

A SAMPLE SURVEY  
OF  
FARMING TYPES  
IN THE  
DIVISIONS OF ALBANY AND BATHURST.

BY

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INTRODUCTION.

It is the purpose of this thesis to examine some of the broad relationships which exist between different land use types and farming practices on the one hand and the geographical environment on the other. The enquiry is confined to the study of a number of farm units which have been selected within the area enclosed by the Divisions of Albany and Bathurst situated in the South-East coastal belt of the Cape Province. (Map 1).

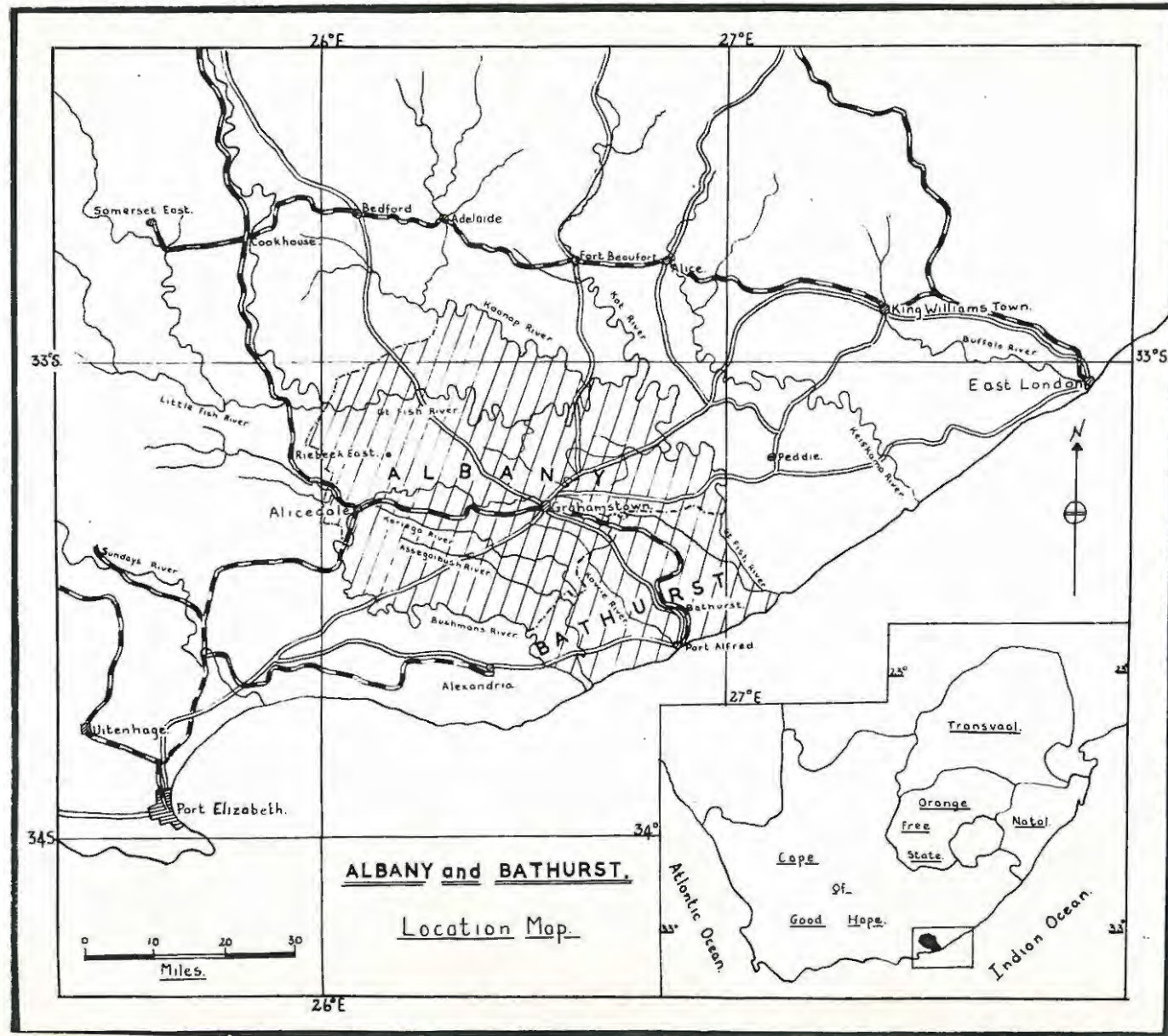
The procedure adapted conforms broadly to that of a project carried out in South America by Professor R.S. Platt of the University of Chicago and embodied in his book "Latin America, Countrysides and United Regions." (Platt 1942).

Platt's project, he notes, "consists of a collection of simple field studies in a frame of complex generalisations." It does not aim to give a complete geographical account of the regions he selected for investigation, but is an attempt to enlarge geographical understanding of the respective areas. It is a "consignment of material to be used in building up a comprehensive structure - generalisations for an outline of design and detailed studies as building stones to be fitted into place."

This present work, in accordance with Platt's project, is a search for knowledge of the region selected for investigation. It has been a search carried out both in the library and the field. Platt observes that in the library available records are often incomplete for a comprehensive geographical understanding of a region while, moreover, it is not always possible in the field to evolve any simple formula for acquiring an understanding of the landscape by direct observation, even though many facts may be observed.

The latter problem is the outcome of what Platt has named the "Geographer's dilemma", where a single worker tries to comprehend large regions while seeing at once only a small area.

# MAP I.



He observes that the complex character of a region, often complicated by "human appurtenances", which are necessarily studied for complete geographical understanding, cannot be immediately and totally perceived by a single pair of eyes.

Platt points out that the problem is not solved "merely by withdrawing to a great height, in reality or imagination, thus extending the view over more area but losing details, some of them essential to geographic comprehension". "Nor is it solved by counting items and totalling them for the region in arithmetical generalisations". He observes that the complexities of a region are not of an amorphous mass but are instead part of a definite pattern in which details fit together in significant combinations. The geographer should not, however, merely recognise individual items and details, but should view such details in association or grouped in relation to each other. An example of the latter is given by Platt who writes that we should have "recognition, therefore, not only of pounds of coffee, but also of plantations (in which coffee is associated with land types and farm systems) and of national and international economics (in which plantations function)".

In his attempt to solve the geographical problem Platt suggests that a map may be drawn whereby the areal pattern is reproduced so that the region is visualised at a glance. He notes, however, that such a map will solve only those problems of which we have already obtained a geographical knowledge. For obvious reasons it will not clarify those situations which arise when field observation first begins in regions not yet fully understood and where features that may be significant for regional understanding must still be recognised and selected to be mapped.

To a greater or lesser degree the area included within Albany and Bathuret, in common with regions in South America, has been mapped and its major features recorded. The work of recognising and recording the smaller features, however, on which the character of the area depends, has thus far been largely neglected. It should be observed, therefore that, as in the case

of Platt's project, this work is in the nature of a reconnaissance, to recognise and record some of the important details which characterize the area. In this respect Platt notes that "the field studies focus attention particularly on basic units of human occupation, on rural units of economic organisation as reflecting, more closely than other common establishments, the characteristics that distinguish one region from another".

It is from the theme discussed above that we draw our justification for an enquiry of this type which at the present state of knowledge would appear to give the maximum satisfaction in an attempt, by a single worker, to comprehend the geography of the area selected for investigation.

At the outset of the work, however, there arose the major problem of defining the area for which detail was to be collected. The area selected and enclosed within the Divisional boundaries of Albany and Bathurst is by no means a natural or a functional geographic unit. It includes within its limits several sub-regions which are portions of larger regions extending beyond the boundaries of this area. These larger regions, moreover, are portions of the area known popularly in South Africa as the Eastern Province. The latter, as Rennie (1945) has described it, is in fact itself not a natural geographical region in many respects, both as regards physical and cultural aspects. It is instead more in the nature of a broad transition zone from West to East across the South-Eastern quadrant of the Union.

Within limits set by time and opportunity, therefore, it has been necessary to select a region of moderate extent. Thus it was decided to confine the study to the area defined by the political boundaries of Albany and Bathurst even though these may not be considered entirely satisfactory in the light of the observations made above.

In compiling material for the thesis, the bias has

been/.....

been placed on a study of the present cultural landscape. This is expressed as the inter-relationship between human and physical elements, the former being of greater importance, but being studied only after as thorough a knowledge as possible of the latter has been acquired.

The detailed field studies are prefaced, in this work, by brief glimpses of the area as a whole. In these introductory chapters is included a section on some of the major features of the natural environment such as the relief, geology, climate and natural vegetation. This is succeeded by a discussion of the broad facts of human occupation and activity, which are related to the agricultural and pastoral geography of the region. This chapter is in the nature of an historical survey of those activities traced from the arrival of the British Settlers in 1820 to the present day. Following on these chapters, giving a generalized genetic picture of the area, are the detailed field studies of six farm units. These have been selected to represent the major farming activities at present being carried on here.

It must be observed at the outset, however, that the units studied in the field are few and imperfectly spaced and by no means cover all farming activities encountered in the area. Within the limits set by time and opportunity, however, each has been chosen to be as far as possible representative of the particular land-use type to which it is devoted.

Although a certain degree of selective screening was possible the ultimate choice of study-sites was governed largely by opportunity and it should be stressed that the landscape of none of the farm units selected for study may be considered as entirely typical or fully representative of other farm units of a similar type within the area. The reader should, therefore, not view the detailed field studies as presenting a fixed pattern of each of the several land-use types discussed, for the region as a whole. It should be borne in mind that each farm is an individual living organism, the growth and character of which/.....

(v)

which is largely determined by the nurture it receives at the hand of its farmer. Each farm presents a unique landscape which is a complex of interwoven factors, the pattern of which has its origins in the fertile resources of man and his reactions to his geographical environment.

FIELD PROCEDURE:

Field trips were undertaken at intervals during the period extending from August 1952 to August 1953, in which time 12 trips were undertaken, each farm unit being twice visited. The total time spent on individual units varied from 10 to 14 days.

Since large-scale base maps are not available, in each case an outline map of the farm unit to be studied was drawn. These maps were constructed in the laboratory from a mosaic of aerial photographs, to the scale of about 2 inches to the mile, prior to the first field trip. These maps used in conjunction with the aerial photographs were of inestimable value in plotting distributions and locating in the field important features in the landscape. Moreover, they removed the necessity for laborious and time-consuming plane-table mapping of each farm unit. Plotting further information on these field maps was done either by careful field sketching or by measurement where areas, distances or directions were involved. Elevations of prominent features in the landscape were taken using an Abney Level and contours interpolated between these spot heights as accurately as possible. In each case two maps, one showing relief and undifferentiated land-use and the other details of land usage, have been constructed from these field maps. They are presented here as visual aids to the understanding of the text.

In the field the first few days of a visit were profitably spent in observing, recording and mapping the important features and in gaining a first-hand acquaintance with the landscape.

Thereafter the procedure was to draw up a detailed

questionnaire/.....

questionnaire. This took into account both features which could be directly observed and such factors as are not actually apparent from direct study of the landscape but which are relevant to further geographical understanding. In all cases valuable suggestions and additions in the compilation of these questionnaires were put forward by the farmers.

Thereupon by a verbal question and answer method the necessary detail was elicited and recorded. As a necessary precaution questions of a leading nature were avoided as far as possible so as to eliminate the danger that pre-conceived ideas of the investigator might colour replies to his enquiries. From the results thus obtained the detailed accounts of the farm units were written and are herewith presented.

THE DIVISIONS OF ALBANY AND BATHURST.

INTRODUCTION:

The Divisions of Albany and Bathurst together cover an area of approximately 2,300 square miles in extent, situated in the South East Cape Coastal Belt, the maximum dimensions being approximately 60 miles East - West and 50 miles North - South and largely occupying the northern half of the area included between 26° and 27° East longitude and 33° and 34° South latitude. The Division of Bathurst, situated in the South-East coastal portion of the region, covers roughly one-third of the whole area and possesses a little over 30 miles of coastline.

The Bushmans River from Alicedale to its mouth forms to the westward and southward a natural boundary to the area, and separates it from the Division of Alexandria. To the north of Alicedale the boundary is an artificial one running roughly north-south to the confluence of the Great and Little Fish rivers and separating Albany and Somerset East. From this point the artificial boundary turns north eastwards to a large bend in the Koonap River and separates Albany from Bedford. The remainder of the boundary is a natural one following the Koonap to its confluence with the Great Fish River and thence along the latter to the sea. This portion of the boundary separates the area from Fort Beaufort, Victoria East and Peddie. The remaining boundary is the sea. For the most part, therefore, it may be observed that the area possesses natural bounding lines.

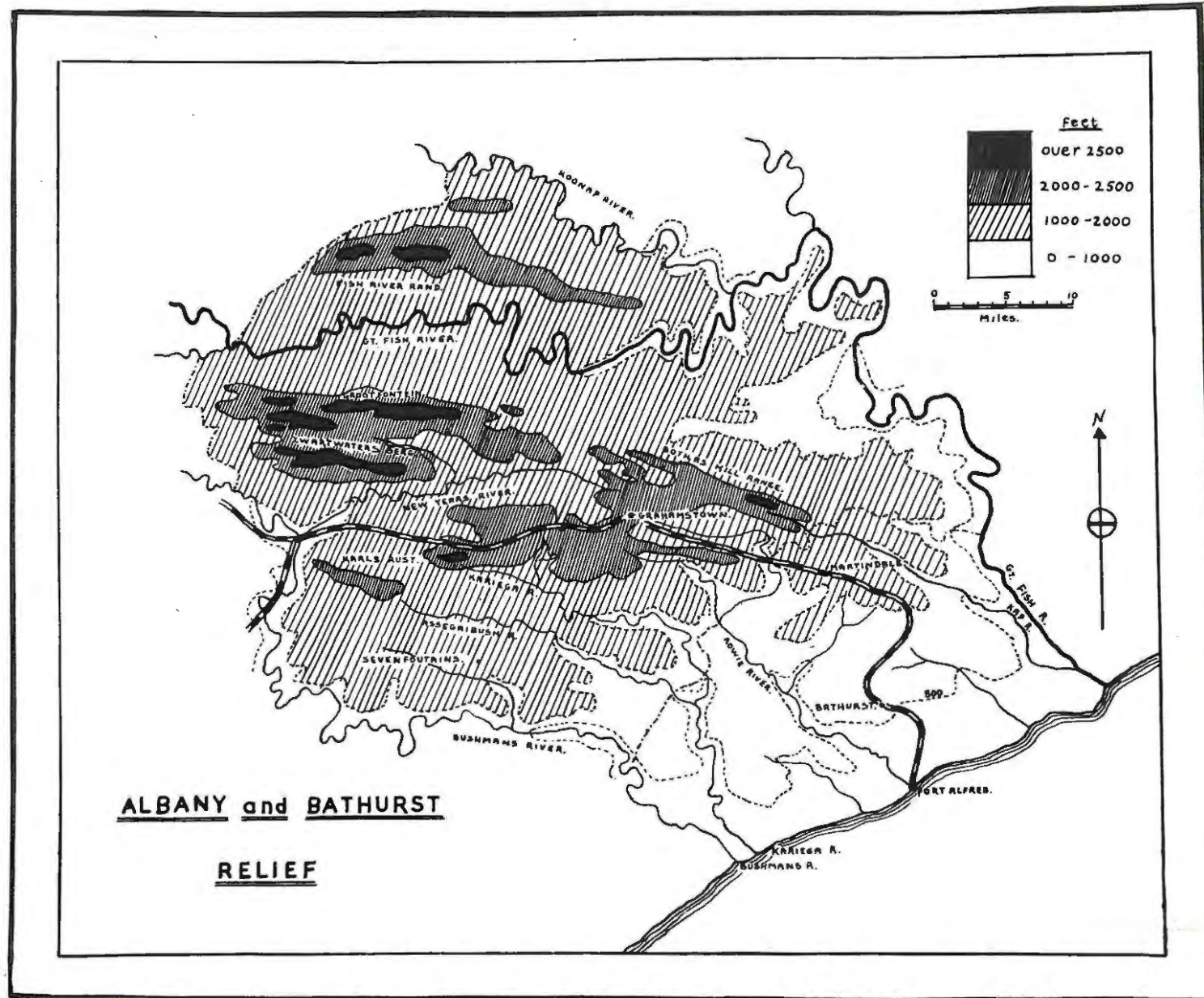
RELIEF AND GEOLOGY:

The area is characterized by considerably diversified relief with a range of altitude of over 3,000 feet rising from sea level to a maximum height of 3,065 feet at the Grootfontein Trigono-metrical beacon to the north of Riebeek East.

On a basis of relief, the area may be divided roughly

into/.....

MAP 2.



into three E-W aligned regions. - the Great Fish River Valley to the North, a tract of sub-parallel ridges and valleys in the centre, and a peneplaned coastal belt to the South.

The central highland region, known collectively as the Albany Highlands, consists of a series of sub-parallel ranges and valleys trending roughly WNW - SSE across the area. These include an unnamed range, of which the Grootfontein beacon is the highest point, and the Bothas Hill range which rises to 2782 feet at Drivers Hill, in the North. Another, the Zwartwatersberg just to the South of Riebeek East rises to a height of 3,013 feet and a fourth range culminates in Karls Rust at 2,734 feet, and passes just to the South of Grahamstown.

Northwards from the Grootfontein and Bothas Hill ranges, the altitude drops into the broad valley of the Great Fish River to below 1,000 feet, while in the region between the Great Fish and Koonap rivers the altitude rises again to the Fish River Rand at an elevation of some 2,400 feet. Eastwards the ridges drop gradually down to the Great Fish River and pass imperceptibly into peneplanes before the valley is reached.

Southwards from the central highland region the relief is seen to consist of a series of dissected peneplanes gradually dropping in altitude towards the coast. Among the most conspicuous of these peneplanes are the flats between Sevenfountains and Salem at 1,300 to 1,400 feet, the Martindale flats at 1,000 feet, the peneplane to the East of Bathurst at 750 - 800 feet and the coastal flats north of Port Alfred at 350 feet. These peneplanes are not horizontal but usually slope very gradually towards the coast.

DRAINAGE:

The Northern and North Eastern portions of the area are occupied by the drainage basin of the Great Fish River and

its tributaries. As may be observed from Map No.2 these rivers have extraordinarily meandering courses for the most part, except for the lower 15 miles of the Great Fish River, which is relatively straight. With the exception of its lower reaches below Hunts Drift, the Great Fish River runs in a broad valley which, according to Mountain (1937), is "singularly deficient in anything like extensive flood terraces", with the river bed occupying entrenched meanders. The only important tributary of the Fish actually flowing through the area is the Kap River which rises near Drivers Hill and flows South Eastwards through a steep sided valley to join the Fish almost at the mouth of the latter.

The Bushmans River system drains the SW & W borderlands of the area. This river also has a highly meandering course and is joined at Alicedale by the westward flowing New Years River which rises near Grahamstown and in places winds through precipitous gorges.

South of the central highlands the country is drained by a number of rivers flowing independently Southwards to the sea, the chief of which are the Kowie and the Kariega with its tributary the Assegaibush. These rivers are all entrenched in meandering valleys cut into the elevated peneplane surfaces of this region. These rivers as also the Bushmans and Fish Rivers have tidal estuaries. The Bushmans River is tidal for some 25 miles inland, the Kariega for 10 and the Kowie for 12 miles. The Great Fish on the other hand is tidal for only 3 miles upstream from the mouth.

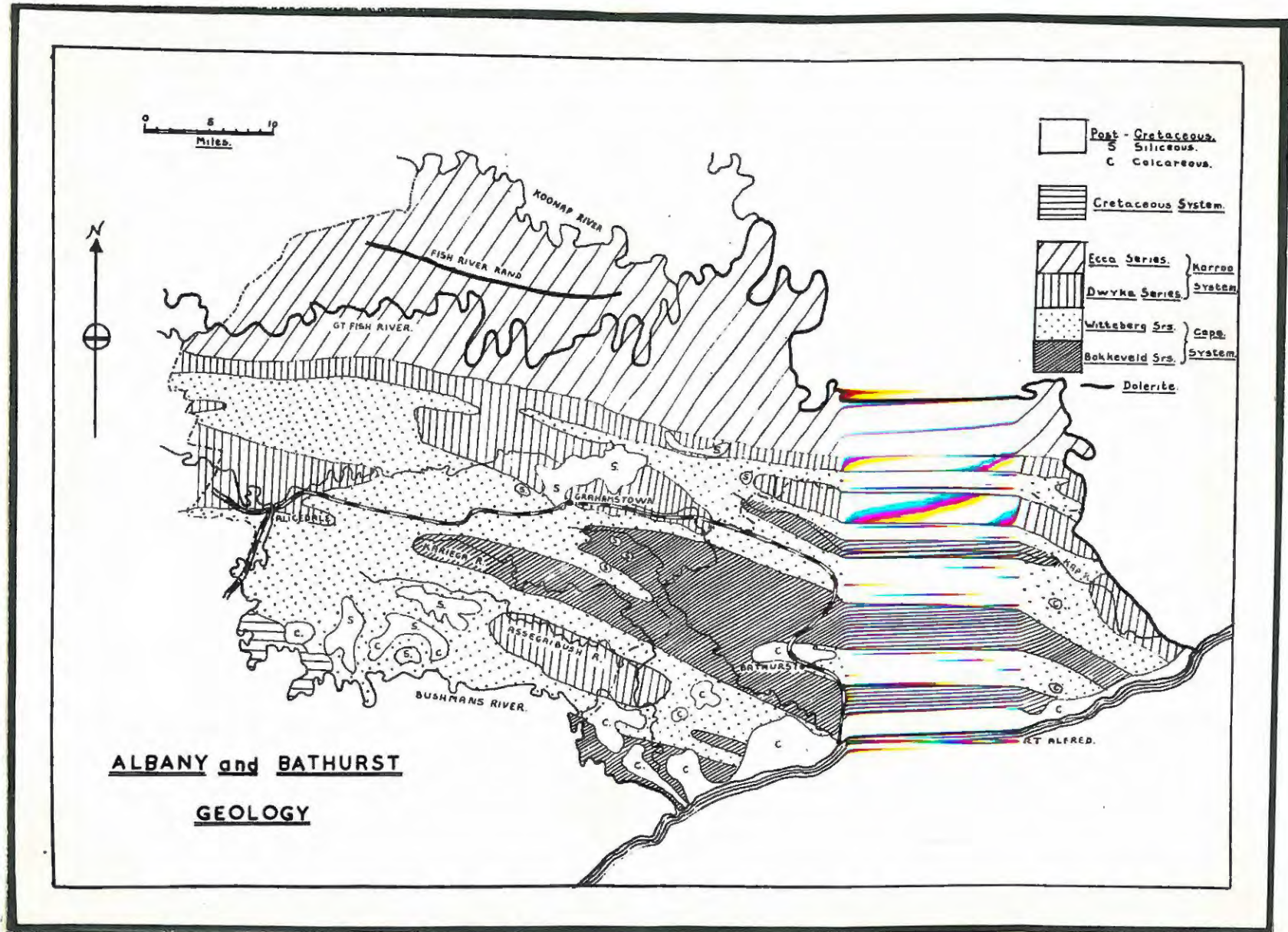
#### GEOLOGY:

Geologically the area is situated along the Northern margins of the Cape Fold Belt at its Eastern extremity where it disappears into the Indian Ocean. It may be noted that the threefold orographic subdivision of the area is to some extent

reflected/.....

