed in the Ciskei.

RECOMMENDATIONS

1. Sound land utilisation on an ecological, bio-economic basis is essential. This applies to both arable and grazing areas, and implies that there is an absolute minimum loss in the primary production resources, such as soil, soil fertility, and sub-climax and climax vegetation. As just less than 68 per cent of the arable land fell within the boundaries of planned locations, correct land use planning and the implementation of such plans, is obviously top priority. High animal and agronomic productivity, which is the logical outcome of correct land-use planning, is the target in the Ciskei. Animal production systems especially, should be adapted to environmental conditions in each ecological area.

2. Land tenure should be based on individual and outright ownership but that these land rights should then only be purchased by, or disposed of to people belonging to that particular location. The initial allocation of land should also be conditional on sound farming systems being followed. Land allocations should be on an economic unit basis, as defined for the Bantu areas, and this unit should be the maximum amount of farming land allowed per farmer in a region. This latter condition should apply until such time as industry and commercial undertakings have developed sufficiently to attract the surplus rural population, when true economic units could be established.

3. The allocation of more substantial funds for agricultural development is a necessary step in altering and accelerating the rate of agricultural progress in the Ciskei. Both short and long-term credit facilities should be made available immediately to bona fide farmers on a regulated basis. A Bantu Land Board or Bank, or the Regional Authorities, could organise and control the various loan schemes envisaged.

4. Agricultural education at all levels should be initiated on a wider and ecological basis. Each Bantu ethnic group, where-ever possible, should have facilities for the training of students in agriculture at university, college and school levels. Each main ecological area requires a demonstration/research farm where the agro-potential for that particular area can be established, where efficient animal production can be demonstrated and where local farmers can gather for discussions, lectures and film shows. The work undertaken by these farms should be of a highly practical nature and should concern the problems faced by farmers in each ecological zone. As trained men become available, so the number of farmers per each agricultural extension officer should be reduced until there are approximately 250 to 300 farmers in each extension ward. In the backward areas, this number could be still further diminished

until there are between 150 to 200 farmers. Where trained personnel are not readily available, or where finances limit the total number of officers in the field, travelling teams of extension workers could be employed to concentrate on an area at a time until a break-through has been achieved. The same team could return to such areas as and when required, to correct malpractices which have arisen, to consolidate improvements already effected, and to aim at further improvements.

The advocation of a general degree course at Bantu universities, other than Fort Hare, means that only a Department of Agriculture is required as contrasted to a Faculty of Agriculture. The syllabi could be tailored to fit in with other available courses at the university concerned.

5. The development of labour-intensive industries and commercial centres within and without the Bantu areas at logical sites, is urgently needed to relieve human pressure on land. Industrial development must be considered to be complementary to agricultural development. Additional land will also be required to be made available to Bantu farmers as soon as possible.

6. Organised marketing facilities need to be further developed and expanded so that each important productive area is served by a market under the direct control of agricultural officials. Such marketing facilities could be satisfactorily combined with a local co-operative and other commercial facilities to satisfy all needs of the population, and to act as livestock and produce disposal centres. All co-operative facilities should be under the control and direction of men of integrity and ability to prevent any abuse from occurring.

7. Animal and crop production schemes communally orientated, and more especially in the irrigation and potential irrigation areas, need to be fostered and intensified to stimulate interest and activity and to initiate immediate increases in food production. Because of their higher productive capacity and their considerably higher population carrying capacity, the development of potential irrigation sites cannot be over emphasized. It is proposed that beef weaner and fattening schemes be encouraged, the former in the predominantly grazing areas, and the latter in the cropping areas where rainfall is not a limiting factor of any consequence. The beef fattening scheme advocated is similar to that in operation in Malawi. Co-operative dairy schemes could be extended to advantage, but, at the same time, the Bantu population should be encouraged to make greater use of dairy products as their standard of living increases to prevent the all too prevalent surpluses on the markets. Crop production schemes based on communal effort and under the guidance of agricultural officials, could play a major part in developing agriculture, especially if such schemes are supported by sufficient credit facilities to enable correct land-use principles to

be employed. Specialisation in both animal and crop production is a logical development of the use of improved farming practices.