# MAP 3.

After Mountain 1937.



**ALBANY and BATHURST**  
**GEOLOGY**

reflected in the geological structure. The drainage basin of the Great Fish River, for example, has been carved out of beds of the Karroo System which have been only slightly involved in the Cape foldings. The central highland region shows typically folded formations about an W - E axis while the southern region of peneplanation consists structurally of a similar series of folds but here truncated by peneplaned surfaces which still carry Post Cretaceous deposits over wide areas. The accompanying map 3 shews the geological formations, partly generalised for simplicity. The formations belong largely to the members of the Cape and Karroo Systems with Cretaceous and Post Cretaceous formations occupying relatively minor areas.

Brief Survey of Geological Formations.

Cape System: (Devonian - Lower Carboniferous).

(a) BOKKEVELD SERIES:

These formations, consisting mostly of shales and thinly bedded sandstones, occupy a large part of the basins of the Kariega and Kowie rivers as also a smaller area of the Kap River basin and the lower Bushmans and Kariega River basins. The outcrops are usually rather weathered, giving rise to reddish clayey soils generally well covered with valley bush.

(b) WITTEBERG SERIES:

Overlying the Bokkeveld is the Witteberg Series composed of fairly massive quartzitic sandstones and subordinate micaceous shales. These formations make up the series of mountain ranges in the central portion of the area and also the greater part of the peneplaned region to the South. They generally give rise on weathering to grey unfertile sandy soils locally blackened under moist conditions.

Karroo System: (Upper Carboniferous to Permian).

(a) DWYKA SERIES:

The Dwyka Series which overlies the Witteberg Series conformably to the North, is subdivided into the Lower Shales, Tillite and Upper Shales. On the whole the Dwyka Series forms the lowlying land in the valleys of the New Years, Assegaibush, and Blaauwkrantz river valleys. All the members give rise to brownish and reddish clayey soils, becoming progressively more drab in colour with increased distance from the sea, due presumably to diminishing rainfalls.

(b) ECCA SERIES:

Succeeding the Dwyka Series is the Ecce Series consisting of shales of varying character, interbedded with bluish sandstones and is found only in the Great Fish River Valley in this region, the beds dipping gently towards the North. The soils are generally rather thin, drab and loamy, whilst in places of particularly low rainfalls there is evidence of lime accretion on the soil surface.

CRETACEOUS SYSTEM:

A small stretch of Cretaceous formations occurs in the S W part of Albany where the Port Elizabeth - Grahamstown road crosses the Bushmans River. The rock consists of clays and greenish sandstones.

POST-CRETACEOUS FORMATIONS:

These formations are found only as thin outliers resting as isolated patches on the various peneplaned surfaces. The deposits of the Great Fish River Valley to the North of Drivers Hill, those on the Grahamstown peneplane and those on the Salem flats consist of surface quartzite or silcrete which usually carries a cover of thin sour sandy soils. Nearer the coast the deposits appear to be predominantly calcareous in nature and although probably a false-bedded calcareous sandstone originally, they are now largely spongy calcareous tufa. These limestones are frequently covered with a

mantle/.....

mantle of reddish clayey soils, though the soil may also be grey or black sandy material.

COASTAL FORMATIONS:

Along the coast the Cape and Karreo formations are largely obscured by unconsolidated coastal dunes and dunerock, which pass imperceptibly into the Alexandria limestones further inland. The dunerock consists primarily of calcareous sandstone which on weathering passes into sand and calcareous tufa.

CLIMATE.

INTRODUCTION:

In broad outline the area covered by Albany and Bathurst may be climatically divided, on the Köppen System of Climatic Classification, into 2 climatic regions. In the North and North-east the semi-arid country occupied by the Great Fish River Valley region experiences, according to Schulze (1947), the BS or Arid Steppe climate while the central highland and coastal peneplane regions experience a C climate or a Warm Temperate Rainy type.

Considering the two climatic divisions in greater detail, it is apparent from Schulze's distribution map of South African Climate, that the BS climate of the Great Fish River valley region may be further classified as a BSLa climate or a hot and dry semi-arid steppe climate, where the mean annual rainfall is from 10 - 15 inches, where the mean annual temperature is greater than 64.4° F and the mean temperature of the warmest month exceeds 71.6° F.

On the other hand the C climate of the remaining area may be classified further as a Clbfs'w' climate indicating a warm temperate rainy climate where conditions may be described as moderately warm, with the mean temperatures of all months between 50° F and 71.6° F. The mean temperature

of/.....

TABLE I : TEMPERATURE. (SCHUMAN (1941)).

GRAHAMSTOWN: PERIOD 1918-1940: 1,800 FEET.

IN DEGREES F.	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	YEAR.
Mean Maximum.	79.4	80.2	77.9	74.9	70.0	66.8	65.5	68.9	70.0	72.1	74.5	77.8	73.2
Mean Abs. Maximum	101.6	101.8	96.3	91.8	83.4	81.1	79.5	85.9	89.9	92.5	93.7	98.3	91.3
Mean Minimum	55.7	57.2	55.8	49.8	44.3	39.8	39.3	41.2	44.9	48.2	51.6	54.4	48.5
Mean Abs. Minimum	45.4	46.0	46.4	40.0	33.6	31.4	31.5	32.7	34.7	37.8	40.1	43.2	38.6
Mean Monthly	67.5	68.7	66.9	62.3	57.1	53.3	52.4	54.9	57.5	60.1	63.1	66.1	60.8
Daily Range	23.7	23.0	22.1	25.1	25.7	27.0	26.2	27.7	25.1	23.9	22.9	23.4	24.7

SYDNEY'S HOPE: PERIOD 1898-1939: 1,400 FEET.

IN DEGREES F.	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	YEAR.
Mean Maximum.	78.7	79.4	76.6	73.7	68.0	64.3	62.8	66.6	67.8	69.6	73.2	76.8	71.5
Mean Abs. Maximum	99.9	100.2	96.2	91.5	83.5	76.4	77.2	84.9	89.3	91.5	93.5	98.0	90.2
Mean Minimum	58.3	59.3	57.9	54.8	59.0	48.0	46.3	47.3	48.9	50.5	53.8	56.5	52.7
Mean Abs. Minimum	50.1	50.6	48.2	44.5	40.4	37.6	37.8	35.7	38.9	40.5	44.3	47.5	43.0
Mean Monthly	68.5	69.3	67.3	64.3	59.5	56.1	54.5	57.2	58.3	60.1	63.5	66.7	62.1
Daily Range	20.4	20.1	18.7	18.9	17.1	16.3	16.5	18.8	18.9	19.1	19.4	20.3	18.8

TABLE I : TEMPERATURE. (SCHUMAN (1941)).

PORT ALFRED: PERIOD 1923-1936: 200 FEET.

IN DEGREES F.	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	YEAR.
Mean Maximum	78.9	78.4	77.4	75.7	72.3	70.4	68.7	70.4	69.8	71.5	75.4	77.8	73.9
Mean Abs. Maximum	90.0	92.0	92.2	95.6	90.7	83.7	84.4	89.5	87.7	85.9	89.7	90.9	89.4
Mean Minimum	61.6	62.5	60.8	56.3	51.6	46.5	47.0	48.6	51.8	54.4	57.8	60.3	54.9
Mean Abs. Minimum	52.8	53.6	51.8	43.7	43.1	39.2	38.3	39.9	42.5	44.4	47.6	50.4	45.6
Mean Monthly	70.3	70.5	69.1	66.0	61.9	58.5	57.9	59.5	60.8	62.9	66.6	69.1	64.4
Daily Range	17.3	15.9	16.6	19.4	20.7	23.9	21.7	21.8	18.0	17.1	17.6	17.5	19.0

SOME ABSOLUTE TEMPERATURES:

(a) GRAHAMSTOWN.

Absolute Maximum:- 108<sup>o</sup>F December 1931.

Absolute Minimum:- 24.8<sup>o</sup>F July 1933.

(b) SYDNEYS HOPE:

Absolute Maximum:- 109<sup>o</sup>F February 1919.

Absolute Minimum:- 28.0<sup>o</sup>F June 1915.

(c) PORT ALFRED:

Absolute Maximum:- 108<sup>o</sup>F March 1936.

Absolute Minimum:- 34.0<sup>o</sup>F July 1934.

of the warmest month does not exceed  $71.6^{\circ}$  F while from 6-8 months have<sup>a</sup> mean temperature of  $64.4^{\circ}$  F, all months have mean temperatures above  $50.0^{\circ}$  F and the mean temperature of the coldest month is not less than  $50^{\circ}$  F. The area normally receives sufficient rain during all months but with Summer and Winter generally receiving the least precipitation and with maxima during the Spring and Autumn. The mean annual rainfall varies from 20 to +25 inches over most of this area.

ELEMENTS OF CLIMATE:

TEMPERATURE:

Temperature statistics for the area, and especially for the inland dry valley regions, are most inadequate, and a consideration of the records for a few long-term stations must suffice to give a general impression of the conditions. The statistics shown in Table No 1 are for Grahamstown and Sydneys Hope representing the inland areas, (excluding the inland valleys of the Bushmans and Great Fish rivers), and Port Alfred to represent the coastal conditions.

TABLE NO. 1:

From Table No. 1 the following features maybe observed:-

The temperature regime for most of the area is distinctly temperate with mean annual temperatures of  $\pm 60^{\circ}$  F in the interior and  $\pm 64^{\circ}$  F along the coast and with mean monthly temperatures never below  $50^{\circ}$  F or above  $71^{\circ}$  F. Mean annual ranges are moderate and of the order of  $\pm 15^{\circ}$  F in the interior and  $12^{\circ}$  F on the coast. The slightly higher mean annual temperature and smaller range on the coasts when compared to those of the interior is due to the tempering influence of the sea, while further inland temperature conditions are affected by greater altitude, especially in the highlands, and distance from the sea.

SUMMER (December, January and February).

Mean/.....

Mean Maximum Temperatures:

Mean maximum temperatures in Summer throughout the area are hot,  $\pm 78^{\circ}\text{F.}$ , the influence of elevation in the interior being largely counteracted by distance from the sea.

Mean Minimum Temperatures:

Mean minimum temperatures in Summer are cool to warm throughout namely  $\pm 55^{\circ}\text{F.}$  in the interior and  $\pm 52^{\circ}\text{F.}$  on the coast.

WINTER: (June, July and August)

Mean Maximum Temperatures:

Mean maximum temperatures during the day in Winter are distinctly warm varying from  $64-66^{\circ}\text{F.}$  in the interior to  $\pm 69^{\circ}\text{F.}$  on the coast.

Mean Minimum Temperatures:

Mean minimum temperatures in Winter are cool throughout, ranging from  $\pm 40^{\circ}\text{F.}$  in the interior highlands, where the greater altitude and distance from the sea make far lower temperatures, to  $\pm 47^{\circ}\text{F.}$  on the coast where marine influences temper the conditions.

Mean Diurnal Ranges are in general not excessive and are usually lower in Summer than in Winter and generally slightly greater in the interior due to relief and distance from the sea.

Port Alfred    Winter (J.J.A.)  $\pm 22^{\circ}\text{F.}$   
                  Summer (D.J.F.)  $\pm 16^{\circ}\text{F.}$

Grahamstown   Winter (J.J.A.)  $\pm 26^{\circ}\text{F.}$   
                  Summer (D.J.F.)  $\pm 23^{\circ}\text{F.}$

Sydneys Hope stands out as an exception in this respect with ranges greater in Summer than Winter.

In general, therefore, the area considered is characterized by an absence of excessive heat in Summer with warm to hot day temperatures and cool-warm nights, and a marked absence of excessive cold in Winter with warm days and cool nights.

In/.....

In the dry valleys of the interior, it may be assumed that temperature conditions are a little less temperate with hot summer days and cold winter nights and with somewhat greater annual and daily ranges.

It should not be assumed, however, that the region as a whole is entirely free from excessive summer heat or that it is entirely frost free.

It may be observed from table 1 that, in the summer months especially, occasional very hot conditions may be expected over several successive days with the mean absolute maximum temperature in the interior of the order of  $100^{\circ}\text{F}$ , and  $\pm 90^{\circ}\text{F}$  at the coast where the cooling influence of the sea is marked. Absolute maxima have been known to exceed  $112^{\circ}\text{F}$  in the Great Fish River Valley while in Grahamstown and Port Alfred  $108^{\circ}\text{F}$  has been recorded.

In the winter on the other hand, intermittent cold snaps may be expected, especially in the interior regions, where at Grahamstown for example the absolute minimum temperature may be of the order of  $32^{\circ}\text{F}$  while at the coast, due to marine influences, conditions may be cool but not cold with values of the order of  $38^{\circ}\text{F}$ .

The coastal strip of the area, for some 10-15 miles inland may be expected therefore, to be frost free ( $32^{\circ}\text{F}$ ) while over the interior, frosts in winter are to be expected. According to Schuman (1941), the mean length of the period during which frosts may occur ranges from 30 days near the coast to  $\pm 90$  days over the northern interior of Albany, it being 83 days at Grahamstown. The maximum frequency of frost occurs also during the mid-winter months of June, July and August. The frequency of frosts, however, is normally moderate, in Grahamstown e.g.  $\pm 10$  frosts ( $32^{\circ}\text{F}$ ) would be considered normal in an average year, while on the peneplanes South of the highlands a lower figure probably obtains, except perhaps in the valley floors where due to temperature inversions, frost occurrence is more frequent.

Over/.....

Over the interior of Northern Albany, again a higher frost frequency is probably encountered.

RAINFALL:

According to the subdivision by Schuman (1949) of South Africa into Rainfall Districts, the Division of Albany (excluding the drier Great Fish River Valley region) and the Division of Bathurst, fall within Rainfall District 8 for which mean rainfall values have been calculated from data supplied by Stations stretching from Cape St. Francis and Steytlerville in the West to East London in the East.

From this data the Mean Annual distribution of rainfall in District 8 may be summarised in table 2 below.

TABLE 2 :

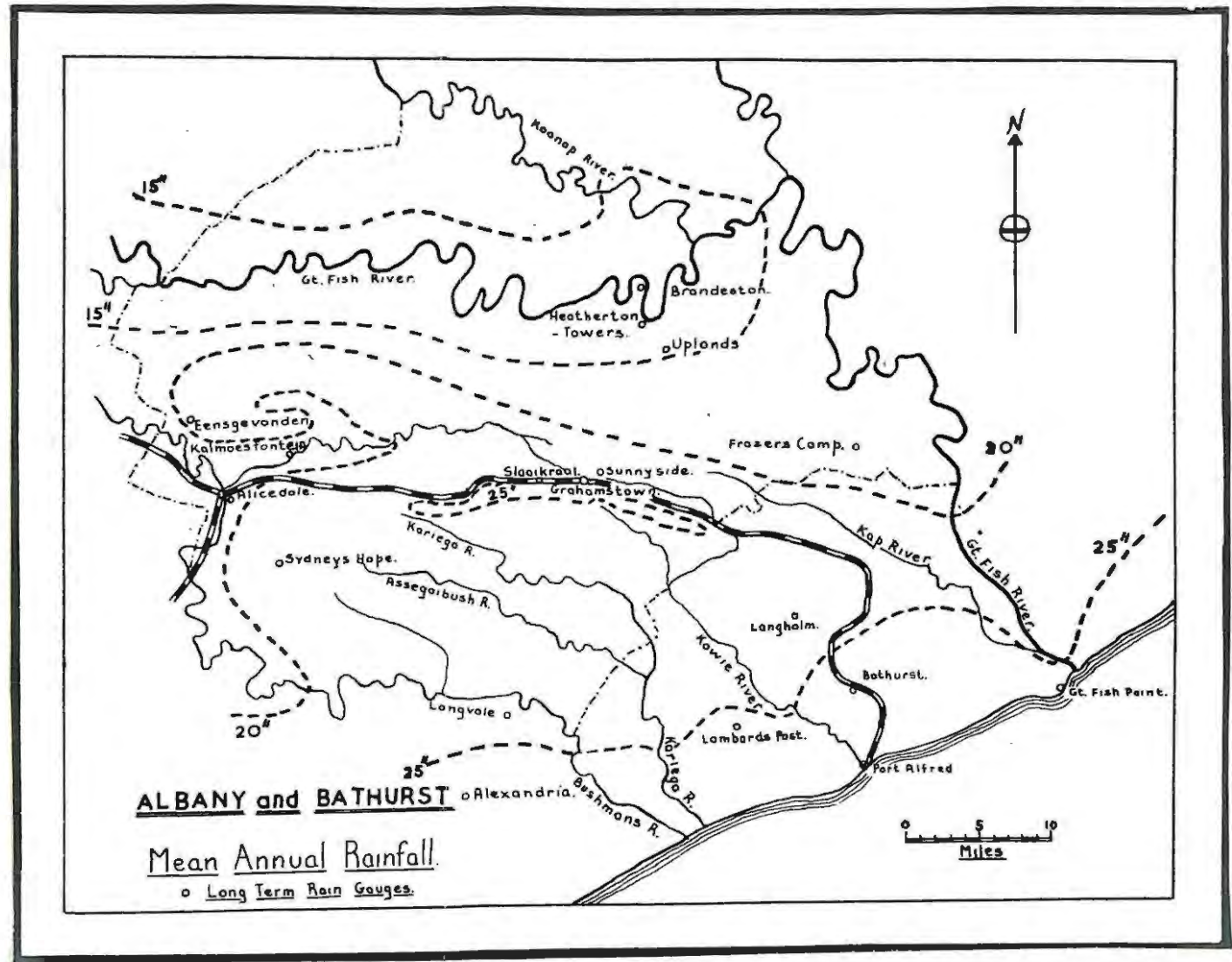
J	F	M	A	M	J	J	A	S	O	N	D	Year.
1.77	1.94	2.55	1.96	1.94	1.41	1.38	1.55	2.16	1.46	2.39	2.06	23.57

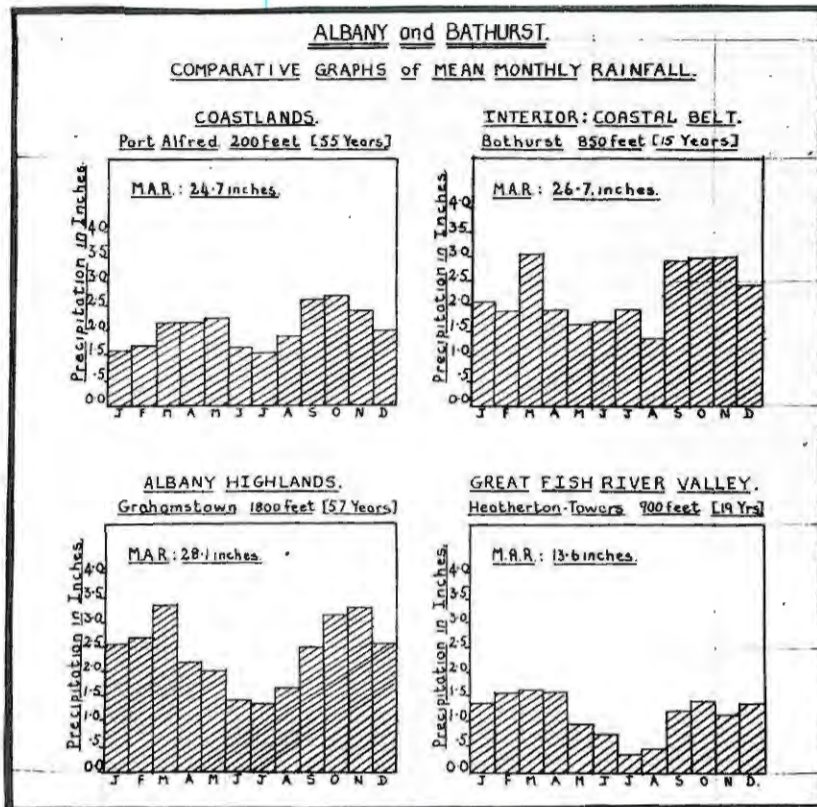
From these figures it may be observed that the rainfall is fairly evenly distributed throughout the year and totals a mean annual figure of between 20 and 25 inches. The distribution of mean annual rainfall, in Albany and Bathurst, is illustrated on Map 4 . The map is accompanied by four graphs, for selected stations within the area, to give some impression of the mean annual and mean monthly distribution of rainfall in various parts of the two Divisions. These graphs are for Port Alfred on the coast, Bathurst in the interior portions of the coast belt, Grahamstown in the Albany Highlands and for Heatherton Towers in the dry Great Fish River Valley. (Graph 1. ).

The winter and summer half years (A to S & O to M) receive roughly equal amounts of rain in the proportion of 43% and 57% respectively. Maximum rainfalls, however, occur during the Autumn (M A M) and Spring (S O N) with peaks in March and October respectively, and with a tendency towards a drier winter. It

should/.....

MAP 4.





# GRAPH I.

After Dyer 1937.

should be noted, however, that with higher temperatures in summer causing higher evaporation the winter rainfalls are often more effective, and as Dyer (1937) notes they are often augmented by autumn rains which have a carrying over effect well into the winter period.

In an area of considerably diversified relief the areal distribution of the rainfall is necessarily complicated, but Dyer (1937) notes that in general, as in most parts of South Africa, rainfalls are generally higher on the ridges and hills than in the valley floors due to rain-shadow effects; and it follows therefore that the broad inland valleys of the Fish and Bushmans rivers are considerably drier than the intervening country. In the coastal and interior highland regions on the other hand, rainfalls are appreciably higher. Over these latter areas as shown on Isohyetal Map 4 the rainfalls are of the order of 20-30" p.a. while in the valleys mentioned above, it diminishes to 10-15" p.a. The rainfall records for Heatherton Towers and Alicedale in the Great Fish and Bushmans river valleys respectively, and for Grahamstown and Port Alfred in the highlands and coastal regions may be examined here to illustrate of these effects.

TABLE 3 : Rainfall Normals up to 1935.

STATION	J	F	M	A	M	J	J	A	S	O	M	D	Y	DA YR
47-49 YRS 1800' GRAHAMSTOWN.	2.56	2.73	3.20	2.36	2.04	1.44	1.22	1.50	2.41	2.95	3.25	2.55	28.2	89
43-45 YRS 200' PORT ALFRED	1.59	1.67	2.02	2.20	2.14	1.59	1.41	1.77	2.46	2.41	2.58	2.06	23.9	80
8-19 YRS. 900' HEATHERTON T.	1.34	1.56	1.59	1.57	.94	.74	.30	.46	1.23	1.44	1.16	1.34	13.67	35
16-46 Yrs. 950' ALICEDALE.	1.44	1.33	1.72	1.45	1.34	.88	.78	.94	1.13	1.62	1.80	1.43	15.50	44

RAINFALL RELIABILITY, VARIABILITY & INTENSITY:

From Schuman's <sup>1949</sup> tables the reliability and variability

of/.....

of the rainfall in District 8 may be summarised as follows:-

TABLE 4 : PERIOD - 1907-1946.

Vr.			R		
JANUARY	JUNE	YEAR	JANUARY	JUNE	YEAR.
.400	.492	.136	.640	.568	.869.

Where Vr = Rainfall Variability ranging from 0 (no variability) to a maximum of 2 and R = Rainfall Reliability ranging from 0 to 1 where 1 represents absolute reliability.

In addition the annual fluctuation of reliability may be summarised -

TABLE 5 : Annual Fluctuation of Reliability (District 8)

J	F	M	A	M	J	J	A	S	O	N	D	YE- AR.
.640	.612	.627	.534	.514	.568	.497	.593	.563	.607	.352	.590	.869

(Where 1 = absolute reliability)

From these tables it may be observed that in general the variability of the rainfall is moderate while the reliability is fair throughout the year with a tendency towards maximum reliability during the summer half year (O-M) with peaks corresponding to the maxima of rainfall in March and October.

Mean values, however, as in temperature are apt to disguise essential factors of the rainfall regime. From a study of annual rainfall distributions for a number of stations within Albany and Bathurst (not submitted here) the occurrence of intermittent, fairly severe, drought spells of several months' duration are revealed. Among the most outstanding examples of such droughts are e.g. 1927 and 1949. During 1927 the annual rainfall for Grahamstown for example was 15.8 inches, when over the period June to November the rainfalls were as follows, compared to the mean values.

Actual/.....

	J	J	A	S	O	N	Total.
<u>Actual</u>	.10	.13	1.45	.33	1.58	1.20	4.79
<u>Means</u> (up to 1935)	1.41	1.29	1.59	2.50	2.98	3.11	12.88

During the same period in the Great Fish River Valley the position was as follows at Brandeston where the rainfall that year (1927) was 4.76".

	J	J	A	S	O	N	Total.
<u>Actual</u>	0.00	.06	.49	0.00	.26	.32	1.13
<u>Means</u> (up to 1935)	.99	.39	.56	1.27	1.17	.93	5.31

Similar conditions may be quoted for the 1949 drought which occurred during the period March to October for most of the region.

GRAHAMSTOWN 1949: (Interior Highlands)

	M	A	M	J	J	A	S	O	Total
<u>Actual</u>	.98	1.15	.91	0.00	0.00	1.06	1.14	1.31	6.55
<u>Mean</u>	3.31	2.26	2.01	1.41	1.29	1.59	2.50	2.98	17.15

ALICEDALE 1949: (Dry Bushmans River Valley).

	A	M	J	J	A	S	O	N	D	Total
<u>Actual</u>	.15	.32	.35	0.00	0.00	0.00	0.00	.17	.17	1.16
<u>Mean</u>	1.39	1.32	.83	.83	.99	1.23	1.38	1.75	1.41	11.13

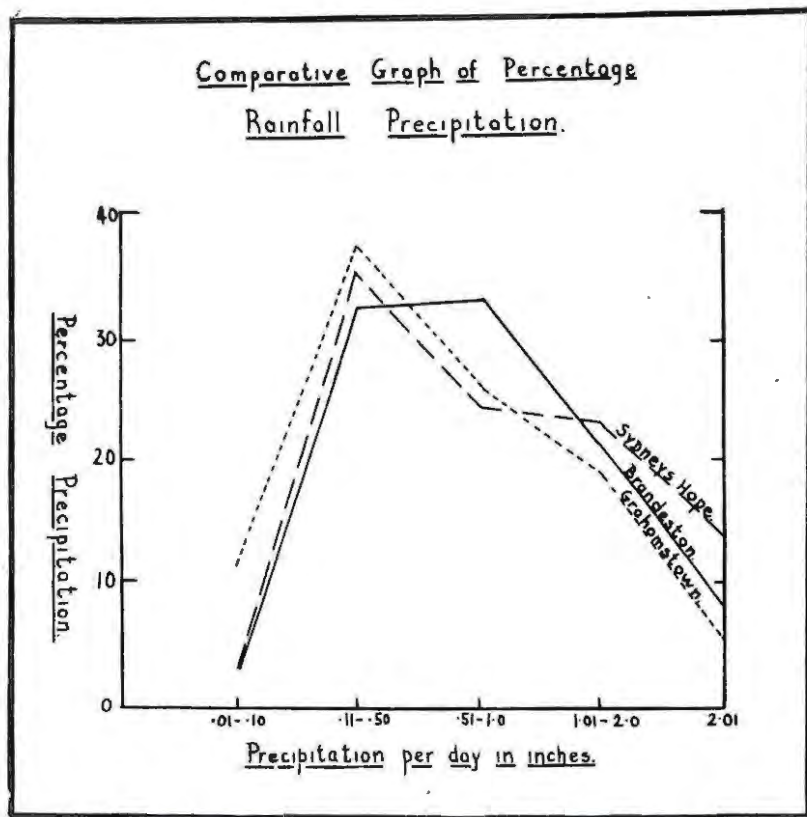
PORT ALFRED 1949: (Coastlands).

	M	A	M	J	J	A	S	O	Total
<u>Actual</u>	.34	1.08	.86	0.00	.79	1.37	2.07	1.24	7.75
<u>Mean</u>	2.18	2.18	2.26	1.68	1.58	1.82	2.60	2.69	16.99

It may be added that due to low mean rainfalls in the drier interior valleys droughts are normally more severe in their effects there. From discussions with farmers in those valleys it is considered that from 2-3 fairly severe droughts in 10 years may be expected there.

According to Dyer, rainfall intensities are generally moderate as may be gathered from the accompanying Graph 2. for 3 stations which shews that a large percentage of the rain is precipitated at a rate of 1 inch per day and only 5-13% is over 2 inches per day. Again, however, mean values disguise the

fact/.....



## GRAPH 2.

After Dyer 1937.

feet that occasional very heavy downpours over a short time may be expected in the region, of which the most recent examples are for 1951 and 1952. At Grahamstown, for example, in January of 1951 8.25 inches were recorded over a few days while at Mosslands in 1952 13.06 inches were recorded in September, approximately 5 inches of which fell in one day. Floods, however, should be considered rare, and as Dyer notes, are usually due more to steady rainfall over a number of days, than to a heavy downpour of "cloudburst" type within a few hours.

It may be noted also that precipitation in the form of hail rarely plays an important role in the destruction of plants.

ADDENDA TO PAGE 14.

RELATIVE HUMIDITY AND CLOUD.

Humidity records are available for Grahamstown (Veterinary Office) and for Port Alfred, but, since these values are calculated only for 8.30 a.m. we have no accurate means of assessing the diurnal fluctuations of relative humidity. Figures calculated on readings taken at midday would be of greater value in an attempt to gauge the importance of humidity as a climatic factor. The values of mean monthly Relative Humidity at Grahamstown and Port Alfred at 8.30 a.m. vary from 60% to 80% (Le Roux 1951). Lowest humidity records are obtained during Berg Winds. Dyer (1937) for example, has recorded that in November 1920 the relative humidity at 8.30 a.m. on one day was 7%. It is estimated that about 8 Berg Winds per year, of from one to three days' duration, are experienced in this region.

The coastal areas of the region are cloudy at all seasons/.....

seasons (Weather on the Coasts of Southern Africa 1942). Values of the degree of cloudiness are again available only for 8.30 a.m. The average cloudiness in Grahamstown for that hour is expressed in the table below.

TABLE 5A: Average Cloudiness at 8.30 a.m. (%). Grahamstown.  
(Sunshine and Cloud in South Africa 1950)

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	YEAR.
46	45	41	35	33	25	29	26	31	44	45	37	36

The values show that the area experiences a fair proportion of cloudy weather with the maximum amount of cloud occurring in the Spring and Autumn when the two maxima of rainfall occur. Although values are not available for stations in the dry interior valleys of Albany, it may be assumed that cloud cover and humidity are of a lower order while the proportion of bright sunshine is consequently greater over those areas.

WIND:

Records kept at the Veterinary Office in Grahamstown, show that the prevailing winds are S.E. and S.W. with W. winds fairly frequent in July and August (Dyer 1937). In addition winds from the N.E. are also fairly frequently experienced. Wind direction and velocity is subject to considerable variation due to the seasonal change in pressure distribution over the interior from a semi-permanent anti-cyclone in winter to a low pressure trough in summer. (Weather on the Coasts of Southern Africa 1942):

Dyer (1937) notes that the S.E. winds are more frequent and much more forceful on the coast than further inland. In addition he observes that these winds are

important/.....

important for the reason that they frequently carry with them water vapour, either to be precipitated as rain or in the form of beneficial mists. The windiest season here is in the spring (September to November) during which time the majority of strong winds, chiefly from the S.W., occur. At Port Elizabeth, for example, the average wind velocity in Spring is 15 m.p.h.

Berg Winds, referred to above, blow mainly from the N.W. in this area and occur most frequently during the Spring and early Summer, when high temperatures and low humidities are experienced.

### VEGETATION.

#### INTRODUCTION:

"The vegetation of Albany and Bathurst is particularly interesting" notes Dyer (1937) "owing to the great diversity of its components". The area is the meeting ground of three distinct floras, namely, the S.W. Cape Flora, a Sub-tropical Flora from Natal and the Karroo Flora.

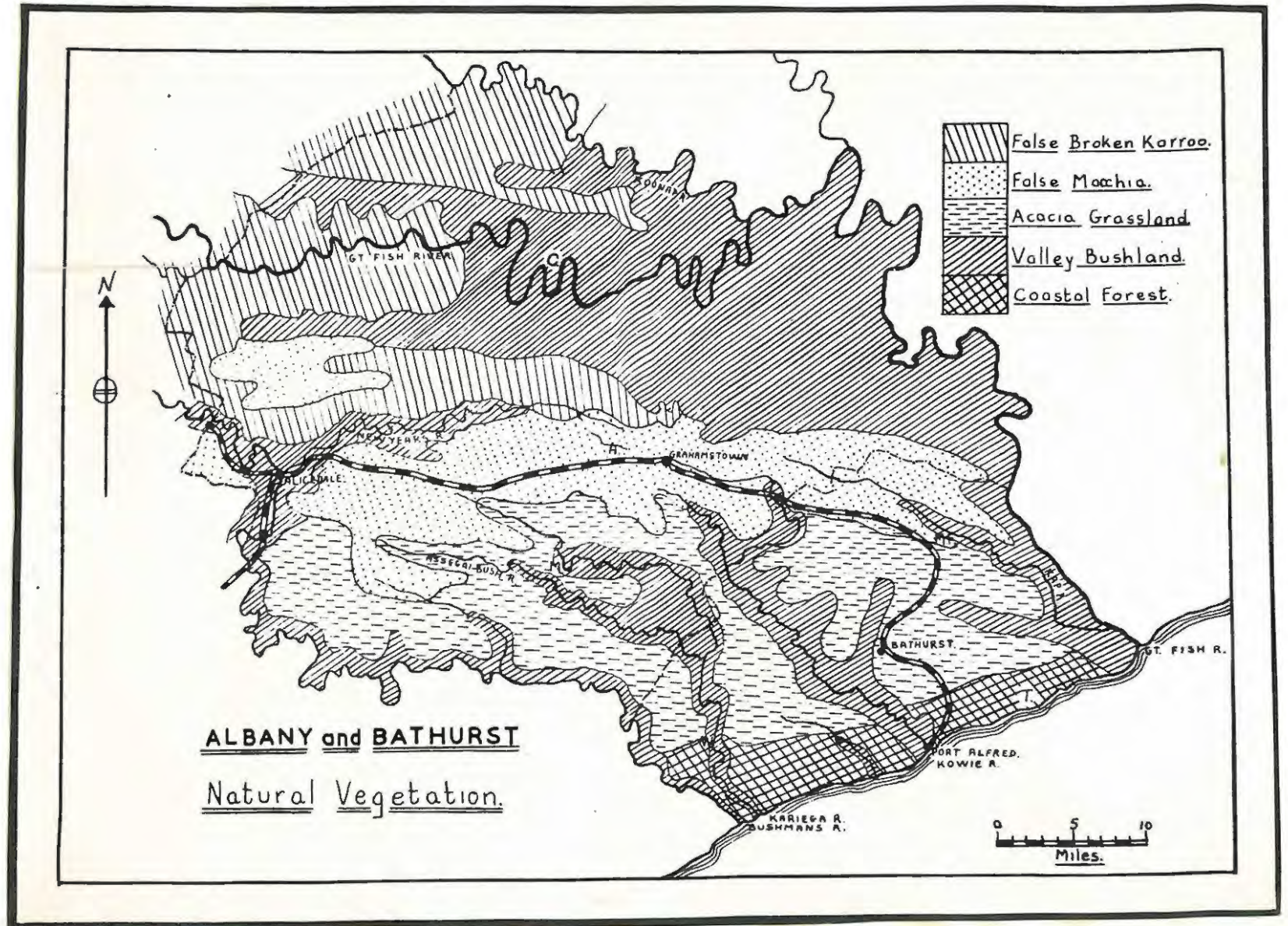
According to Dyer the S.W. Cape Flora occurs here in relatively small patches which are in the nature of outliers of the main stream from the Cape, and locally give character to Fynbos. The sub-tropical Flora in addition to supplying many elements in Fynbos also provides Forest, Bush, Scrub and Grassland which formations occupy the greater part of the area. The Karroo Flora is characterised by dwarf shrubs and succulents and is dominant over small areas in the Great Fish River Valley where it mingles with the scrub and larger succulents to form Karroid Scrub. The latter vegetation type occurs also in the hot and dry interior portions of the Bushmans River Valley.

The discussion of vegetation distribution which follows is based on a new Veld Types map of South Africa compiled by Acocks (1953), to a scale of 1 : 1,500,000. One must be

forewarned/.....

# MAP. 5.

After Acocks 1953.



forewarned, therefore, of the limitations imposed by the small scale as regards detailed distributions. Moreover, it must be assumed that with frequent broad transitions, boundary lines, based on personal interpretations, are arbitrary and open to criticism.

VEGETATION DISTRIBUTION AND CHARACTER:

As illustrated on Map 5. the vegetation may be described under the following heads:-

- (a) Coastal Forest.
- (b) Acacia Grassland.
- (c) False Macchia.
- (d) Valley Bushland and Karroid Scrub.
- (e) False Broken Karroo.

(a) COASTAL FOREST:

According to Acocks (1953) the forest which occurs in the coastal regions of Bathurst, is a portion of a S.W. extension of the coastal sub-tropical forests, into the Divisions of Peddie, Bathurst, Alexandria and Port Elizabeth, being best developed in Alexandria.

The forest is normally short, with trees of the order of 20-30 feet. In the Bathurst Division, due to considerable clearing for grazing and agricultural land, much of the forest has been removed and replaced by more open acacia grassland.

Acocks notes that with a relatively evenly distributed rainfall throughout the year, droughts are felt more severely, and the forests here tend to be more xerophytic than in the true sub-tropical regions to the N.E. Where the forest meets the entrenched river valleys it gives way in an easy transition to the Valley Bushland vegetation type.

Among the more generally occurring members of the forest Acocks notes the following:-

Cassine , Ochna , Apodytes , Sideroxylon ,  
Euclea , Pittosporum , Rapanea , Schotia and  
others/.....

others.

In addition Acocks observes that low growing shrubs are a common feature, among which the following may be noted:-

Scutia, Azima, Grewia, Rhoiacarpos, and Plumbago, among others.

(b) ACACIA GRASSLAND:

The grasslands of Albany and Bathurst occupy most of the undulating country between the river valleys, from the margins of the coastal forest, extending inland up the open slopes and along the Albany Highlands. It should be noted that on Map 5, showing Acocks's distributions, the highland region, is shown to have a False Machia vegetation. The latter, however, is here associated with the grassland of the Dohne - Sourveld type, a lower altitude variety of Acocks' Highland Sour Grassveld.

Adamson (1938) notes that in the Acacia grasslands the ground layer is closed and dominated by close growing low grasses, which, where luxuriant, may attain 3 feet at the flowering period. The upper layer is discontinuous, and made up of bushes and less often by small trees of which Acacias are the most common. These bushes may be small (3 to 4 feet) or at times as much as 6 to 10 feet tall.

The grassland of this area is largely sour and according to Dyer affords relatively poor natural grazing owing to the low mineral and protein content. It is convenient here to define the terms sour and sweet veld since they are used repeatedly in discussions, on grazing, which follow. According to Scott (1947), Sourveld is veld in which the majority of the grasses become unpalatable on reaching maturity, even though this occurs long before the end of the growing season. The sour grassland is normally associated with higher rainfall and is often dense, with a high carrying capacity. In winter, however, due to its low nutritional value supplementary feeding of fodder crops is usually necessary.

In/.....

In Sweetveld, on the other hand, the majority of grasses are palatable when mature, and even when dry and dormant. It is usually associated with lower rainfalls and the cover is generally sparser than in sourveld with a corresponding lower carrying capacity. Scott notes that Sweetveld is most economically farmed where it is used mainly for winter grazing due to its higher nutritional value.

The grassland is especially deficient in phosphorous and nitrogen. Dyer notes, however, that these deficiencies are often less evident in mixed veld where scrub bush counter balances the mineral and nitrogen deficiencies to a certain degree. He observes, furthermore, that owing to their high silica content the sour grasses of the highland region suffer an additional disadvantage as regards feeding value and palatability.

In the grassland vegetation type dominance of certain grasses, especially of such grasses as *Themeda triandra* (Rooigras) and *Digitaria eriantha* (Woolly Finger Grass), is evident in some areas. Dyer notes that the total number of grass species in the area is about 125, among which the following important members may be noted:-

*Themeda*, *Tristachya*, *Andropogon*, *Heteropogon*, *Elyonurus*,  
*Eragrostis*, *Sporobolus*, *Setaria*, and *Cynodon*.

*Panicum* grass is common in areas dominated by bushland.

Acocks notes that the relatively evenly distributed rainfall accounts for the importance of Fynbos in the grassland of the area. The former occurs for example as invasions of *Rhynchospora* (*Elytropappus* sp.,) pioneers on fallow land, on bush clump margins and along the edges of valley bushveld.

(c) FALSE MACCHIA: (Fynbos)

The association of macchia with the sour highland grassland has already been noted above. According to Dyer the area occupied by the macchia is relatively small and has decreased rapidly under present day methods of stocking and grazing

management/....

management. He notes that in this area fynbos is most commonly found on the margins of wood and forest patches on the South and South-west, usually rocky, slopes of the Albany Highland area. He notes that in its most characteristic form, fynbos is very dense, and is dominated by sclerophyllous shrubs belonging to the genera: Erica, Berzelia, Cliffortia, Passerina, Aspalathus, Metalasia etc.

(d) VALLEY BUSHLAND:

From Map 5 it may be observed that in areal distribution, this vegetation type, covers large tracts of the area, extending up the river valleys from the coast to the foothills of the Albany Highlands.