8. Associated with animal production schemes, is the need to investigate the advocacy of additional breeds to meet the varying ecological conditions in the Ciskei. Comparative performance trials could be undertaken by the research and demonstration farms in each main ecological region. However, as the human factor, associated with nutrition and management of livestock, is a considerable limitation in production, these aspects need urgent attention. Education of the adult, rural population by extension services, has already been highlighted. Improved nutrition and management practices, universally employed, will result in significant increases in the amounts of livestock commodities produced per animal and per unit area. Fodder banks, in the form of hays or fortified supplements, are required to be established in every tribal authority area, and should be under the jurisdiction of these bodies. The processing of maize and sorghum stover and other crop by-products and roughages into fortified feeds for livestock, should be seriously considered with a view to the establishment of the necessary processing plants situated at strategic centres. The establishment of lucerne under dry-land conditions is advocated, as this will materially boost animal production.

9. Readily available co-operatives carrying the necessary farming items, such as seeds, fertilizers, medicines and inoculants, and with a trained agriculturalist on the staff of each, would result in increased output in many areas. As mentioned, such co-operatives could function on a tribal authority basis.

SUMMARY

1. The aim of the study was to record the existing animal production practices, and to describe the existing agricultural structure and the production limitations as a basis of the assessment of the agro-potential of the Ciskei.

2. A survey of the twelve districts involved, was undertaken and as many agricultural officials in these districts and at King William's Town head-office, were interviewed and consulted. All available literature and records were investigated.

3. Historical literature was consulted to provide the necessary background to all possible phases of Xhosa and Fingo subsistence agriculture from the time of the early Portuguese reports up until recent times. This information indicates that numerous changes have been made in agricultural methods employed by the Bantu, as well as in their customs, and these are practically all due to European influences under a process of acculturation. A shifting-type of cultivation has been in existence from the earliest times, until boundaries were determined in the latter half of the nineteenth century.

4. A detailed description of the geographical areas is presented in the text, the four zones totalling 1, 061, 491 morgen, of which 4. 2 per cent is privately owned by Bantu, the remainder being South African Bantu Trust property. Over 55 per cent of the area receives 25 inches (635 mm) of rain and over.

5. The human population totalling 404, 818 souls, is predominantly Xhosa with a smaller proportion of Mfengu (Fingos). The possibility of a 35 per cent under-estimate of the population exists. Arable land per capita of the rural population is 0. 352 morgen. Traditional and present day diets are mentioned, and the main change has been that sour milk has been replaced, to a large extent, by cereals. Average estimated educational levels lie between standards two to four. Malnutrition is rife amongst the Bantu in the Ciskei today.

6. Animal husbandry is generally at a low level, and while the Bantu have long been associated with livestock, they cannot be referred to as being stockmen in the European acceptance of the word. Using the modified Talbot system of calculating livestock equivalents, there were 342, 253 mature livestock units in the Ciskei, and the grazing pressure averaged one unit per 2. 51 morgen. It is estimated that there were not more than 10 per cent of the land and livestock owners in the Ciskei who can be regarded as "progressive". The Xhosa consider cattle to be the most cherished of their possessions, and these play an important part in their social, economic, ritual and spiritual life. Cattle have been used in the payment of lobola or bride-price but a change over to a cash basis seems prevalent. Cattle are of a heterogeneous type, but the encouragement and sub-

sidisation of Brown Swiss sires by the authorities, has tended to increase the number of exotic/native cross-bred progeny. A homogeneous and productive cattle population throughout the Bantu Ciskei is the aim of this policy. The Bantu farmers have many arguments against the Brown Swiss breed. Breeding data is presented, and in some locations where late castration of the bull-calves is practised, inbreeding appears probable, although its effect is probably minimized because of the continuous replacement of animals that die. Veld and browse provide about 99 per cent of the diet of cattle, the remainder being crop residues. Very little provision is made for winter feeding, even in the irrigation areas. Management is generally at a low level, being of the traditional type, while the annual incidence of disease together with no, or ineffective, treatment, is responsible for lowered production. Mortality in normal years lies between five and six per cent, but can be as high as 50 per cent in a drought year in some locations.

Mature native cattle average about 820 pounds liveweight, while the Brown Swiss cross-breds have averaged 1, 040 pounds. At the East London abattoir, Bantu-origin cattle averaged 380 pounds for cold, dressed carcasses, and in 1967, 90 per cent of these carcasses graded thirds and fourths. Cattle dying in the locations are generally consumed by the local population. The popularity of stock sales is stressed by the large increase in numbers sold over a ten-year period. The incidence of bovine cysticercosis in Bantu stock at the abattoir averaged 7. 53 per cent compared with the European cattle incidence of 4. 87 per cent.