The Great Fish River Valley, however, Dyer notes, widens out considerably about 15 miles from the coast and the vegetation is then of the Karroid Scrub type, for many miles inland. This feature is, due primarily to high temperatures and lower rainfalls. The Karroid Scrub is encountered also in the inland drier portions of the Bushmans and New Years river valleys, especially near Alicedale. In these drier valleys, Acocks notes, the bushveld proper occurs as narrow belts on the northern less arid slopes of the valleys facing the prevailing rainbearing winds.

Succulents are conspicuous on the rocky slopes and kranzes, while for the rest the vegetation is of a medium scrub bush type, the height and density of which depends on rainfall, soil and degree of exposure.

The valley bushland was almost impenetrable before the coming of the white settlers but during the past 100 years considerable thinning has taken place by chopping out and grazing.

Although, as Acocks notes, the bushland shows a lack of dominance, the following members, among others, may be noted

as important/.....

as important:-

Scutia, Capparis, Rhoicissus, Azima, Secamons, Plumbago, Grewia, Euclea, Cassine, Portulacaria, Acacia, Schotia and Pappia.

KARROID SCRUB:

As noted above this vegetation type is a modification of the Valley Bushland proper, and occupies an extensive area across Northern Albany. It extends up the Great Fish River Valley from a point some 15 to 20 miles inland from the Coast until it grades into the False Broken Karroo towards the West. In addition this vegetation type occurs to a lesser extent in the Bushmans River Valley near Alicedale.

Dyer notes that the abundance of succulent plants is the main distinguishing feature from the normal valley bush. Moreover, there is a greater development of spinescence, a decrease in the number of species, a retarding of regeneration and in disturbed areas, a succession towards Karroo with the percentage of dwarf shrublets increasing. Under severe climatic conditions where, for example, rainfalls have been known to descend to 4.39 inches in a year at Brandeston (1927) where temperatures are frequently high ( $>100^{\circ}\text{F}$ ) and relative humidities are of a low order, the Karroid Scrub is a remarkable adaptation to such severe environmental conditions. Among these adaptations the following may be noted from Dyer's investigation of the vegetation type.

- (1) Tolerance of a wide range of temperature.
- (2) Economy of water - reduction of leaf size and number, deciduous shrubs, thick cuticles and reduction of stomata size.
- (3) Power to profit by rainfall - development of both shallow, surface, and deep root systems to tap both small amounts of surface moisture as also deep seated supplies.

(4)/.....

- (4) Power to survive desiccation.
- (5) Rapid life cycles and viable annual seeds.
- (6) Conservation of water - succulence and water storage organs.
- (7) Spinescence - reduction of leaf surface, and as a protection against destruction by over grazing by animals during droughts.

In undamaged state the Karroid Scrub is extremely dense, containing succulent and thorny scrub elements from 6 to 8 feet tall. It normally presents a drab grey-green, thorny, aspect which in good seasons, however, may be transformed to green heightened for short periods by splashes of brilliant colour from the many flowering plants which inhabit the area.

In general the vegetation has been much opened up and as Acocks notes, has been invaded by prickly pear and in some parts so heavily by species of dwarf Euphorbia that it resembles Noorsveld (Roux 1953) whose dominant character is this type of Euphorbia. In the tributary valleys the woody scrub and trees becomes more prominent and dense but Dyer notes that the Karroid character is expressed in the presence of acaescent species of Aloe and Euphorbia, and many low growing succulents.

Among the more typical plants listed by Acocks the following may be noted:-

Portulacaria (spek-boom), Grewia, Euphorbia, Rhoicisus, Asparagus, Gymnosporia, Pappia (pruin-boom), Aloe, Euclea (guarri), Acacia, Cussonia (cabbage tree), Rhigozum (driedoorn).

Among the lower growing shrublets, grasses and succulents are:-

Chrysocoma, Fentzia (good Karroo bush), Panicum, Sporobolus, Setaria and Mesembryanthemum.

(e) FALSE BROKEN KARROO:

This vegetation type representing a transition from

true/.....

true Karroo to Karroid Scrub, occupies the Western extremity of the Great Fish River Valley in Albany. It extends Eastwards also into the New Years River depression between the Zwartwaterberg and the Zuurberg extension as illustrated on Map 5 .

According to Acocks the vegetation is less arid looking, taller, denser and generally less desert like than true Karroo. It is largely the result of the thinning out and destruction of Valley Bushland, Spek-boom veld and Karroid scrub, the eating out of grassland associated with these veld types, of erosion and invasion by Karroo elements. He notes further that the destruction of the prickly pear in recent years has given the Karroo a further chance to spread.

From Acocks the following elements among others may be noted as important invaders of the area:-

Pentzia, Aster, Chrysocoma, Aptosimum and Ruschia.

NOTE:

It is possible only to include a relatively short and somewhat incomplete account of the natural vegetation in this work. For greater detail, especially as regards species encountered, the reader is referred to Dyer (1937) and to Acocks (1953).

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THE AGRICULTURAL AND PASTORAL LANDSCAPE OF ALBANY  
AND BATHURST.

The history of permanent European farm settlement in Albany and Bathurst may be said to commence with the arrival, in 1820 and 1821, of the 4,000 to 5,000 British Settlers. Prior to this date farming activity in the area had been a semi-nomadic system of cattle and sheep herding by a few Dutch Settlers, on large land grants.

The Settlers of 1820 were established on locations situated mainly in the Zuurveld of Lower Albany, between the Great Fish and Bushmans rivers, South and South-East of the then military post of Grahamstown.

Prior to the settlement, the region had been described by Lord Charles Somerset, as one of many difficulties, especially with respect to the hostility of the native tribes across the Great Fish River to the East. He outweighed such drawbacks, however, with a somewhat inflated and optimistic estimation of the possibilities of the area to support a dense agricultural settlement. It is reported in the Handbook of the Cape Colony for 1886, that he had observed that the Settlers' reward was "to be found in the cultivation of the most fertile soil in the most healthy and temperate climate in the Universe," where "the same species of cultivation which affords food to man in our country (Britain) is most likely to succeed here". In addition he represented that such other crops as tobacco and cotton could be produced together with quality wool (1886 Handbook p. 49). This glowing report of the region was later discounted, however, and the real reason for the establishment of the settlement emerges, as the necessity for the creation of a dense defensive buffer population along the Eastern Frontier, as Cory (1913 p. 47) notes "forming a barrier against the Kaffirs."

To this end the Settlers were organised into parties and settled on small locations with 100 acres for each immigrant. Edwards (1934 p. 61) notes that the concentration of the population/.....

population determined the nature of the farming to be undertaken, since the congestion of the parties and small land grants prohibited pastoral farming and limited the Settlers to the pursuit of agriculture.

It soon became difficult to maintain the dense agricultural population, however, since over 45% of the Settlers were not agriculturalists. In addition the Colony was experiencing a distinct labour shortage and many Settlers desired to follow their own trades. Only stern Governmental measures at the time, therefore, were able to maintain the dense settlement. Edwards (1934 p. 66) notes further that the promotion of agriculture was revolutionary and represented a complete change from pastoral farming which had hitherto characterised the region.

The Settlers fortunately shared the optimistic views of Somerset at first and Pringle (1834 p. 136) for example, records that "some of the most intelligent men were carried away by anticipation of the land." Nevertheless, the first eagerly awaited harvest failed owing to the appearance of rust in the wheat crops. This misfortune led to the conviction that the Albany Zuurveld was not suited to this type of agriculture.

In 1821 Sir Rufane Donkin, then Acting Governor at the Cape, considered the possibility of extending the locations to include pastoral farming in the economy of the area. On Somerset's return to the Cape, however, Donkin's views were discarded and the unsatisfactory state of the settlement persisted. Somerset's return coincided also with the second harvest failure and renewed inroads by the Kaffirs. (Edwards 1934 p. 79).

Discontent developed apace and Edwards (1934 p. 79) noted that "never was a country so different from what it was represented"; and that Pringle for example maintained that the area was not suited to the cultivation of grain, to any extent. Irrigation was an acute problem, because of deeply entrenched

river/.....

river coursed and furthermore, the soils proved unsuitable for agriculture and one observer is known to have noted that "either observation of the nature of the soil of the country will teach or starvation will enforce" (Edwards 1934 p. 80).

The third harvest failed as did a large portion of the fourth in 1823 while during that year large tracts of the area were devastated by serious floods, reducing the Settlers to a deplorable state of want and poverty.

At this stage (1823) there were 364 farm houses in the area, the majority constructed of wattle and daub, 1,500 acres were under cultivation producing such crops as wheat, oats, barley, maize, potatoes, pumpkins and other vegetables. In addition, in spite of severe losses through stock thefts by the Kaffirs, there were roughly 2,950 cows, 3,230 oxen, 3,220 sheep, 650 goats, 500 pigs and 210 horses in the Albany Division. (Hockley 1948 p. 110).

Thereafter Governmental policies were modified and Hockley (1948 p. 128) writes that numerous measures were introduced to improve the Settlers' lot, among which the following may be noted:-

- (a) Kaffir Fairs were re-introduced, through which Settlers were able to trade with the Kaffir tribes across the Great Fish River. In exchange for metal implements, cotton goods beads and trinkets the traders obtained, for example, in the first 7 months of such fairs, over 50,000 lbs of ivory, 17,000 lbs of gum, and 15,000 hides which gave an immediate fillip to commercial activity at the seaports of Port Elizabeth and Port Francis (Port Alfred) while Grahamstown rapidly became a thriving distributing centre for wholesale merchants.
- (b) The Government-owned farm at Somerset was closed down eliminating the restrictions on the sale of produce by the Settlers.
- (c) The use of paid Hottentot and Native labour was granted,

alleviating/.....

alleviating the acute farm labour shortages.

(d) Perhaps the most important, extensions of the locations were permitted and Hocklay (1948 p. 133) notes that "it was not possible to give up the utterly hopeless system of intensive agriculture and to conduct pastoral farming on a proper basis, crops being sown only on small patches of really suitable arable land." He notes that many Settlers turned to trading but the majority remained on the land and "wheat was replaced by crops more suitable to the climate and soils, such as barley and oats (either for fodder or grain) and maize; but cattle and sheep farming soon became the mainstay of those who remained on the land". (Hocklay 1948 p. 142).

The 1886 Official Handbook (p. 249) of the Cape Colony reports that although the first merino wool sheep were introduced by Col. R.J. Gordon as early as 1790, the colonists had hitherto concentrated chiefly on the rearing of hairy fat tailed Cape sheep for mutton, and by 1830 for example, shipments of wool from the entire colony totalled only 33,000 lbs. After 1830, however, rapid strides were made in the breeding of fine-woolled sheep, in which the Settlers of Albany played an important role, and in 1835 over 79,000 lbs of wool were shipped from Port Elizabeth alone, while in 1845 over 2,000,000 lbs were shipped. In the Albany Division the number of woolled sheep reached 10,000; Cape Sheep 67,000; Cattle 30,000 and Goats 15,000 during 1831 while by 1834 wool sheep totalled 12,000.

Hocklay (1948 p. 143) observes that it was soon established that, due to its rank and sour pastures, the Albany Zuurveld, was unsuited to the grazing of sheep. He says, however, that a contemporary observer noted that the Zuurveld of lower Albany "had been gradually covered with numerous herds of cattle" while "fine wool can be produced on the more inland pastures of the district, of a quality fully

equal/.....

equal to the best Spanish or Australian".

In 1834 the first of three disastrous Kaffir Wars, the others occurring in 1846 and 1852, ravaged the area and resulted in severe stock losses and damage to property which led to the ruination of many of the Settler farmers.

In spite of the privations of the Wars, however, considerable material progress, especially as regards pastoral farming, was accomplished in the area. The stock census of 1845 reveals significant increases in livestock numbers in Albany. In this year there were over 300,000 wool sheep, 50,500 cattle and 3,800 horses in the Division, while in 1844 over 1,300,000 lbs of wool were exported to Britain from this Division alone, compared to 33,000 lbs from the entire Colony in 1830. The exports of hides, skins and tallow are also reported to have been considerable, reflecting the importance of cattle to the prosperity of the area. The 1845 Official Handbook refers also the cultivation of Citrus and other fruits, which at this stage were probably not grown commercially however, but in small farm orchards for home use. In addition cotton was being cultivated, and hopes for its development as an article for export were expressed. Maize was the chief grain crop while barley and oats were also cultivated as were vegetables. Small quantities of wheat were being cultivated for use as a breadstuff.

At this stage the Division of Albany, as then constituted, contained large tracts of country northwards of the present boundaries in the Kat and Koonap river areas which now make up parts of the Divisions of Bedford and Fort Beaufort. It is supposed, from available records, that these became separate Divisions after 1849. Albany then also contained the present Division of Bathurst which became an independent unit after 1857. The discussion which follows is thus confined to the area at present occupied by Albany and Bathurst unless otherwise stated.

In the history of agricultural development in

Albany/.....

Albany and Bathurst, the year 1865 is significant since it marks the point at which the pineapple was first introduced here, and when it was discovered that the area was suitable for its cultivation. In that year, King (1951) notes, Mr. C. Purdon was given some 30-40 pineapple crowns by a Mr. Lindsay Green, a barber of Grahamstown. These crowns were taken from a small consignment of pineapples sent to Grahamstown from Natal. Mr. Purdon planted them in a small garden plot on his farm "Thorndon" near Clumber in the Bathurst District, and after tending them for a few years he was able to offer the first locally grown pineapples on the Grahamstown produce market. There he received the phenomenal price of 7/6 per pineapple.

From this small beginning Mr. Purdon continued to enlarge his pinery by planting out suckers pruned from the older plants, while others were sold and distributed to farmers in the surrounding area. Many of these farmers, who had hitherto experienced little real prosperity, realized the possibilities of pineapple cultivation, but soon over production brought dwindling prices due to the limited local market and a deficiency of suitable transport facilities. The pineapple had made a premature debut in the area and was destined to remain relatively unimportant as a commercial crop until a more recent date as will emerge later.

It is apparent, therefore, that the rearing of cattle and sheep remained the major farming practice of the area during this time. By 1875 Albany had approximately 34,500 cattle, 151,400 woolled sheep 33,600 Angora Goats and 22,800 common goats while over 400,000 lbs of wool were produced. In the Bathurst Division, on the other hand, there were 16,000 cattle and 2,600 woolled sheep from which 18,250 lbs of wool were obtained, reflecting the importance of cattle rather than sheep over the Zuurveld area. The two Divisions, in addition, produced 21,600 bushels of wheat, 9,000 bushels of barley and 47,000 bushel of oats. The 1875 Descriptive Handbook reports also that in 1874 92,000 lbs of unginned cotton were exhibited in Grahamstown

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which from available records appears to be the last occasion on which considerable quantities of the crop were offered for sale in the area.

During this period ostrich feathers emerged as an important factor in the economy of the area. Douglass (1881) notes that prior to the 1820 settlement, Albany had abounded in wild ostriches, the greater majority of which, however, were driven further afield after the expansion of the settled area, and Grahamstown had become an important fitting-out centre for the hunter-traders. Few birds had hitherto been domesticated, and since the greater proportion of the feathers was obtained from wild birds, the industry throughout the Cape was carried on upon a relatively small scale. In 1869, however, Mr. A. Douglass of the farm Heatherton (now Heatherton Towers) in Albany, built the first artificial ostrich hatching incubator and with this innovation commenced the remarkable rise of ostrich farming as a major activity. By 1875 the number of domesticated birds in the Cape Colony had risen to over 21,000 from fewer than 80 in 1865. In 1875 Albany had approximately 650 domesticated birds which rapidly increased to reach over 10,000 producing 8,000 lbs of feathers by 1891 while in that year Bathurst had over 2,000 birds from which 1650 lbs of feathers were produced (1891 Agricultural Census).

From the account given by Douglass (1881) it is apparent that the ostrich was well adapted to all parts of Albany and Bathurst. The birds were found to thrive both in the sourgrassland areas of the Albany highlands and of Lower Albany and Bathurst and in the succulent scrub areas of the interior valleys, where sowings of lucerne provided the necessary green-feed for chick rearing.

It is evident that with the increasing demand for feathers set by the fashions of the time, and the high prices obtained for the product (£4/lb. of feathers in 1884 for example), the ostrich brought the first real measure of prosperity to many farmers in the area. Cattle and sheep farming, hitherto

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hitherto the major farming activities, had long been hampered by serious limitations among which low prices and stock losses from disease and insect pests appear to be the chief. Furthermore inefficient and untrustworthy native labour, overstocking, the herding of animals and serious deterioration of the natural grazing through the neglect of grazing management were other factors adversely affecting pastoral farming at the time.

The ostrich, however, was less susceptible to disease and insect pests, while the improved economic position of the farmers resulted in better farming practices in many cases. On a large number of farms fences and paddocks appeared in the landscape for the first time and controlled grazing was introduced. In addition the ostrich farmers were now able to build more substantial homesteads, farm sheds and develop water supplies.

Hereafter the number of birds and production of feathers rose steadily until in 1911 (Agricultural Census) for example, at the peak of the ostrich feather boom, Albany had 40,400 birds and was producing over 23,000 lbs of feathers, while Bathurst had over, 16,500 birds and a production of 11,000 lbs of feathers. Throughout this period Albany maintained second place after the major producing area in the Oudtshoorn Division both in numbers grazed and in feather production. (In 1911 Oudtshoorn had over 114,000 birds and a feather production of 125,500 lbs.)

A measure of the prosperity of the industry may be gathered from the value of feathers exported from the Cape which totalled over £2,900,000 in 1913.

The ostrich era came to an abrupt halt, however, in 1914 with the outbreak of World War I; with changes in fashion, the market collapsed and whereas £2. 18. 0. was obtained for a pound of feathers in 1913 only 15/- was obtained in 1915.

By 1918 (Agricultural Census) the number of birds in Albany and Bathurst had declined to 15,000 and 4,000 respectively while in more recent times, in 1945 for example, there were only 819 and 110 birds in the two Districts respectively. It may be concluded, therefore, that ostrich farming can no longer be considered/.....

TABLE 6 : LAND USE IN ALBANY AND BATHURST 1911. (Agricultural Census 1911/12)

CATEGORIES.	ALBANY.	BATHURST.
(a) Grazing land.	489,000 morgen.	124,600 morgen.
(b) Grazing land fenced either by stone walls or wire.	+ 400,000 morgen.	101,000 morgen.
(c) Cultivable land (including fallow land).	18,000 morgen.	19,000 morgen.
(d) Irrigated land.	1,294 morgen.	108 morgen.
(e) Maize lands.	3,900 morgen.	5,200 morgen.
(f) Oats lands.	2,700 morgen.	2,300 morgen.
(g) Barley lands.	980 morgen.	1,100 morgen.
(h) wheat lands	580 morgen.	618 morgen.
(i) Lucerne lands	475 morgen.	78 morgen.
(j) Grasses cultivated	-	1,141 morgen.
(k) Orchards producing citrus and deciduous fruit (apples mainly).	544 morgen.	736 morgen.
(l) Number of Orange trees (all varieties).	48,000	50,000
(m) Number of apple trees	14,000	90,000

considered of any importance in the farming practice of the area at the present day.

Although ostrich farming during the period 1880-1914 was perhaps the most profitable farming practice in the area, the other farm occupations already encountered remained important in the rural economy. Land utilization in 1911 for example may be selected to illustrate the conditions prevailing at the time. The important features are summarised in Table

From Table 6 it may be observed that land use in the two districts followed a very similar pattern except that in Bathurst agriculture represented a slightly more important feature in the landscape than in Albany. It is apparent from the relatively small areas devoted to agricultural pursuits, however, that agriculture had remained of relatively minor importance in comparison to pastoral farming. The major grain crop produced in both areas was maize, 78,000 and 109,000 bushels of grain being produced respectively. Oats was produced mainly for hay, the two districts producing 2,600 and 1,600 metric tons of oathay respectively. The barley crop was utilized both for hay making and for the grain. In addition to these crops smaller quantities of Kaffircorn, tobacco, potatoes and other vegetables were also produced in both districts.

In 1911 the Albany orchards produced some 1,800,000 oranges and a smaller quantity of apples and other fruits while 29,000 pineapples were also offered for sale. In Bathurst on the other hand a yield of 6,500,000 oranges and 10,000,000 apples was obtained from the orchards while over 4,000,000 pineapples were also produced.

After ostriches it is evident that cattle and sheep grazing were the most profitable farming practices in the area as already intimated. In 1911 there were in Albany some 47,000 cattle 64,000 woolled-sheep and 51,000 other sheep (presumably non-woolled mutton breeds), while in Bathurst there were 19,000 cattle and only 2,500 sheep of all classes.

Wool sheep numbers in Albany are seen to have declined materially since 1875 when the Division possessed some 150,000 woolled-sheep/....

woolled-sheep. This feature is presumably related to the increased grazing of ostriches in the Upper Albany region which is considered best suited to sheep.

In 1911 wool produced in the two Divisions totalled roughly 340,000 lbs and 2,000 lbs respectively reflecting once more the importance of cattle rather than sheep over the grass-land regions of Lower Albany and Bathurst. In both Districts considerable quantities of hides and skins were also offered for sale.

TRANSPORTATION:

During this period transport facilities were greatly improved, and whereas much of the transportation had hitherto been carried on by transport-riders using ox waggons, a large proportion of the commerce now flowed along the railways. In 1879 a railway linking Grahamstown to the main Port Elizabeth line at Alicedale was completed and in 1885 Grahamstown was linked to Port Alfred. In addition it is apparent that considerable extensions to the gravel roadways, over which the transport-riders plied their traffic, had been accomplished in the area.

At the mouth of the Kowie River, at Port Alfred, harbour developments had been undertaken since the early years of the settlement and the 1875 Descriptive Hand Book (p. 184) observes, for example, that in 1874, 50 vessels entered the port. In that year imports through Port Alfred totalled £131,450 while exports in 1872 were valued at £101,191. The Hand Book observes also that the port possessed a steam tug and lighters for loading and discharging in the outer anchorage or for bringing vessels of moderate draught (9-10 feet) into the river to the wharves, a mile from the river mouth where stores, a landing warehouse and a customs house had been erected. It should be observed at this stage, however, that although Port Alfred played a relatively important role in the commerce of the area in these early years, repeated attempts to develop the port since

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that time have consistently failed, and today it is of no importance except for a few small fishing vessels. With the geographic momentum possessed by the ports of Port Elizabeth and East London it is very unlikely that it will be developed in the future. Nevertheless considerable interest is still displayed in the port development schemes as will emerge under the heading of transportation in the present day landscape.

It is apparent that at this stage (1914) the chief aspects which characterise the present agricultural and pastoral landscape of the area began to emerge clearly; and it is perhaps more convenient to trace the development of the landscape from this time forward in a topical sequence rather than chronologically. The important features which will be discussed are:-

- (a) General agriculture.
- (b) Pineapple growing.
- (c) Citrus growing.
- (d) Chicory growing.
- (e) Pastoral farming concerning cattle and sheep grazing.

(1) AGRICULTURE:

(a) General Crop Cultivation:

Succeeding census reports reveal that except for fruitgrowing (citrus and pineapple cultivation) and recently to a lesser degree chicory growing, general agriculture remained relatively unimportant as a major commercial farming activity in the years following and into the present landscape. These census reports show that the area devoted to crops (other than pineapples, chicory and citrus) remained remarkably constant throughout the period from 1911 to the present day. In 1946/1947 for example, there were in Albany some, 13,000 morgen of land devoted to agricultural crops (this figure includes about 3,700 morgen of fallow land) and 13,000 morgen in Bathurst (inclusive of 3,000 morgen of fallow land) (1946/47 Agricultural Census)

A study of the utilization of agricultural land

illustrated/.....

TABLE 7 : CROP PRODUCTION IN ALBANY AND BATHURST. (1946/47 Agricultural Census).

	MAIZE.		OATS.		BARLEY.		WHEAT.	
	<u>ALBANY</u>	<u>BATHURST</u>	<u>ALBANY</u>	<u>BATHURST</u>	<u>ALBANY</u>	<u>BATHURST</u>	<u>ALBANY</u>	<u>BATHURST</u>
Area Sown (morgen)	4,000	3,850	1,615	410	560	297	414	23
Reaped for grain (Morgen)	2,400	2,700	89	16	86	91	216	12
Cut green or grazed (Morgen)	-	-	(1,347)	(324)	415	137	(198)	(11)
Reaped for hay (Morgen)	-	-	179	70	-	-	-	-
Reaped for silage (Morgen)	771	18	-	-	-	-	-	-
Total grain yield (bags)	8,000 <sup>*</sup>	8,700 <sup>*</sup>	447	63	347	618	950	26
Grain retained on farms (bags)	6,900	7,600	?	?	?	?	561	26
Hay yield (tons)	-	-	240	70	-	-	-	-

\* Includes production by Natives on European farms.

1 bag of Maize = 200 lbs.

1 bag of Oats grain = 150 lbs.

1 bag of barley grain = 150 lbs.

1 bag of wheat grain = 200 lbs.

( ) = presumed area devoted to green grazing or greenfeed.

illustrated on Map 6 may yield a somewhat erroneous impression of the commercial importance of general agriculture in the area unless it is realised that agricultural crops, are here, not generally cultivated for cash sales. Furthermore it should be remembered that crops such as pineapples, chicory and citrus are intensively cultivated and require only a limited area for their growth.

Agricultural crops are cultivated here mainly for use, chiefly as stockfeed or in the case of maize for consumption by Native farm-workers, on the farms where they are grown. This feature is illustrated in Table 7. Moreover, for the most part, these crops are usually raised in conjunction with some other major farming activity rather than as a sole source of income.

Throughout the period since 1911, maize remained the major grain crop in both Albany and Bathurst followed in order of magnitude by barley and oats together with a small sowing of wheat. In Bathurst the cultivation of artificial pastures and potatoes are also important features as illustrated on Map 6.

In addition to the crops noted above smaller quantities of Kaffir-corn, millet, cowpeas and lucerne are also cultivated here. Vegetables are grown mainly in the vicinity of the major produce marketing centres at Grahamstown and Fort Alfred.

It may be concluded that owing to the relatively limited extent of fertile agricultural soils and low yields over much of the area together with limited irrigation facilities on the one hand and in the face of competition from more lucrative farming activities, to which the environment is more adapted, on the other, the area does not favour the cultivation of such crops on a large scale commercial basis.

#### PINEAPPLE GROWING:

It has been noted above how Mr. C. Purdon brought the Queen pineapple to this region in 1865. In 1895 the Cayenne variety was introduced by him and again by extending his own plantings and disposing of excess suckers, the variety has been gradually spread throughout the area.

King (1951) notes that for a number of years pineapple growing was largely confined to the coastal belt around Bathurst, but gradually the area has been extended both inland and along the coastal belt to include Lower Albany and parts of Peddie, East London and Alexandria. By 1918 for example, Bathurst had 1990 morgen of pineapple land and Albany 153 morgen while by 1946/47 Bathurst had 6,000 morgen, Albany 1,400 morgen, East London 2,000 morgen and Alexandria 400 morgen. In 1951 the estimated number of plants in the pineapple growing area exceeded 100,000,000 with 80,000,000 contained within Bathurst alone. Today, according to Shuttleworth (1953) the major area of expansion is in the East London region where climatic conditions are more favourable; but he notes that it will take some years before the production of Albany and Bathurst is surpassed.

During the 1951/52 season Albany and Bathurst produced 30,000 tons of fruit representing about 66% of the total Union crop, while East London produced 14,000 tons or about 30% of the total crop. The remaining portion is produced mainly in the Pinetown and Durban Districts of Natal and in the Eastern Transvaal. (Shuttleworth, 1953).

For many years the pineapple industry was limited by the lack of markets, the fruit being sold fresh on the frequently glutted home markets at low prices. By 1912/14, however, a small export trade to Britain had been developed and from 2,000 - 3,000 cases, each containing a dozen pines, were being despatched each year (King, 1951). During World War I exports ceased, but in 1916 a canning factory was established in Port Elizabeth opening up a large market for the fruit. With the factory absorbing the greater portion of the crop, fresh fruit markets were more regularly supplied, and prices were more stable, while pineapple acreages were steadily extended.

After the war exports were resumed but owing to inefficient refrigeration, the quantities exported remained small. At this stage the quantity of fruit produced was too small to warrant it being transported in separate holds and it

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was thus loaded into holds containing deciduous fruits. The latter require lower temperatures than the optimum for pineapples which consequently resulted in considerable losses of pineapples in transit. Clark (1931) notes, therefore, that by 1928 the total exports had reached only 49,000 cases.

During World War II exports again ceased but increased demands for the locally canned product for the armed forces readily absorbed the pineapple crops.

In 1950 exports were once more resumed, 80,000 cases valued at £160,000 being despatched. With the increased production the fruit is now transported in separate holds from other fruit and research into optimum conditions for transporting the fruit has considerably encouraged exports.

In recent years exports have risen considerably and in 1951 le Roux (1951) notes that it was estimated that over 300,000 cases would be exported. Nevertheless, the greater portion of the crop by weight is still canned, and in 1951 out of a total of over 40,000 tons produced, 30,000 tons were supplied to the canners. King (1951) notes that there are some 22 canning factories on the Coast from the Western Province to East London which each handle huge quantities of the fruit every year. Apart from the increasing demands in the Union for the canned fruit, the larger proportion is exported to other African territories, the Middle and Far East, Canada, UK, etc. From its small beginnings, therefore, the pineapple industry has expanded to become a major agricultural activity in the area and in 1951 le Roux (1951) estimated the total value of the crop to be over £1,000,000.

It is apparent that the industry has of late experienced a boom period and opinions are sharply divided as to its future.

Soil conservationists view the boom with alarm and Robertson (1951) among others, observes that apart from the nature of the crop, which requires clean cultivation leaving the soils exposed and open to deterioration, the psychology of many growers is a major factor. He notes that since 1820

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the area has been considered poor agricultural country where farmers claim that "before the pineapple boom farming here was a dead loss." Robertson observes, therefore, that under boom conditions many farmers have ploughed up their soil in their haste to share in the good fortune, without due consideration being given to soil erosion, which in many cases has resulted in considerable deterioration of the lands. Gradually, however, he notes, the growers have come to realise that the industry is likely to become permanent and are now concerned with maintaining their soils. Shuttleworth (1951) also observes that planting methods have considerably improved and many progressive farmers are establishing mixed farming to avoid the dangers of monoculture.

The phenomenal demand from the canners, who offer long term contracts to producers, is probably the major stabilising factor in the industry today. The canners provide a regular and constant market for the greater proportion of the crop, while the remainder is somewhat more profitably disposed of on regularly supplied export and home markets at high prices.

Although a pessimistic view may be taken, Shuttleworth (1951) for example, notes that many observers believe that the industry has a bright future. Mr. Lewcock for example (an Australian pineapple expert attached to Messrs. Jones & Co. canners and producers of Port Elizabeth) observes that the South African pineapple regions have not got the best climate in the world, but it is adequate and we have untold acres of suitable ground with access to seaports and we have the labour. South Africa could become the largest producer of canned pineapples in the Commonwealth. He notes that Hawaii produces 70% of the world's canned pineapples (some 700,000 tons representing a £14,000,000 annual production) followed by Formosa, the Phillipines and Puerto Rico, all regions within the dollar area. In the Commonwealth South Africa ranks third after Malaya and Queensland producing 2% of the world's total but Lewcock predicts that in the future South Africa could be third

in the world after Formosa and first in the Sterling area. He observes further that judging from the last war, another will not affect the industry adversely since canned foods have a high priority in wartime and hence the Unions production would be readily absorbed along this channel.

Shuttleworth (1951) notes that the prosperity of pineapple growing is materially visible in the area in the form of modern farm houses, well furnished, with water laid on and lit with electricity (from small farm plants and not from a grid system) and it may be added a higher standard of living than in former years may be clearly observed.

Since the pineapple industry is not served by a central Control Board the bulk of the crop from Albany and Bathurst is marketed through the channels of the Bathurst Farmers Union the major co-operative society in the area.

Finally the industry in this area is served by a government sponsored pineapple research station at Bathurst where valuable research work on pineapple cultivation has been accomplished. It is the opinion of many growers, however, that the limited financial resources of the station have thus far prevented it from conducting sufficient research into the many problems which face the industry in this area, and that through increased government aid it could be of greater service.

#### CITRUS GROWING:

The historical record of citrus growing in Albany and Bathurst is very incomplete but it may be suggested that the industry here has followed the general pattern of citrus growing in the Union as a whole.

Citrus fruits were introduced to the area at an early date, as already noted, when the fruit was cultivated in small farm orchards on a non-commercial basis, most of the fruit being used for home consumption and the sale of a small excess on the Grahamstown and other local produce markets.

The trees of these early orchards were apparently dominantly of a seedling variety.

It is interesting to note that (according to Marloth (1952) ) Bahia navel trees, grafted (presumably on rough lemon root stock) by Mr. W. Tuck of Grahamstown, were distributed in the Cape Province in 1854, and since commercial citriculture is primarily based on trees propagated vegetatively, this date may perhaps be regarded as the beginning of the citrus industry in South Africa.

It is evident from census reports, however, that commercial production remained small and in 1896, for example, the number of trees in Albany totalled only 4,500 while Bathurst, with the second largest number of trees in the Cape at the time, had only 14,000 trees. According to Bestbier (1952) the citrus industry continued to experience very slow development, with the fruit being sold mainly on the home markets until the end of the First World War when, he notes, "the initiation of large scale developments in the Citrus Industry" took place. In 1911, for example, only 853 shipping tons were exported from the Union while by 1938 the total had reached 202,446 shipping tons. By 1918 Albany had 17,600 grafted orange trees and 34,000 seedling trees while the Bathurst orchards carried 127,500 grafted orange trees, 26,500 seedling orange trees and 23,000 lemon trees, reflecting a marked increase over the 1896 records. The increase in production is attributed mainly to the development of the export trade from the end of the war onwards.

During the Second World War exports of citrus fruit were greatly reduced and farmers throughout the Union experienced serious price declines and glutted home markets. Since the war, however, conditions have considerably improved with the reintroduction of exports.

Today Albany and Bathurst together have over 250,000 citrus trees and according to Mr. Lombard, the Citrus Officer in Grahamstown, the normal production of the area each year

is about 100,000 cases (70 lbs per case) of Navel oranges and 37,000 cases of Valencia oranges for export and 20,000 cases of Navels and 5,000 cases of Valencia oranges for sale on home markets. About 70% of the home market fruit from the area is sold on the produce markets of East London, King William's Town and Grahamstown. In addition small quantities of lemons and grape fruit are also produced.

The area is served by one co-operative packhouse situated in Grahamstown and administered by the Bathurst Farmers' Union the major co-operative society of the region. This packhouse has a capacity for dealing with from 150-200,000 cases of export fruit per annum and handles the bulk of the crop produced in Albany and to a lesser extent that produced in Bathurst. The sale of the bulk of the crops both for export and home markets from the two districts is, however, administered by the Bathurst Farmers' Union.

#### CHICORY GROWING:

Although chicory growing in the past was mainly confined to the District of Alexandria the Districts of Albany and Bathurst have in recent times become fairly important producers of the crop. In 1951 for example they produced 17% and 23% of the total crop respectively as against Alexandria's 55%. A short account of the development of the Chicory Industry is, therefore, warranted here.

Radloff (1952) observes that the crop was first cultivated on a recognisable scale in South Africa in 1895 by Mr. R.T. Smith in the Alexandria District. Planting and cultivating methods were primitive, however, and only small quantities were produced. This locally grown chicory was produced mainly for home use practically all the chicory used in the colony at the time being imported from Europe.

Home production remained small for many years due to the poor qualities produced and uncertainty of the market, the chief of which was Port Elizabeth to which the crop was

transported/....

transported in ox waggons.

In 1917 Smith established his second drying and roasting mill on the farm Kaba in the Alexandria District, at a time when very little chicory root could be imported from Europe due to the war, and prices rose considerably to 40/- / 100 lbs of raw root as compared to 13/6 - 25/- / 100 lbs of dried root in the preceding years.

After the war when imports from Holland and Belgium were resumed, prices for the rather poor quality home product declined once more. The raising of import tariffs in 1922 and 1931, however, gave the industry the protection is required and resulted in a considerable decline in imports from over 3,000,000 lbs in 1928 to about 400,000 lbs in 1938, while home-grown chicory used in the Union rose from 45% in 1928 to 90% in 1938.

In the interim a co-operative society had been established to control the marketing of the crop, but it was unpopular and was disbanded in 1935.

On the outbreak of war in 1939, however, a keen <sup>internal</sup> demand for South African chicory was once more experienced, and a desire for controlled marketing of the crop and for the establishment of higher standards became evident. Accordingly in 1940 the present Chicory Control Board came into being. The Board today controls the marketing of the crop not only in Alexandria but also in the districts of Albany, Bathurst, Peddie, East London and Port Elizabeth, and also provides a considerable number of other useful services to the growers.

In recent years as noted above considerable quantities of chicory have been cultivated in Albany and Bathurst which are the second largest producers after Alexandria. The remainder of the Union's chicory crop is produced in the Peddie, East London and Port Elizabeth Divisions. Radloff (1952) notes, however, that in Albany and Bathurst chicory growing is secondary to pineapple production and, in the face of competition from that industry, is unlikely to progress much

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beyond its present status or to seriously challenge the lead of Alexandria.

The Union crops produced in the period 1941 - 51 have varied from 1,460,000 lbs of dried root in 1941 to 24,000,000 lbs in 1951, the latter being an exceptional record crop. Radloff estimates that the average crop for the 5 years preceding 1951 totalled about 8,000,000 lbs. Production is usually sufficient to supply the needs of the Union's coffee manufacturers and only occasionally are they obliged to resort to importation of the product when poor crops are reaped locally.

PASTORAL FARMING:

Since 1914 as in the years preceding that date, pastoral farming with cattle and sheep continued to be an important aspect of the rural economy of the area. Detailed analyses of the development of pastoral farming in the area are not available, but from census reports it may be observed that the cattle population of Albany and Bathurst has, except for relatively minor fluctuations, remained fairly stable since 1911 - 14. In 1948, for example, there were approximately 49,400 European-owned cattle in Albany and 10,000 owned by Natives living on European farms in the District. In Bathurst the totals were 27,400 and 6,500 respectively. These totals include both beef and dairy cattle both of which categories are common features of the area. In many cases beef and dairy cattle are grazed as a complimentary farm activity to some other major occupation such as pineapple, citrus or chicory growing for example.

In common with most other areas in the Union, however, the woolled-sheep population has declined considerably. In Albany after increasing to 215,000 in 1933 the numbers declined to approximately 104,000 in 1948. de Klerk and Bowman (1952) report that this general decline of the merino sheep population may be attributed severally to diseases and insect pests,

encroachment/.....

encroachment of undesirable elements in the grazing, labour shortages, the difficulty of breeding sheep adapted to widely varying conditions and to that major problem relating to the low fertility of the merino sheep. They note, however, that the main reasons are to be sought in the competition from more intensive types of farming with decreasing merino flocks and with more attention being paid to other agricultural and livestock products. Nevertheless, with the phenomenal prices obtained in the recent wool boom and to a lesser extent today, the sheep farmers of the area are as prosperous if not more so than the pineapple farmers. The wool produced in Albany today totals roughly 1,400,000 lbs. while Bathurst with only 389 merino sheep produces only ~~from~~ between 60 - 80,000 lbs.

Non-woolled sheep numbers on the other hand have remained relatively constant since 1911 - 14 and in 1948 there were 51,000 non-woolled mutton sheep in Albany and 418 in Bathurst. Goats are also fairly common in the area, there being 14,000 in Albany in 1948 and 2,700 in Bathurst.

Other livestock farming in the area includes poultry keeping, there being 47,000 fowls in Albany and 39,750 fowls in Bathurst in 1948, and pigs of which the two Divisions possessed 1,000, and 1,150 respectively.

#### THE PRESENT FARM LANDSCAPE.

The present rural landscape of Albany and Bathurst emerges, therefore, as one which is characterised by a fairly wide range of farming activities, the most important of which have been noted above and include cattle and sheep grazing, the cultivation of pineapples, chicory, citrus and on a smaller scale a wide variety of other crops including maize, barley, oats, wheat, lucerne and Kaffircorn. In recent times also, a small amount of cotton has been cultivated. In addition such other specialised activities as poultry farming and the rearing of pigs, goats and horses are also commonly practised

but/.....

but on a smaller scale.

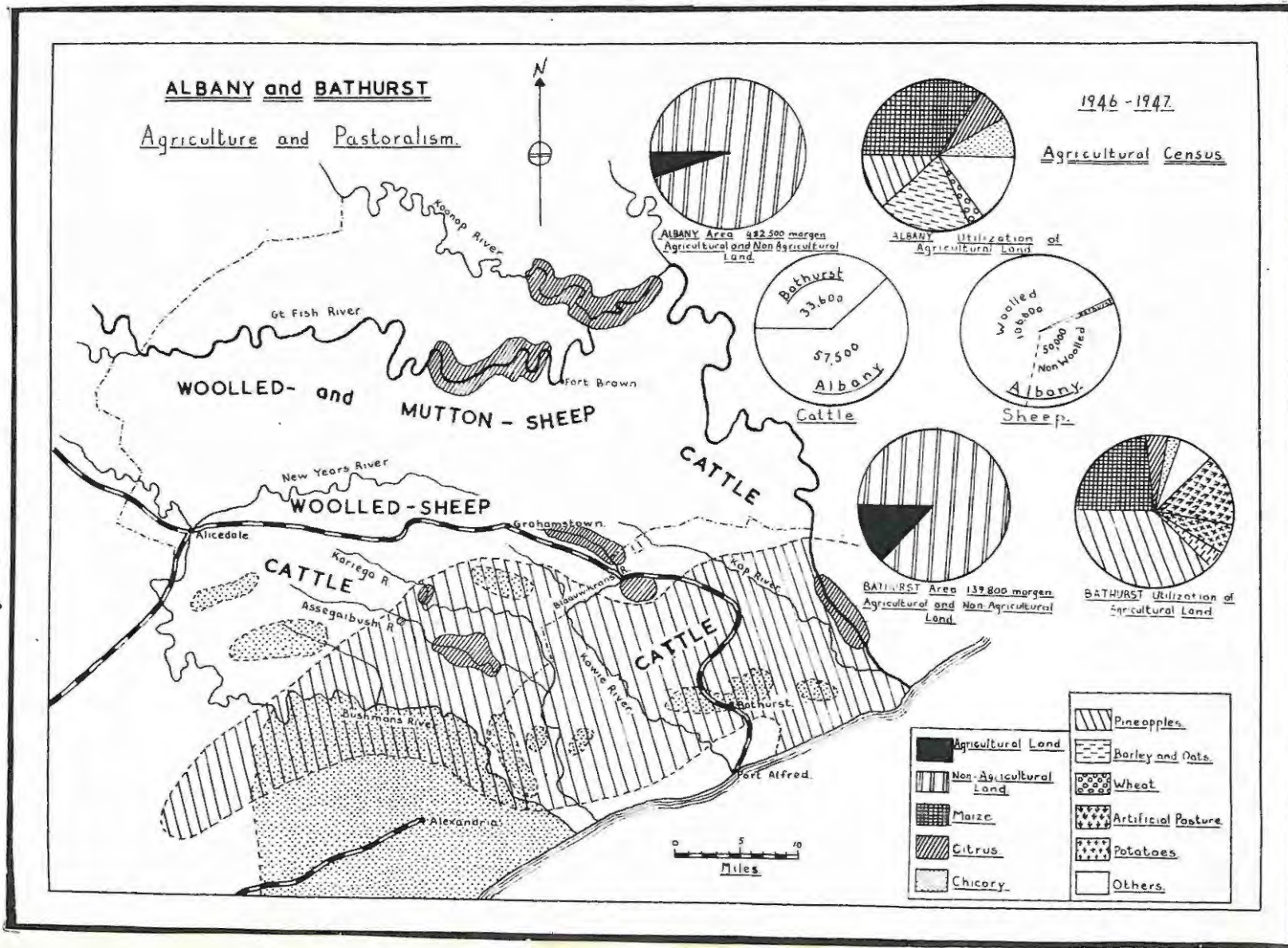
Map 6 illustrates the broad features of the distribution of the major farming activities of the area from which the following major factors may be observed:-

- (a) Cattle grazing both for beef and dairy produce is a common feature of all parts of the region, both in the better watered coastal and highland grasslands, and the drier succulent scrub of the interior valleys. On the whole, however, although no statistical data is available it may be suggested that the major portion of the cattle population, especially of the dairy cattle, is concentrated mainly in the more favourable coastal and highland grassland pastures.
- (b) Sheep grazing is a characteristic chiefly of the sour highland grassland and the drier scrub pastures of the interior, and is largely excluded from the more luxuriantly growing grasslands of the coastward margins of the area. According to Mr de Wet, Agricultural Extension Officer in Grahamstown, sheep, in the Great Fish River valley, are especially prominent westwards from a point corresponding roughly to Fort Brown. West of this point the grazing begins to grade gradually into the more arid Karroo type of vegetation, this grazing being considered more suited to sheep than cattle. The Eastern and Southern coastal portions of the valley on the other hand are characterised mainly by beef cattle grazing although sheep, especially the Black-head Persian mutton breeds, are not entirely excluded.