Co-operative dairy schemes operate throughout the Ciskei on a basis of separating the milk and selling the cream. Fresh milk is sold by a few of these dairies, notably Jan Tshatshu in the King William's Town District, where cows averaged 7. 86 pounds of milk daily on irrigated pastures. Dryland production averages 2. 77 to 6. 49 pounds per cow daily. A high proportion of the calves die from overmilking of the dams each year. Nearly 38 per cent of the total cattle population are oxen, and these are maintained chiefly for land cultivation purposes.

Sheep of the Merino type, are kept and averaged 50 to 90 per cent lambing percentages in the different localities. Nutrition and management are much the same as for cattle. Wool yields average between three to four pounds per sheep, the wool being fine (64's to 66's), but being of an inferior quality and mostly short wool. Large numbers are sold on the stock sales, but from a ritual viewpoint, sheep are considered unsuitable as they do not cry out when being slaughtered.

African goats predominate, but the Angora goat and Boerbok are gaining in popularity. Goats are run together with sheep and are important from both

a ritual and a meat point of view.

African Hut-pigs are the main type in the Ciskei and are scavengers, the latter being the reason why the incidence of cysticercosis is as high as 13.38 per cent of all Bantu-origin pigs.

Equines and poultry, comparatively speaking, are relatively unimportant, although the horse plays an important rôle in transportation and recreation, and it is generally considered that the fowl provides a good deal of the meat consumed in some districts. The "Native-type" horse and the African Hut-fowl predominate.

7. Crop production plays an important, although secondary, part in the lives of the Bantu farmers, and only 13 per cent of the total area is arable, of which 67 has been planned. Dryland cropping is most common, but there are four irrigation schemes in existence. Maize, sorghum and wheat are the important crops, and in all cases, low yields are obtained. Oxen comprise the chief draught power when ploughing, with tractors accounting for about one-third of the area ploughed. Just over half of the veld is under a system of controlled grazing, while soil erosion is a serious problem in many areas. Vegetable, fruit and forestry generally play a small part in the life of the farming community, the forestry side falling under the Trust to a major degree.

8. The limiting factors in animal, crop and pasture production, are indicated in detail. In animal production, low yields are due primarily to poor nutrition and management, and in some locations, to inbreeding to a lesser degree. In crop production, natural factors, low soil fertility, erosion, poor cultivation practices, and the negligible use of fertilisers and organic matter, are, inter alia, responsible for low yields. The relative scarcity of organised markets, inadequate development of water resources, the existing limited credit facilities, lack of capital and the predominating form of land tenure, are all factors which affect animal and crop production. In general, the human factor is considered to be the main limiting factor in production, since the Bantu farmer displays his greatest deficiency in entrepreneural ability.

The agro-potential of the Ciskei is assessed, and it is apparent that a highly accelerated, evolutionary approach is required. The animal potential is high providing that improved nutrition and management practices are introduced and that breeds are used to best advantage on an ecological basis. Many production schemes are indicated but these require the production and utilisation of supplementary feeds to even out the nutritional level in the dry periods and to encourage the use of improved production techniques. The growing of lucerne under irrigation and dryland conditions, together with the processing of crop by-products into fortified feeds, can give a tremendous boost to animal pro-

duction in the Ciskei.

The agronomic potential, in terms of average yields per morgen, can be assessed as follows: maize - 12 to 15 bags; sorghum - six to eight bags; wheat - five bags; lucerne hay - three tons. Most crops growing under irrigation, could have their averages nearly doubled, and the area under irrigation, 735 morgen, could quite likely be increased to 19, 000 morgen, not including supplementary irrigation schemes. The grazing potential of the high rainfall areas could be assessed at two to two and a half morgen per livestock unit. Where veld is fertilised, animal production could be increased three to four-fold.

In realising the agro-potential of an area, education at all levels, becomes of prime importance, and this includes the provision of sufficient practical and well-trained agricultural extension officials in the field. Credit facilities, and out-right ownership of land are necessary, and agricultural co-operatives and farmers' associations are seen as mediums through which higher levels of production can be achieved. Human potential can be realised mainly by education and example and it is here where the progressive farmers have an important part to play. Industrial development is needed to relieve the pressure on land, so that only the true farmer remains on the land. The existing "dual society" presents difficulties on both the agricultural and industrial sides.

A system of training farmers is mentioned, together with the rôle that Radio Bantu is playing in agricultural development.

A list of recommendations is appended, and deals with ways and means of bringing about an agrarian revolution.

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