The highland region on the other hand exhibits a somewhat diversified farming landscape and besides woolled-sheep grazing such other special farming practices as poultry farming, cattle grazing, deciduous fruit growing and over small stretches even pineapple cultivation are also carried on. Sheep, however, may nevertheless be

considered/.....

# MAP 6.



Pineapple and Citrus Areas after  
Dr J.P. Jansen National Resources  
Planning Council 1952.

Chicory Growing Areas after  
Orchard and von Rooyen 1951.

considered as the major feature of the area.

- (c) Pineapple growing is centred for the most part on sloping well-drained soils in the more temperate frost-free coastal margins of the area and according to le Roux (1951), mainly below 1,500 feet. The major areas of production are seen to be in Lower Albany and Bathurst where the crop represents the major agricultural activity.
- (d) Chicory growing is carried on in scattered areas situated mainly in the Western margins of the area where they represent outliers from the major growing region in the coastlands of Alexandria.
- (e) Citrus growing is concentrated mainly on alluvial soils along the major river valleys of the region where the orchards may be irrigated by water pumped from the rivers or from farm dams constructed across the water courses. As illustrated the major areas of production today are situated along the Fish River, the Blaauwkrantz River in Belmont Valley and in the Kariega and Assagaibush river valleys.

RURAL POPULATION:

According to the 1951 population census (Preliminary Report No. 192 of 1952) the total population of Albany and Bathurst comprised, in that year, 46,531 and 23,499 persons of all races respectively. Of these totals 19,176 and 16,657 persons respectively comprised the rural population of the two Divisions, and were made up as follows:-

TABLE 8 : RURAL POPULATION OF ALBANY AND BATHURST.  
ALBANY. BATHURST.

Categories.	No.	Persons Sq. Mile	No.	Persons Sq. Mile.
Europeans	1,588	1	1,315	2.3
Asiatics	1	-	-	-
Cape Malays	6	-	3	-
Coloureds	830	.5	126	.2
Natives.	16,751	10.4	15,213	27
Total all Races	19,176	11.9	16,657	29.5

This table serves to illustrate the greater concentration of people in rural Bathurst with greater attention being paid to more intensive agricultural and pastoral usages of the land as compared to Albany where extensive pastoral activities are more prominent, especially over the dry interior portions of the Division where agriculture, except on irrigated land, is largely excluded.

It may be observed here that farming in Albany and Bathurst is almost entirely in the hands of Europeans, and the landscape is not complicated by enclaves of Native Reserve territories which characterise the bounding districts to the East. The relatively large native population here is resident mainly on European farms within the area.

LAND TENURE:

The major features of land tenure in the area is summarised in Table 9 below:-

TABLE 9 : LAND TENURE IN ALBANY AND BATHURST.  
(1945/46 Agricultural Census).

CATEGORIES.	No. OF FARMS & AREA IN MORGEN.			
	ALBANY.		BATHURST.	
	No.	Area.	No.	Area.
(i) Owner Farmed.	347	372,999	158	88,120
(ii) Farmed in Partnership	28	25,402	12	6,373
(iii) Rented by Occupiers	62	48,167	46	20,808
(iv) Occupied on Share System	8	6,695	30	13,558
(v) Managed for others	31	43,502	20	19,220
TOTAL -	476	496,765	266	148,079

NOTE. The statistics contained in Table 9 are based on census returns received from farmers and exclude a small number of farms from which no returns were received.

From Table 9 it may be observed that by far the greater majority of the farms are owner worked while tenancy and absentee ownership are relatively minor features in comparison.

FARM SIZE/.....

FARM SIZE:

The classification of farms and holdings according to area is summarised in Table 10 below:-

TABLE 10 : CLASSIFICATION OF FARMS BY AREA FOR ALBANY & BATHURST.

AREA IN Morgen.	ALBANY.		BATHURST.	
	Number of farms.	Percentage	Number of farms	Percentage
0-100	29	6.2	69	23.0
101-500	143	30.8	137	45.0
501-1,000	128	27.2	64	21.0
1,001-1,500	71	15.2	19	7.1
1,500-2,000	39	8.3	5	1.6
2,001-3,000	35	7.8	7	2.0
3,001-5,000	15	3.2	1	0.3
5,000-10,000	6	1.3	0	0.0
TOTAL -	466	100 .	309	100.

(NOTE These statistics are based only on returns actually received from farmers in the 1948/49 agricultural census).

From Table 10 it may be observed that in Albany the majority of farms fall within the brackets of 100-500 and 500-1,000 morgen while a fair number of farms presumably situated in the more sparsely vegetated area of the interior valleys, are of considerably larger areas of over 2,000 morgen. One farm in the Division has an area of over 9,000 morgen. In Bathurst on the other hand almost half of the farms are from 100-500 morgen in area while the proportion of farms less than 100 morgen in area is also considerably larger than in Albany. In addition the number of farms of over 1,000 morgen in size is markedly lower than in Albany. These features may be traced primarily to the greater concentration on more intensive agricultural activities in Bathurst as compared to a greater concentration centred on pastoral farming, especially with sheep on larger farm units in Albany.

TRANSPORTATION IN ALBANY AND BATHURST:

The organised transportation of goods and passengers within this area relies almost entirely upon rail and motorised road transport facilities provided by the South African Railways. A small proportion of the goods and produce of the area is handled by privately owned transport contracting firms.

Map 7 illustrates the railway communications and the major motor bus routes. It, however, excludes a large number of short branch routes, followed by the motor buses, serving farms which are not actually situated close to a major route.

The map reveals the marked radial pattern of route-ways focused on Grahamstown, situated roughly at the centre of the area, and serves to illustrate the importance of that town as the main collecting, distributing and commercial centre serving the surrounding farming district. Port Alfred is the focus of a smaller radial pattern of routes the town being the main commercial centre for the Bathurst coastal areas, as also the terminus of the railway line from Grahamstown. Whereas in the past the town was an important collecting and distributing centre for imports and exports as also for produce destined for the home markets, its importance today as a collecting and distributing centre is relatively of minor importance and its sphere of influence is purely local.

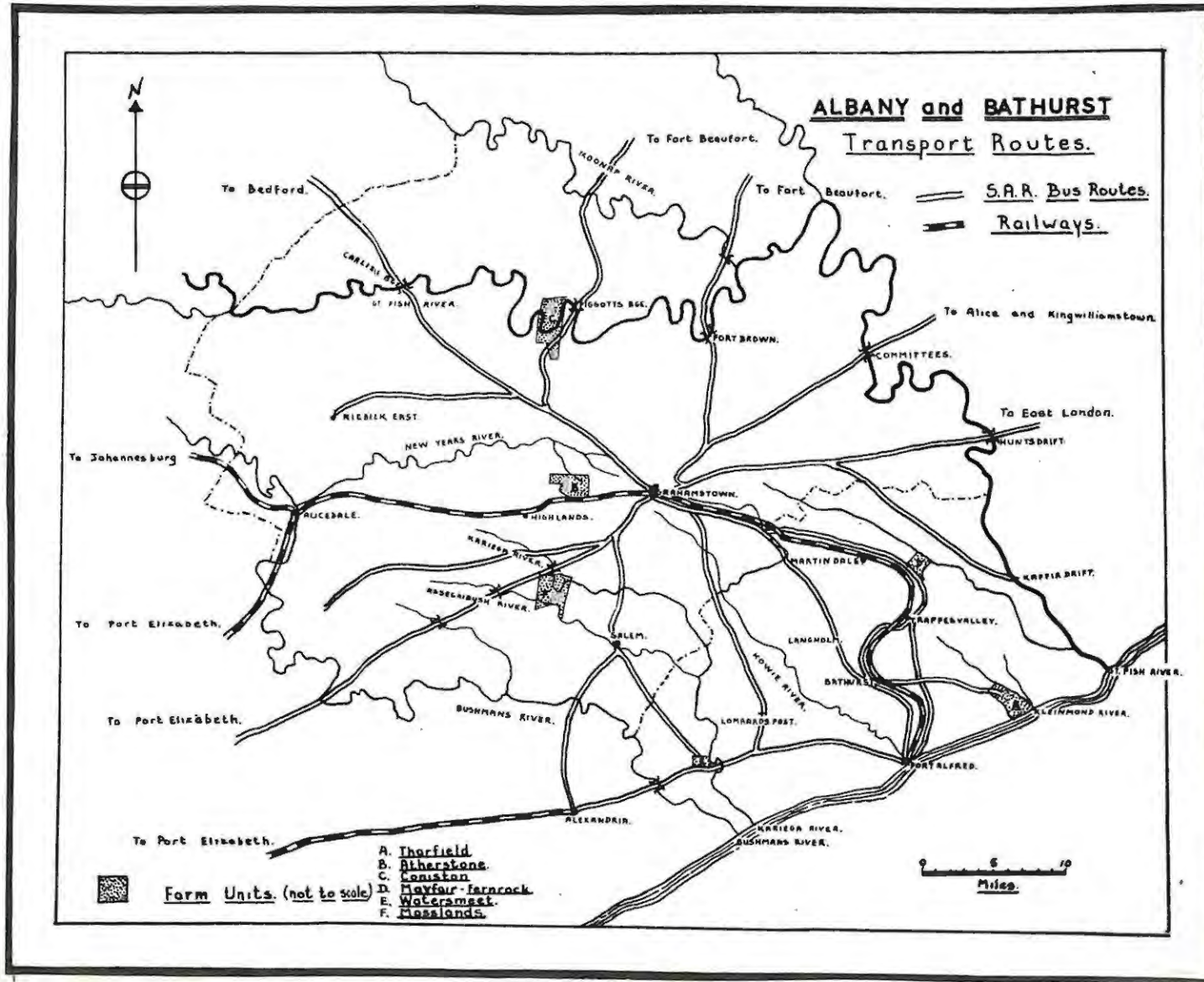
The produce and goods from its immediate hinterland are now more conveniently routed to the many small railway sidings and station situated at short intervals along the railway line or are carried by bus to Grahamstown and thence by rail to their destination.

A third route focus is centred on Alexandria towards which much of the trade from the S.W. portions of the area, especially that from the chicory growing community, is directed. The village is the site of the Chicory Control Board, the collecting and distributing body of the chicory crops produced in the area. Since most of the chicory producers' business is conducted here the town has become also the main commercial

and/.....

# MAP 7

After S.A.R. Sketch Map  
Grahamstown Station.



and shopping centre for many farmers of the area. Alexandria is also the terminus of a branch line railway leading to the main Port Elizabeth-Johannesburg line. The use of this railway is of greater convenience to farmers in this S.W. portion of the area than the rather circuitous route via Grahamstown and Alicedale to Port Elizabeth or the interior.

It may be observed that the railway routes serving the area are branch lines from the main Port Elizabeth-Johannesburg railway and it suffers, therefore, to some extent, from a less efficient and less frequent service. This would not have been the case had the main line traversed the region. Nevertheless the transport facilities offered by the railways complemented by a radiating system of bus routes for carrying both passengers and goods, is considered adequate for the present requirements of the area. Under the available transport system no point in the region is more than 5-10 miles from a recognised transport route.

In recent years, however, frequent shortages of railway rolling-stock have caused considerable inconvenience to farmers within the area. It is evident furthermore that as the agriculture capacity of the area expands, as is most likely to be the case when the dynamic developments of the present day are considered, services will have to be materially improved, especially as regards rail transport, to cope with the increased demands being placed on the transportation facilities. As regards rail transportation an extension of the line, from Port Elizabeth to Alexandria, across Bathurst and Peddie to link up with the Border Railway System, would appear to be very desirable and would remove the necessity for the circuitous route through Grahamstown and Alicedale. It would naturally be of great importance to the neighbouring Division of Peddie which at present is served only by a bus service.

The roadways of the area, except in the case of the National Road which traverses it are entirely or partly gravel surfaced. The National Road linking Port Elizabeth and

East London and which passes through Grahamstown is tarred from Port Elizabeth to Peddie beyond the eastern limits of Albany. In addition the trunk route linking Grahamstown to Port Alfred is tarred from the former to the Albany Divisional boundary at the Blaguwkranz River and it is planned by the Bathurst Divisional Council, to complete the tarring of this road in the near future. The main roads from Grahamstown to Bedford and Fort Beaufort are at present being prepared for tarring. This work will terminate at the Divisional boundary but the Divisional Councils of Bedford and Fort Beaufort, however, are being encouraged to complete the roads in their areas.

The gravel roads of the area, however, are frequently in poor condition and corrugated due to the heavy traffic which they must carry, notably Railway Motor-buses, heavy farm lorries, ox waggons and the like. These poor roads are often the cause for bitter complaint from farmers, especially those producing fruit crops, whose product is readily damaged in transit over poor roads.

The bulk of the overseas export trade of this region passes through the port of Port Elizabeth on which the railway and road routeways from Albany and Bathurst converge as illustrated on Map 1. The exports from the region are agricultural and pastoral products mainly fruit - pineapples, citrus and small quantities of peaches and apples, wool, hides and skins and in some years a small amount of dried chicory root. In pre-1939 years quantities of beef and mutton were also exported but have not been resumed since the war.

The vain hopes for the development of a minor port at the mouth of the Kowie River, to serve this region, have already been noted above. Nevertheless interest in the possibilities of establishing a port here is still displayed. The most recent expression of such interests was made at the 1953 Annual Congress of the Cape South-Eastern Areas Public Bodies Association held at Adelaide (Grocotts Daily Mail October 6th, 1953).

At/.....

At this meeting it was pointed out that Port Alfred is the centre of the most extensive and concentrated pineapple growing area in the Union; and with factories in Port Elizabeth and East London the fruit has to be picked less ripe than it should or could be in order to stand up to the rough rail journey via Alicedale. Were it possible to establish a canning factory in Port Alfred this long rail journey would be unnecessary. Furthermore it is reported that should the demand from a canning factory arise, quantities of fruit and vegetables such as Cape Gooseberries, guavas, green beans, peas, tomatoes and root crops could be readily produced in this region. It is observed that sugar and coal at port rates are the two great essentials and only the opening of the harbour at Port Alfred to coastal traffic could supply these essentials/cheaply enough for the establishment of a canning industry in the town. Finally the possibility of developing a fresh fish industry at Port Alfred was expressed. This fishing industry could only flourish if the harbour were made safe for the passage of trawlers.

Whether these arguments will be of any avail in the future remains to be seen. As noted above, however, with the momentum held by Port Elizabeth it is very unlikely that port development will be undertaken here. Furthermore the approaches of the Kowie River mouth suffer from the natural disadvantages of a persistent sand bar and a rock reef bound coast, both undesirable and making for unsafe shipping conditions.

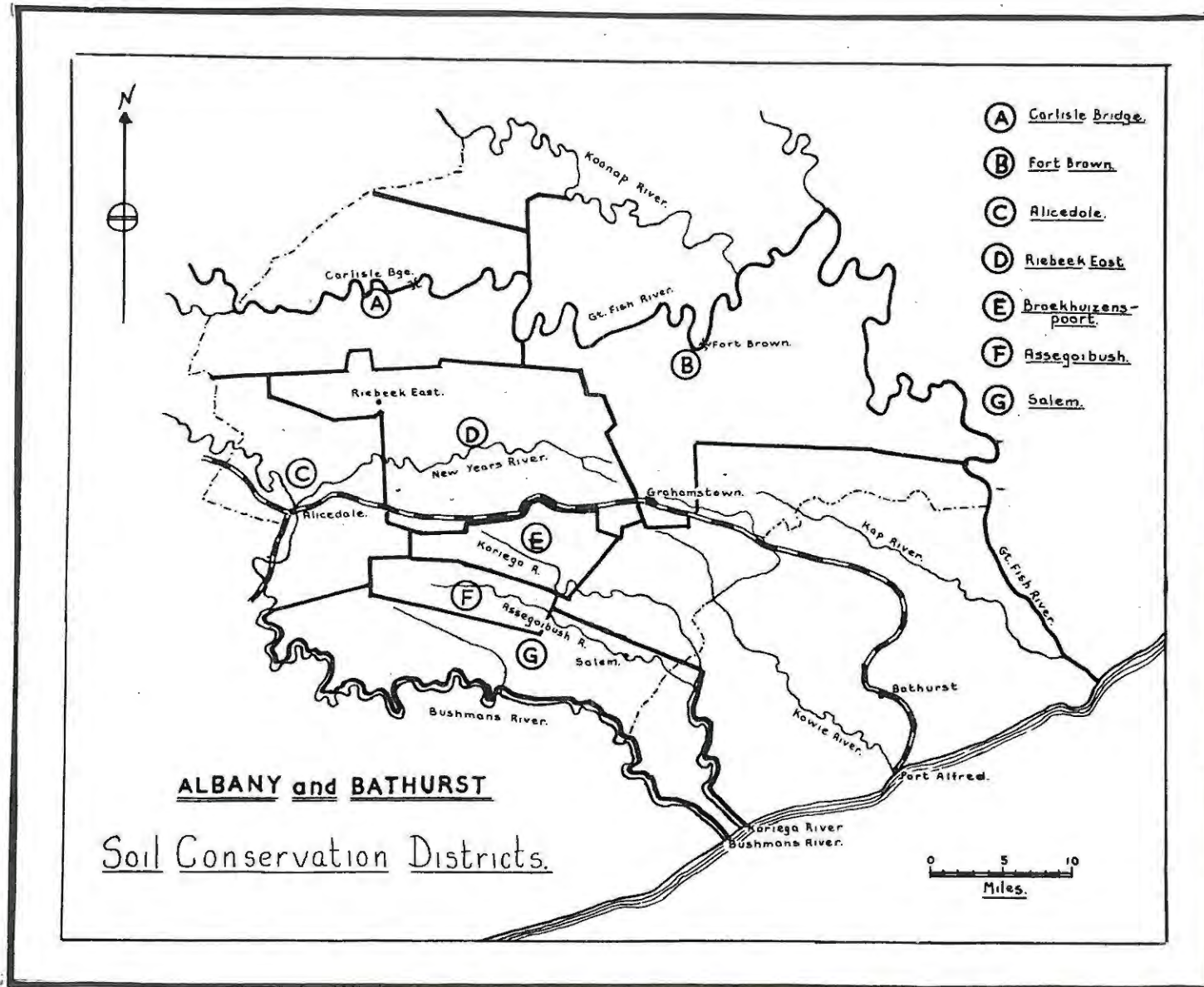
It may be suggested, as a final note, that the disadvantage of the circuitous rail route could be improved upon instead by the extension of the Alexandria railway into Bathurst which would bring Port Elizabeth within more easy reach for the transportation of fruit crops.

#### SOIL CONSERVATION IN ABLANY AND BATHURST.

Since the introduction of the Soil Conservation Act by the Union Government in 1946. (Act 45 of 1946) considerable

development/.....

# MAP 8.



development in the field of conservation farming has been accomplished in the area. As may be observed from Map 8 7 Soil Conservation Districts have already been declared. These Districts are entirely within the Albany Division except for the narrow stretch of land in the Western borderland of Bathurst between the Bushmans and Kariega rivers. Similar Districts are, however, planned for those areas outside of the present declared regions, in the near future. Soil Conservation Districts thus far declared are those of Carlisle Bridge, Fort Brown, Riebeek East, Alicedale, Broekhuizenspoort, Assegaibush and Salem.

The boundaries of these districts have been arbitrarily computed by the Central Committee in each District. These Committees consist, in most cases, entirely of farmers who own and work farms within the area of their District. Two-thirds of the members of each Committee are elected by the local farmers while the remaining one-third are appointed by the Department of Agriculture.

For each Conservation District a Master Plan embodying broad recommendations for improving farming practices in the respective areas has been drawn up. These Master Plans are utilized in computing comprehensive individual farm plans for each farm within the respective Districts. These farm plans are normally drawn up by the farmers in consultation with officers of the Department of Agriculture and or with the Central Committee, whereafter they are submitted to the Minister of Agriculture for final approval. It then remains for the farmer to carry the final plan into effect on his farm. In his work of rehabilitating eroded soils and vegetation, developing water supplies, erecting silos etc. the farmer is aided by financial assistance from the State if such works are formally approved by the Soil Conservation Board and the Department of Agriculture.

According to Mr. de Wet (Agricultural Extension Officer in Grahamstown) the process of completing individual

farm/.....

farm plans is slow but that a considerable number have already been completed and in most cases marked improvements in farming practices and farm landscapes are to be observed after the implementation of a plan.

The Central Committees working through the Department of Agriculture have certain legal powers to enforce the adoption of conservation farming in their respective areas. The policy usually adopted, however, is one of encouragement and demonstration to educate the farmers in the ways of better farming. It may be safely said that most farmers in the area are at least aware of the necessity for conservation farming and although the process of imple<sup>men</sup>ting better farming methods is necessarily slow the interest displayed by progressive farmers in the area augers well for the future of farming in the region.

#### CONCLUSION:

In the above discussion some attempt has been made to sketch the broad features of the geographical character of Albany and Bathurst, as a framework for the field studies which follow.

Platt (1942 p. 25) notes that such broad generalisations do not necessarily spring from the study of small rural units of land occupance. The microgeographical field studies, he writes, tell only part of the story, but they nevertheless provide a basic part, and he notes that ultimately such generalisations depend upon factual details, the study of which is the purpose of this enquiry.

Six field studies have been undertaken. Four of these units are situated in the coastal margins of the region between the Albany Highlands and the sea. These comprise a Coastal Cattle Farm, a Pineapple Estate, a Chicory Farm and a Citrus Farm. One unit, a Merino Woolled-sheep Farm, is situated in the Albany Highland region and another a Merino and Mutton Sheep Farm is located in the dry valley of the Great Fish River in the North of Albany. The location of these farm units is illustrated in Map 7.

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ATHERSTONE.

A MERINO WOOLLED-SHEEP FARM OF THE ALBANY HIGHLANDS.

INTRODUCTION:

Atherstone, a Merino woolled-sheep farm of approximately 2,200 morgen in area, is the property of Mr. R. Stephenson. It is situated in the sour grasslands of the Albany Highland region some 13 miles west of Grahamstown on the Alicedale-Grahamstown rail link (Map 7).

The farm was, (according to the farmer,) originally occupied in the years following the 1820 settlement when expansion of the farming areas commenced inland from the original grants. It was initially called "Iron Pot" the name originating from the large number of Native iron cooking pots which were sold in an old trading store which once flourished on the farm in the mid 19th Century. The Iron Pot River running through the farm also derives its name from this source. The farm name was later changed to Kruisfontein but it has for many years past been known by its present name of Atherstone.

The farm is historically interesting in that it was the early home of Dr. John Atherstone whose famous son, Dr. W.G. Atherstone is well known in the annals of Eastern Cape and South African history as the man who first used anaesthetics in S.Africa in 1847, and who played a part in identifying the first South African diamond in 1867. The farm was thereafter successively owned by Messrs. T.T. Hoole, and H.M. Hilton-Barber, the present farmer having bought it in 1932.

For most of its history the farm has been associated with woolled-sheep farming, Mr. T.T. Hoole having established the present fencing system for sheep grazing in the late 19th Century. In its earliest days it is thought that cattle were more important but that sheep soon outstripped them. During the ostrich feather boom also, the farm carried several hundred birds, but this notwithstanding, sheep remained the mainstay of the farm economy as they are today.

GEOLOGY AND RELIEF:

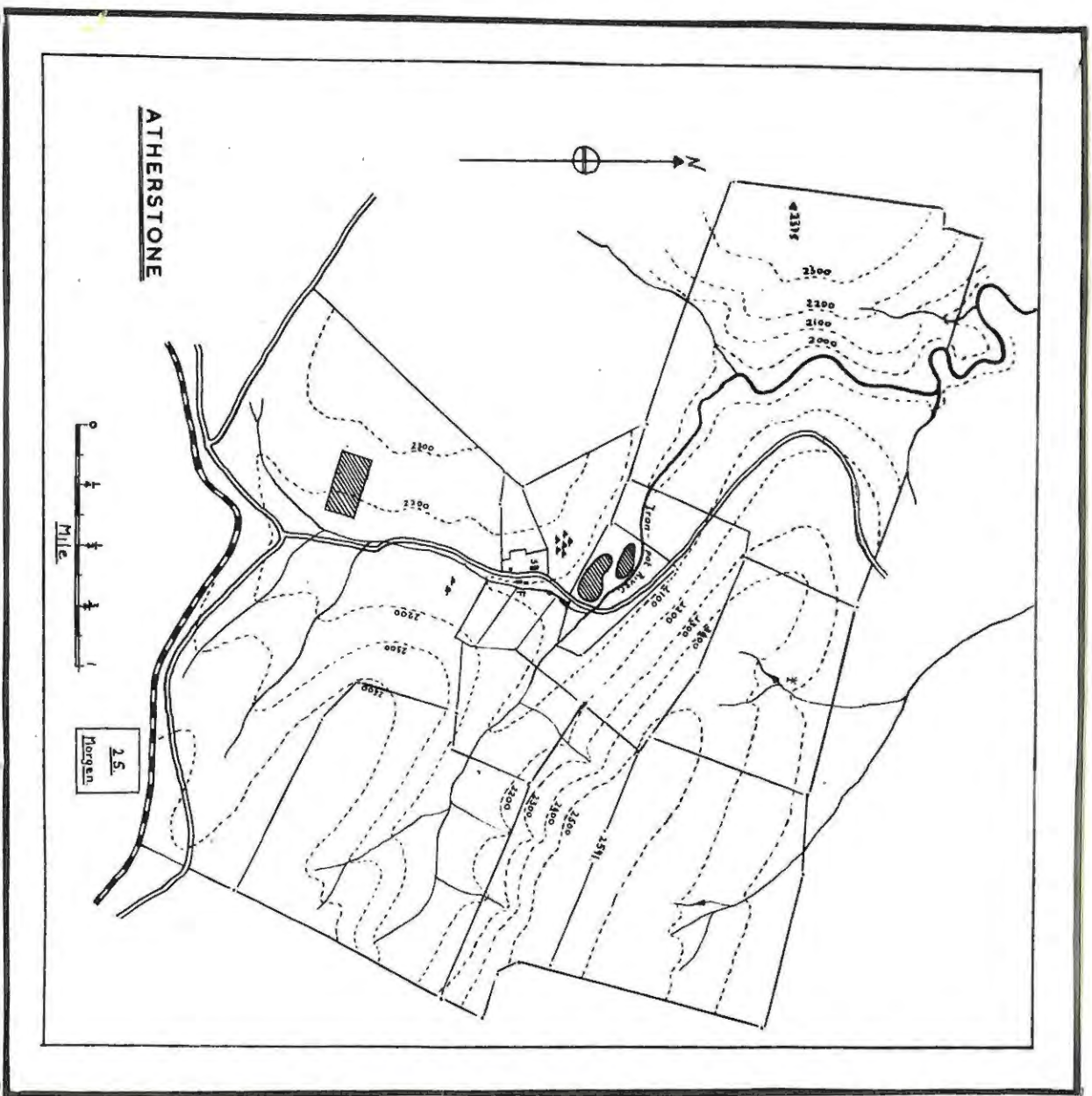
Geologically the farm falls within the area of folded Witteberg quartzite formations of the Cape System, which, as noted above, make up the highland regions of Albany. The farm is situated on the coastward margins of these highlands, which here reach a mean altitude of from 2100-2200 feet.

The trend of the major relief features, is roughly W.N.W. - E.S.E. across the farm, with a range of altitude approaching 600 feet. The highland has been somewhat dissected by the northward flowing Iron Pot River and its tributaries and today lends a distinct ridge and valley character to the farm.

Across the northern portions of the farm (Map 9) stretches a prominent ridge, locally known as the Rand. It has been breached in the N.W. by a narrow stretch of the Iron Pot River separating it from a highland block in the N.W. corner of the farm. The main ridge slopes steeply into the Iron Pot valley and for the greater part of its length presents a rather rugged South-facing slope interrupted at intervals in Camp E by narrow and steep gradient tributary valleys and broad sweeping spurs. The Northern aspect of the ridge on the other hand, is reminiscent of a plateau top with gentle gradients running into a minor tributary of the New Years River to the North. The ridge approaches 2,600 feet at its summit in Camp C and is connected to the Southern highland portions of the farm by a narrow saddle, at 2,300 feet, beyond the Eastern boundary of Camp F. The highland block in the N.W. corner of the farm, presents much the same character as the main ridge, with steep rugged slopes for the most part. It reaches an altitude of 2,437 feet at its summit where stands the only trigonometrical beacon on the farm.

Occupying the Southern parts of the farm are two upland blocks, interrupted by a Northward flowing tributary of the Iron Pot, stretching out from ~~and~~ ~~linked in~~, a high watershed beyond the Southern boundary of the farm. This watershed separates drainage northwards to the Iron Pot and

Southwards/.....



MAP 9.

Southwards to the headwaters tributary to the Kariega River. These Southern highlands present a more gentle rolling character, with uniform slopes and gradual gradients for the most part. The altitude here reaches to above 2,400 feet within the farm boundaries, rising gradually to over 2,500 feet in the South-East beyond the limits of the farm.

Between these highlands run the rather narrow valleys all shewing a marked, broad, V shaped cross section profile, and with a general absence of extensive valley-floor level ground. The altitude of the valley floors ranges from 2,000 to 2,200 feet placing them from 200-400 feet below the summits of the bounding ridges.

Valley-side slopes vary widely from point to point, ranging between rough limits of 5-20% while over small distances slopes of less than 2% occur. The character of the valley-side slopes varies again from smooth to rolling as in the case of the major north running valley of the Iron Pot tributary, to rugged, stony and steep as over some stretches of the Southern slopes of the main ridge.

#### CLIMATE:

The climate of Atherstone may be considered characteristic of the Albany highland region with its temperature conditions slightly less equable than in the coastal region, with frosts in the winter season and with a mean annual rainfall of about 22 inches.

#### TEMPERATURE:

Temperature values are not available for the farm but statistics for Grahamstown some 13 miles to the East and at approximately the same altitude may be presented here to give some impression of the conditions to be expected.

From temperature tables (Schuman 1941) the following features emerge for Grahamstown for the period 1918 to 1940:-

(a) Mean Annual Temperature. 60.8°F.

(b)/.....

(b) Mean Seasonal Temperature:

Spring. (S.O.N.)	60.0°F.
Summer. (D.J.F.)	67.5°F.
Autumn. (M.A.M.)	62.0°F.
Winter. (J.J.A.)	53.0°F.

(c) Mean Seasonal Maxima and Minima.

	MAXIMA.	MINIMA.
Spring. (S.O.N.)	72.0°F.	48.0°F.
Summer. (D.J.F.)	79.0°F.	55.5°F.
Autumn. (M.A.M.)	74.0°F.	50.0°F.
Winter. (J.J.A.)	66.0°F.	39.5°F.

(d) Mean Seasonal Absolute Temperatures.

	MAXIMA.	MINIMA.
Spring. (S.O.N.)	91.0°F.	37.0°F.
Summer. (D.J.F.)	100.0°F.	45.0°F.
Autumn. (M.A.M.)	90.0°F.	40.0°F.
Winter. (J.J.A.)	82.0°F.	31.5°F.

(e) Some Absolute Temperatures.

<u>Absolute Maximum.</u>	<u>Absolute Minimum.</u>
108.2°F. (December 1931)	24.8°F. (July 1933)

(f) Mean Annual Range. 16.3°F.

(g) Mean Daily Range. 24.7°F.

From these tables it may be suggested, therefore, that Atherstone experiences warm to hot summers (68°F.) and cool to mild winters (53°F.) with a mean annual range of temperature of some 16 to 17°F.

It may be observed, however, that in the summer months maximum temperatures during the day may be high (79-80°F.) and may on occasions rise to as much as 100°F. In winter the days are warm 66°F while nights may be expected to be cold/.....

cold 39°F. with frost occurrence a common feature during this season especially in the valleys due to air drainage and inversions of temperature.

RAINFALL:

Rainfall values are available for Atherstone for the 23 year period from 1929 to 1951 from which mean values may be calculated to give a fair impression of the rainfall regime to be expected here.

From these statistics it has been found that the farm has a mean annual rainfall of some 22 inches. This figure is considered slightly lower than the average for the highland region which is estimated to be approximately 25 inches. The low value obtained for Atherstone, however, may be explained by the fact that the raingauge is situated in a valley floor adjacent to the homestead, where rainfalls are generally lower than on the ridges.

The rainfall is distributed as follows:-

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	Year.
1.94	1.83	2.90	1.73	1.70	1.13	1.40	1.10	1.10	2.80	2.51	1.91	22.1

From this table it may be observed that the rainfall is characteristically fairly evenly distributed throughout the year with slight maxima in Spring (S.O.N.) and Autumn (M.A.M.) with peaks in October and March. The Summer and Winter seasons are slightly drier with the Winter share of precipitation somewhat lower than the summer. With higher temperatures in the latter season, however, the Winter rains are considered slightly more effective to plant growth. Considering the Winter and Summer half years, the rainfall is distributed in the proportion of 38% and 62% respectively.

The variation, reliability and intensity of the rainfall may be expected to follow the general pattern for Albany and Bathurst as a whole and need not be repeated here.

VEGETATION:

The vegetation of Atherstone belongs to the Highland grassland and False Macchia vegetation types of the Albany Division. It presents an aspect of generally open hilly mixed grassland with typical members of the Fynbos occurring throughout, together with scattered stunted trees which occasionally form small dense thickets. On the rocky outcrops and hillslopes and in the Kloofs and ravines, especially on the generally drier northfacing slopes, aloes and other succulents occur frequently.

Grass undoubtedly forms the major vegetal cover. (Map 10). Over the South-facing slopes the grasses are generally closely growing, tending to approach a mat. Over the North-facing slopes, on the other hand, they are more widely spaced with occasional patches of bare soil between the tussocks. This difference in character is attributed to slightly lower rainfall received by the Northern slopes and to prevalence of mist occurrence on the Southern slopes of the farm.

Under normal climatic conditions the grasses here grow to a height of about 4 inches, while at the seeding time in early Summer they may reach heights of up to 12 or 18 inches. The most commonly occurring grasses observed are; Rooigras or *Themeda triandra*, *Eragrostis*, *Digitaria* and *Cynodon*. From observations the hairy, blue, glauca form of *Themeda* occurs most commonly on Atherstone and especially over Camps F, G and H. It may be noted that Henrichi (1934) observes that this is in fact the most prevalent strain of *Themeda* throughout the Division of Albany. *Aristida* (Steek-gras) is less prevalent in comparison to the other grasses noted and is considered as less valuable and ~~more~~ as a sign of overgrazing. It occurs commonly in Camp A which, as will be noted later, is frequently grazed and hence has perhaps become overgrazed.

It appears from observations that, among many others,

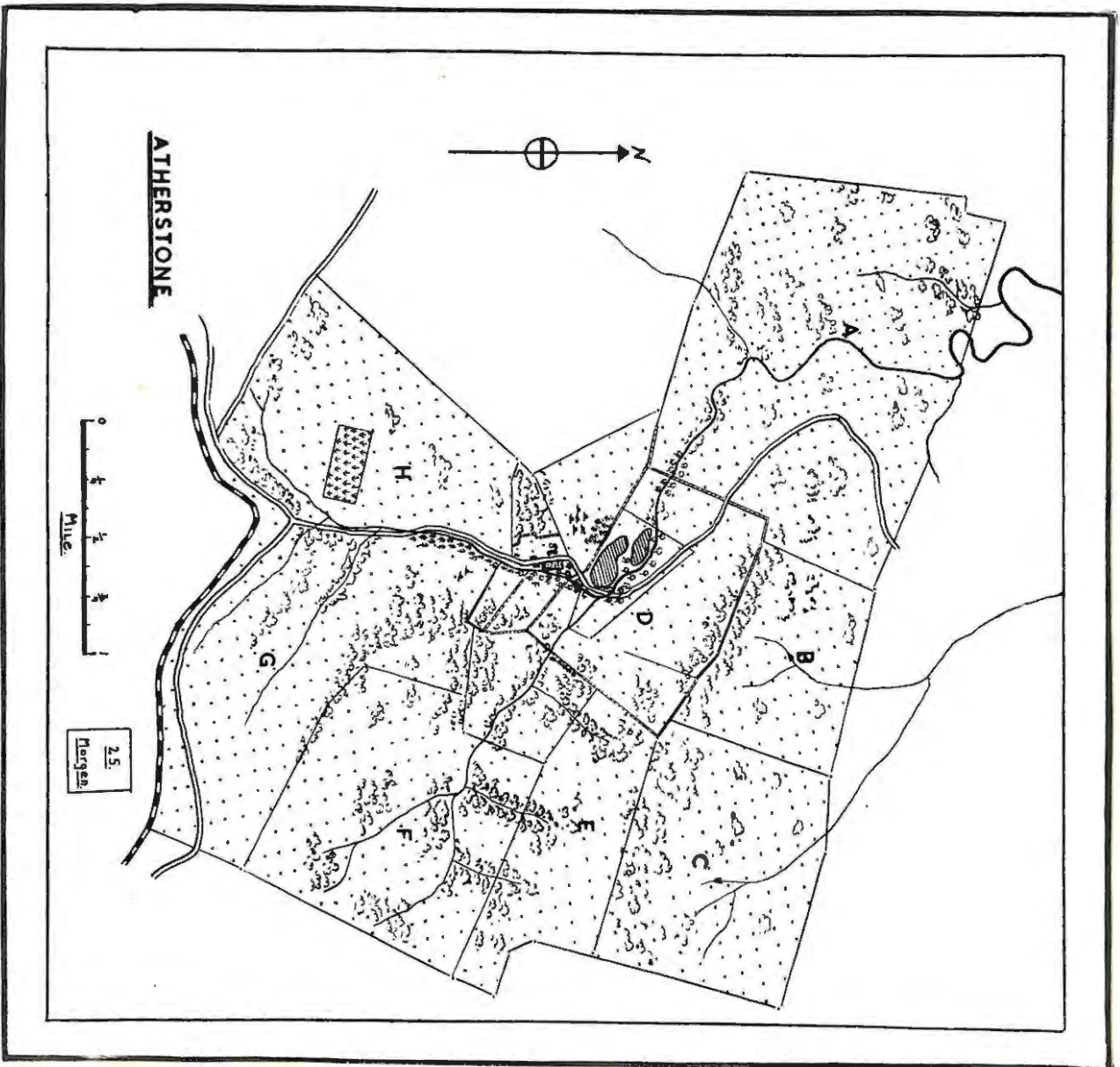
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low growing shrublets such as Chrysocoma, Aster and Selago occur frequently in the grassland throughout. On the higher stretches of the South-facing slopes, the vegetation is characterised by the rush-like Bobartia which is prized as a thatching material but not as grazing.

The broken upper layer of vegetation of stunted shrubs and trees tends to be most prominent on the more rugged and stony portions and along the water-courses of the farm as illustrated on Map 10. The commonly occurring species have been noted in the account of the valley bushland in an earlier chapter and need not be repeated here.

Exotic vegetation is represented by linear stands of Pine trees (Pinaster), Black Wattles and Lombardy poplars which occupy stretches along the water-courses as illustrated in Map 10. Occasional large oaks are also scattered through these woods which represent the outcome of both an economic and an aesthetic motivation in the farm landscape.

FARM SYSTEM/.....



MAP IO.

FARM SYSTEM.

INTRODUCTION:

The farm system of Atherstone is taken to represent the Merino Woolled-sheep industry which is commonly encountered in the highland sour-grassland of the Albany Division.

Atherstone is essentially a woolled-sheep farm, where all major farm activities are directed towards the profitable production of wool for sale.

The system is briefly one where the sheep are allowed to graze unherded in fenced camps, together with a small herd of cattle, which, however, plays a relatively small part in the farm economy, and where agricultural pursuits are of minor importance primarily due to lack of sufficient level land and poor soils.

GRAZING:

In any livestock farming system, except in rare cases, the provision of adequate nourishment for the animals, depends primarily on the natural grazing provided by the vegetal cover. The relationships between the vegetation and the possibilities it offers for grazing on the one hand, and of some important factors related to its efficient utilization on the other are thus important geographical factors worthy of consideration here.

VEGETATION AND GRAZING:

The grasses are undoubtedly the major elements providing grazing for the sheep whilst the Fynbos shrublets and the stunted trees provide a secondary feed source.

Among the grasses the Themeda is perhaps the most valuable, although the other grasses noted above also are important grazing material.

Among the low shrublets the farmer noted that the young shoots of the Aster (especially Aster filifolus) and Chrysocoma are fairly well grazed, while the Selago sp is undesirable and according to Dyer (1937) may become a pest in sheep grassland.

The/.....

The rush-like *Bobartia* sp, is of no value as grazing except in the Spring when the sheep graze its brilliant yellow flowers.

PALATABILITY OF THE GRAZING:

In broad outline the natural grazing of Atherstone is derived from the highland sour-grassland which comprises the major vegetation type of the farm. According to the farmer, however, Atherstone possesses certain large tracts of relatively sweet grazing. He notes that the denser sour grazing is found chiefly in the Southern areas of the farm including roughly Camps D, E, F, G and H while the sweet grazing stretches lie across the Northern extremities of the farm in Camps A, B and C. The distribution of the two grazing types, from the farmer's observations, may be attributed chiefly to unequal distribution of rainfall with the Southern hills and Valleys generally receiving slightly higher rainfalls and frequent mists while the Northern camps situated in the rain shadow of the Southern hills normally receive lower rainfalls. It is to be noted, however, that although the sour grazing becomes less palatable in maturity, it makes up for its lack of nourishment to some extent through greater bulk, and in consequence is able to carry more livestock per unit area than the better quality but generally sparser sweet grazing. The lower nutritional value of the sour grasses in Winter, however, results in a decline, to some degree, of animal condition.

NUTRITIONAL VALUE OF THE GRAZING:

According to the farmer, the grazing throughout the farm is deficient in such essential mineral matter as phosphates and calcium and also to some degree in proteins. This factor is found to be common to most parts of Albany according to Henrichi (1934) and it reflects the poverty in these respects of the soils developed over the Witteberg Quartzites. Henrichi (1934) notes, however, that the trees and bushes of the area, have been found to contain considerable fractions of these mineral elements due probably to deeper root-systems tapping

sources/.....

sources beyond the reach of the grasses, or to the ability of the trees to assimilate the minerals to a higher degree. It is evident therefore that the browsing of young shoots from the trees must play an important role in supplying phosphates and calcium. Furthermore the mineral deficiencies are to some extent overcome by the feeding of a suitable "lick" which the farmer prepares from phosphate and calcium-rich bonemeal mixed with protein concentrates. These licks are fed from weather-protected wooden troughs, of which each camp contains at least one, in a readily accessible site. The licks are provided throughout the year but are particularly important during the winter poor-grass period extending from April to September.

The farmer observes that although deficiency diseases are staved off by feeding concentrates, the effect of the deficiencies in the natural grazing and its general sour character have marked effects on the size of sheep, which is normally considerably smaller than sheep from the sweetveld of the Karroo. It is evident, therefore, that the quantity of wool produced per unit of livestock in the Albany Highland grassland assuming the same length of wool, is probably somewhat lower than for the average Karroo sheep. On the other hand Henrichi has recorded that in spite of bonemeal feeding the large phosphorus deficiency of Albany grasslands results in exceedingly fine wool being produced whose higher value it may be suggested somewhat offsets the smaller weight of the average fleece.

#### THE SEASONAL RHYTHM OF THE GRAZING:

The grazing, according to the farmer, passes through a definite cycle during the passage of a year. Its quality is highest from September to November (Spring) after the vernal maximum of rainfall, when its protein content is greatest and the sheep improve rapidly. After the early Summer the grazing gradually deteriorates in feeding value, except for a considerable revival during the Autumnal rains. It usually reaches its lowest ebb during the winter months of July and August.

From/.....

From analytical data compiled at the Döhne Research Station (which falls within the grassland vegetation type found on this farm) Kotze (1950) has shown how the nutritive value of the grazing decreases:-

TABLE 11 :

	SUMMER	AUTUMN	WINTER
Percentage P <sub>2</sub> O <sub>5</sub>	0.18 - 0.21	0.161	0.070
Percentage Protein	6.5 - 7.5	4.90	2.28.

He notes that if the percentage of phosphorus is lower than 0.11% and that of protein less than 5.0% the nutritive value of the grazing is normally too low to meet the requirements of the animals for normal growth. These results correspond to the farmer's observations when he says that the sheep actually do decline in general condition from a peak in early Summer to a low in Winter, due to the deteriorating nutritive values of the grazing.

CARRYING CAPACITY OF THE GRAZING:

The total area of grazing on Atherstone is approximately 2,200 morgen while the flock at present grazed on the farm numbers approximately 2,600 (including lambs) giving a mean stock density of approximately one and one-fifth sheep per morgen. Although no official estimate of the stocking rate suitable for this grazing is available, it may be assumed, from the farmer's observation, that it is within the norm for the grazing, if not slightly below it. Thus inspite of the exceptional prosperity in the wool industry over the past few years, no overstocking has been allowed, since, according to the farmer there appears to be no point in amassing an excessively large wool-cheque at the expense of the grazing when so large a proportion of the money is lost in taxes.

The carrying capacity varies from camp to camp according to the farmer, depending on the grazing character and the relief. Camps G and H for example with gentle, smooth, slopes/.....

slopes and luxuriant grassland may carry a maximum of 500 sheep on their 200 - 300 morgen. Camp A on the other hand, due to considerable areas of difficult rugged relief, and with its slight rainshadow situation, possesses somewhat sparser grazing and can support a maximum of only 400 - 500 sheep on its 450 morgen. In other cases e.g. Camp D the grazing may contain excessive amounts of undesirable elements such as the *Chrysocoma*, *Selago* sp, or the *Bobartia* sp, which make for lower carrying capacities of the order of 1 sheep per morgen.

THE FENCING SYSTEM:

By 1894 Mr. T.F. Hoole, then the owner, had fenced the outer boundaries and subdivided the grazing of the farm into camps and paddocks. The present farmer observes that this early fencing led to efficient utilisation of grazing. Sheep have now been grazing on Atherstone for over 50 years and no obvious signs of serious deterioration of the grazing are visible today. According to most writers grassland grazing rapidly declines in quality unless careful management is practiced. This factor is due to the very selective and close grazing habits of the sheep.

The fences, approximately 21 miles in total length, are all constructed of strand and barbed wire with jackal-proof mesh, using indigenous sneezewood poles as fence posts. The fences are normally from 4-5 feet in height sufficient to prevent the entry of the jackal. In addition the farm possesses a fair length of stone walls representing early attempts to fence off the grazing, especially against the marauding jackal and other pests. Camp D is for example almost entirely enclosed in this manner. These walls are approximately 4 feet high and constructed of locally quarried blocks of Witteberg quartzite. The stone blocks have been placed one on top of the other without any cementing material, but are nevertheless remarkably stable. In places wire fences have been added to the walls since it was found that the jackal had learnt to scale them and enter the camps.

The farm is subdivided into 8 large camps as on Map 10, varying in size from 400 morgen to 100 morgen. In addition there are a number of small paddocks a few morgen in size, which it is seen, are grouped around the organising centre at the homestead (F), where they are most conveniently situated for the handling of animals. All the camps have interleading gates to facilitate the movement of stock.

According to the farmer, the camping layout bears relationship to factors of the farm environment, especially as regards -

- (a) THE LOCATION OF WATERING SPOTS. From Maps 9&10 it may be noted that all the large camps with the exception of camps B and C abut on the major water-courses along which suitable water holes or small dams have been developed. In addition each camp, excepting camps B and C, is served by at least one permanently running fountain. Camps B and C are served by centrally situated, small, dams supplied from a windmill-pumped borehole in Camp B, while Camp D is served by a pipeline running from a neighbouring fountain in Camp E.
- (b) TO THE RELIEF FEATURES. With the exception of Camp E all others possess stretches of both smooth valley grazing and more rugged ridge pastures in varying proportions. This division makes for uniform grazing qualities in all Camps while in addition, it allows the animals to retreat to highground at night, especially in winter, when through temperature inversions the valleys are exceptionally cold.
- (c) ACCORDING TO GRAZING TYPE. The areas of sour and sweet grazing as already noted have been largely separated in the fencing scheme, making for convenient grazing management. The sweet grazing occupies Camps A, B and C with the sour grazing covering the remainder of the farm.

In the future when the farm is scientifically planned under the Master Plan of the Riebeck East Soil Conservation

District, (Map 8), further subdivision is likely so as to make for more controlled grazing management.

GRAZING MANAGEMENT:

A comprehensive grazing plan has as yet not been worked out, but is awaited when the comprehensive farm plan is drawn up by the Committee of the Soil Conservation District of Riebeck East. At present, therefore, a scheme depending largely on the farmer's knowledge of grazing conditions is operative. As a general rule, the older ewes and lambs, - those sheep with fully developed teeth, are grazed on the sour grazing where they are able to cope with the coarser and ranker growth, while the younger sheep and lambs are run on the more palatable sweet grazing.

The Camps are grazed for periods of varying duration depending on the grazing condition at the time. Under normal climatic conditions, the grazing in at least one camp is rested each year. This resting period normally falls in the Spring and early Summer from September to December when the Spring rains and rising temperatures bring about the maximum growth and seeding of the grasses. From the farmer's observations the following two factors relating to the importance of resting the grazing may be noted:-

- (a) While sheep are generally recognised to be close grazers resulting in diminution of the vegetation cover, they are also very selective in their choice of grazing material. Henrichi (1934) has investigated this trait as regards the varieties of *Themeda triandria* grass with the following results:

TABLE 12:

GRASS VARIETY	PROTEIN	P <sub>2</sub> O <sub>5</sub>	CaO	C1 <sub>2</sub>	REMARKS.
Hairy	7.40	.25	.52	.38	Very well grazed.
Glauca	7.19	.23	.50	.38	Well grazed.
Smooth	6.01	.23	.44	.48	Not very well grazed.
Pine	4.38	.14	.38	.28	Poorly grazed.

From the above table it becomes self evident that the better grass types would gradually disappear unless sparing and regeneration were allowed.

(b) Parasitic diseases which may prevail are somewhat controlled by sparing since they are not able to survive for long in any Camp without their hosts, the sheep.

During prolonged droughts no grazing is spared, since at such times no vegetative growth is apparent, grasses do not seed and hence, unless they are utilized, the grazing will eventually be lost. To diminish pressure on the grazing, however, the sheep are spread evenly throughout the farm each Camp carrying a few. According to the farmer, exceptionally severe droughts on Atherstone are not very common and the grazing is normally able to maintain the flock for considerable periods. Occasionally, however, as in 1949 for example the grazing may deteriorate severely, when supplementary feedstuffs have to be purchased to maintain the stock. In 1949 when from March to October only 3.58" of rain fell, the farmer, in spite of feeding purchased maize to the sheep, lost over 200 of them and had perforce to sell almost the entire cattle herd.

NOTE.

An important feature of the camping system, which can be equally applied to other livestock farms, is that the Kraaling of animals at night is unnecessary. Among the advantages gained the farmer noted the following:-

- (a) Sheep allowed to graze freely day and night yield more wool per unit of livestock.
- (b) Breeding stock are more prolific.
- (c) The herding of animals during the day and driving at night to the Kraals deteriorates the grazing and leads eventually to soil erosion.
- (d) The Kraals are the breeding grounds for many diseases.
- (e) The manure collected in the Kraals is too often not

returned to the grazing from which it was derived, and  
(f) Wool from non-kraaled sheep is of a greater purity and  
cleanliness, since it is not contaminated by the dirt and  
manure which collects in the Kraals.

GRAZING CATTLE AND SHEEP TOGETHER:

Sheep are characteristically close grazers, and as  
noted above, the grasses here normally grow to some 4 - 5" tall  
whereas sheep require, according to the farmer, grazing of  
1 - 1½" tall. In this respect, therefore, the cattle play  
their major role in the farm system. They are allowed to  
graze with the sheep in each camp, grazing down the tall grass,  
after which the sheep take over. The ratio of cattle to sheep  
in each camp depends mainly on the condition of the grazing  
from time to time. In addition the cattle being less selective  
in their grazing are instrumental in keeping down the undesirable  
element in the grazing. While further, since because of their  
valuable fleece, sheep cannot be dipped often, the frequent dipping  
of the cattle is a prime factor in the control of the ticks and  
their associated diseases on the farm.

VELD BURNING:

The controversial question of veld burning does not  
arise in the case of Atherstone. Here the veld is burned  
only at widely spaced intervals of years and then only over  
small areas where the grazing has become either too rank and  
dense or where undesirable elements have become particularly  
prevalent. As regards the former, however, burning is rarely  
necessary since with several severe frosts each winter excessive  
growth is killed off and the accumulation of debris is kept in  
check.

WATER SUPPLIES:

On any livestock farm, the availability of good water  
is perhaps the prime factor for consideration since the amount  
controls the number of stock grazed.

Atherstone is fortunate in possessing ample water supplies from permanently running fountains; and where these do not occur water is readily available by boring. The water from the fountains is available to stock in natural or excavated water holes along the main watercourses.

Camps A, D, E, F, G and H are served by fountain water while the fountain serving Camps G and H at the head of the main Iron Pot tributary also supplies the homestead (F), and its surroundings lower down the valley.

Camps B and C with no permanent fountains are served by the only borehole, on the farm, situated in Camp B. The water from this borehole is piped to Camp C and in both Camps it is stored in small earthen walled dams constructed across the drainage lines.

The only dam of any size on Atherstone is situated on the main Iron Pot tributary just South of its confluence with the Iron Pot River. The earthen wall impounds only a few 100,000 gallons, storing the surplus waters from fountains higher up the valley. It serves several important functions however -

- (a) to irrigate the small agricultural lands immediately below it;
- (b) as a source of water for livestock brought into the small paddocks surrounding the homestead;
- (c) as a water source for the dipping tanks situated below the dam wall, and
- (d) as a reserve for use during drought when all the gates on the farm are open and stock from all parts can readily reach it.

The farm thus possesses permanent supplies of good sweet water, which have not been known to fail even in a drought year such as 1949. Further the water is concentrated in convenient localities, leaving the grazing well drained which is an advantage for successful wool sheep farming.

THE DISEASE FACTOR IN THE ENVIRONMENT:

During the last century, according to the farmer, when woolled-sheep farming was first attempted in the highland grasslands, many farmers were at first sceptical of the success of such ventures, due mainly to limiting disease factors relating to the coarse sour grazing, the moist conditions, the prevalence of ticks and internal parasites. However, through experience of the environment and aided by modern veterinary developments, the limitations placed on sheep farming here have been largely overcome. Kotze (1950) for example, who carried out experiments with sheep at the Dohne Research Station on highland sour grassland grazing, of a similar type to that which occurs in the Albany highlands, has amply demonstrated the efficiency of the use of mineral licks and medicinal dosings in combating deficiencies in the grazing and internal parasitic diseases. A few of his results may be profitably quoted here.

(a) THE EFFECT OF A MINERAL LICK ON SHEEP: using two herds of 68 ewes each.

(1) MORTALITY.

TABLE 13:

	NO. OF EWES.	DIED IN 3 YRS.	% DIED IN 3 YRS.
Control herd	68	22	32.3%
Herd receiving Lick	68	17	25.0%

(11) LAMB CROPS.

TABLE 14:

	NO. OF EWES	LAMBS BORN IN 3 YRS.	LAMBS DIED IN 3 YRS.	LAMBS RE-ARED IN 3 YRS.	% DIED IN 3 YRS.
Control herd.	68	81	51	30	60.9%
Herd & Mineral Lick.	68	114	42	72	36.8%

(111) WOOL PRODUCTION/.....

TABLE 15:

(iii) WOOL PRODUCTION:

	NO. OF EWES.	TOTAL WOOL PRODUCTION 3 YEARS.	QUANTITY OF WOOL / MORGEN / YEAR (MEAN FOR 3 YRS.)	QUANTITY OF WOOL / SHEEP (MEAN / YR.)
Control herd	68	561.6 lbs.	23.4 lbs.	5.8 lbs.
Herd + Min. Lick.	68	700.8 lbs.	29.2 lbs.	7.3 lbs.

It is evident from the above tables that the effect of feeding mineral licks is important not only as regards mortality from deficiency diseases but also as regards lamb progeny and wool production.

Similar results were also obtained in the case of livestock live weights although this table is not included here.

Again in the case of internal parasites the use of suitable prophylactics shews promising results as is evident from the tables below which shew -

TABLE 16 : MORTALITY.

	NO. OF EWES.	DIED DURING 3 YEARS.	% DIED DURING 3 YEARS.
Control Herd	102	46	45.1%
Dosed herd.	102	23	22.5%

TABLE 17 : LAMB CROPS.

	NO. OF EWES.	LAMBS BORN IN 3 YRS.	LAMBS REARED IN 3 YRS.	% LAMBS DIED IN 3 YRS.
Control herd.	102	129	54	58.2%
Dosed herd.	102	169	80	52.7%

TABLE 18 : WOOL PRODUCTION.

	NO. OF EWES.	WOOL PROD. IN 3 YRS.	WOOL / MORGEN / YEAR (MEAN FOR 3 YEARS.)	WOOL / SHEEP / YEAR (MEAN FOR 3 YEARS.)
Control herd.	102	1,418 lbs	19.7 lbs.	4.9 lbs.
Dosed herd.	102	1,857 lbs.	25.8 lbs.	6.4 lbs.

As regards the tick-borne diseases such as heartwater

and/.....

and redwater, the farmer notes that through persistent dipping they have been all but eradicated from the farm. The important role cattle have to play in this respect has already been noted above. The cattle are dipped regularly at least once each week in Spring, Summer and Autumn when the ticks are especially prevalent and once each fortnight in the Winter. The sheep on the other hand are dipped only once a year, after shearing, to prevent damage to the fleece. To minimise tick attacks on the sheep, however, such vulnerable spots as the ears and crutches are regularly treated by hand, using suitable insecticides.

Among other insect pests the blowfly is the most important and may cause considerable distress to the sheep especially during Spring and Summer. Great care is, therefore, taken to destroy immediately all carcasses, which are among the blowfly's chief breeding grounds. No reliable cure for the effects of the sting from the fly have yet been evolved.

#### THE BREEDING OF SHEEP ON ATHERSTONE:

It is the practice here to breed stock for grazing on the farm. Many farmers in this sour grassland area, however, prefer to purchase lambs from the sweetveld grazing regions such as the dry Great Fish River valley, within this district, and the Karroo. This is due to the larger size and greater wool yields of sheep especially the lambs from the sweetveld.

The farmer observes, however, that it is probably more profitable to graze mostly ewes which not only produce a wool clip each year but also a lamb for replenishing the flock. Under this system wool yields are somewhat lower but the savings made by not having to purchase stock, more than make up for that loss.

Although the farmer does not aim at the breeding of the exceptional stud animal, he does attempt to breed sheep which are in harmony with their environment. The latter applies equally to adjustment to the grazing type, disease and to climatic factors which have complicated physiological effects on the

animals/....

animals. Under such conditions the sheep are an economic success. Furthermore having brought the flock into harmony with the environment, with intelligent selection, he keeps to the same animal type to ensure continued success.

Among the important characters bred for on Atherstone are sheep of good constitution to cope with the rather harsh grazing, plain bodied sheep without excessive foldings of the fleece to prevent disease chiefly and to make shearing less difficult and sheep who have strong and uniform fleeces of fine wool.

#### LAMBING SEASONS:

The lambing season is perhaps the feature in the farming regime of Atherstone, which is most clearly influenced by factors of the natural environment.

Lambing takes place twice a year on Atherstone, in Autumn (March - April) and Spring (September - October), the ewes being served respectively either in late October or late April.

Of the two lambing seasons, however, the Autumn is undoubtedly considered to be the most favourable, and the majority of ewes are allowed to lamb then. The reason advanced by the farmer, in support of this view, is the adjustment which is achieved at this season, between the condition of the grazing and diseases, especially internal parasites, which are now on the decline.

The farm is fortunately endowed with fair stretches of relatively sweet grazing, which remain palatable during the Autumn and which are in addition considerably revived during the Autumnal rains. Secondly, as the season advances, lower temperatures prevail leading to considerable reductions of disease and insect pests. The ultimate ebb of disease is naturally in Mid winter but at that season grazing is poor and the cold may be too intense for successful lambing.

Spring lambs, on the other hand, benefit by the new growth in the grazing, but with rising temperatures and

humidities/.....

humidities disease incidence increases rapidly, leading to losses of lambs and ewes, sufficient to deter the Spring from becoming the main lambing season. Further, late Spring lambing may interfere with the shearing which normally takes place in late September to October.

These observations are conclusively borne out by Kotze's (1950) results from his investigation of Autumn versus Spring lambing at the Döhne Research Station using two flocks of sheep. These results show for example that:-

- (i) During 3 years deaths occurred in 24.6% of the ewes lambing in Autumn and in 36.2% of the ewes lambing in Spring.
- (ii) In the same period 38.9% of Autumn lambs as against 73.3% of spring lambs died. (The mortality rates <sup>in both cases</sup> were exceptionally high owing to the lack of supplementary feeds during the winter which did not happen to be available then.)
- (iii) The Autumn group averaged 28.4 lbs of wool per ewe per morgen per year as against 17.7 lbs of wool per ewe per morgen per year for the Spring group.

#### LAMB CAMP:

Camp A, because of its sweeter grazing and adequate shelter provided by the low shrubs and trees, is the favourite lamb camp and is normally spared for this purpose for a few months prior to the lambing season. In addition the camp contains a centrally situated system of waterholes readily reached by the lambs and ewes.

#### LAMB CROPS:

The mean yield of successfully reared lambs annually including both Autumn and Spring lambs is here from 50 - 60% (i.e.) from 500 - 600 lambs per year from 1,000 - 1,200 ewes. In some seasons births and survivals are higher and in 1951 for example 650 lambs were reared from 750 ewes. In others, due to drought, excessive rain or cold and disease, losses are severe and survivals/....

survivals small. In 1949, for example, drought resulted in 300 sheep being lost, a fair proportion of which were lambs, while in 1941 with excessive spring rains again over 300 sheep were lost through the cold and damp conditions.

#### SHEARING AND PREPARATION OF WOOL FOR MARKET.

##### SHEARING SEASON:

The annual shearing season commences normally in the last week of September after the Spring lambing, before temperatures become too high and diseases too prevalent, since the shorn sheep are particularly susceptible, for example, to ticks and blowflies.

##### LABOUR:

The shearing is done by qualified shearers who travel through the wool producing areas contracting their labour on a piece-work basis. The actual commencement date of shearing depends therefore on the time of the shearers' arrival at the farm. These men are either Coloureds or Natives trained in the work, and normally 8 shearers are employed each year.

The shearing is carried out using hand-operated shears which, although slower than electrically operated shears, are thought to be both more economical and also better for the sheep. For electrical shears a special plant would be necessary, the outlay for which would not be warranted considering the number of sheep to be shorn according to the farmer. Moreover he states that electrical shears tend to clip too closely and leave the sheep too exposed to weather changes for several weeks afterwards.

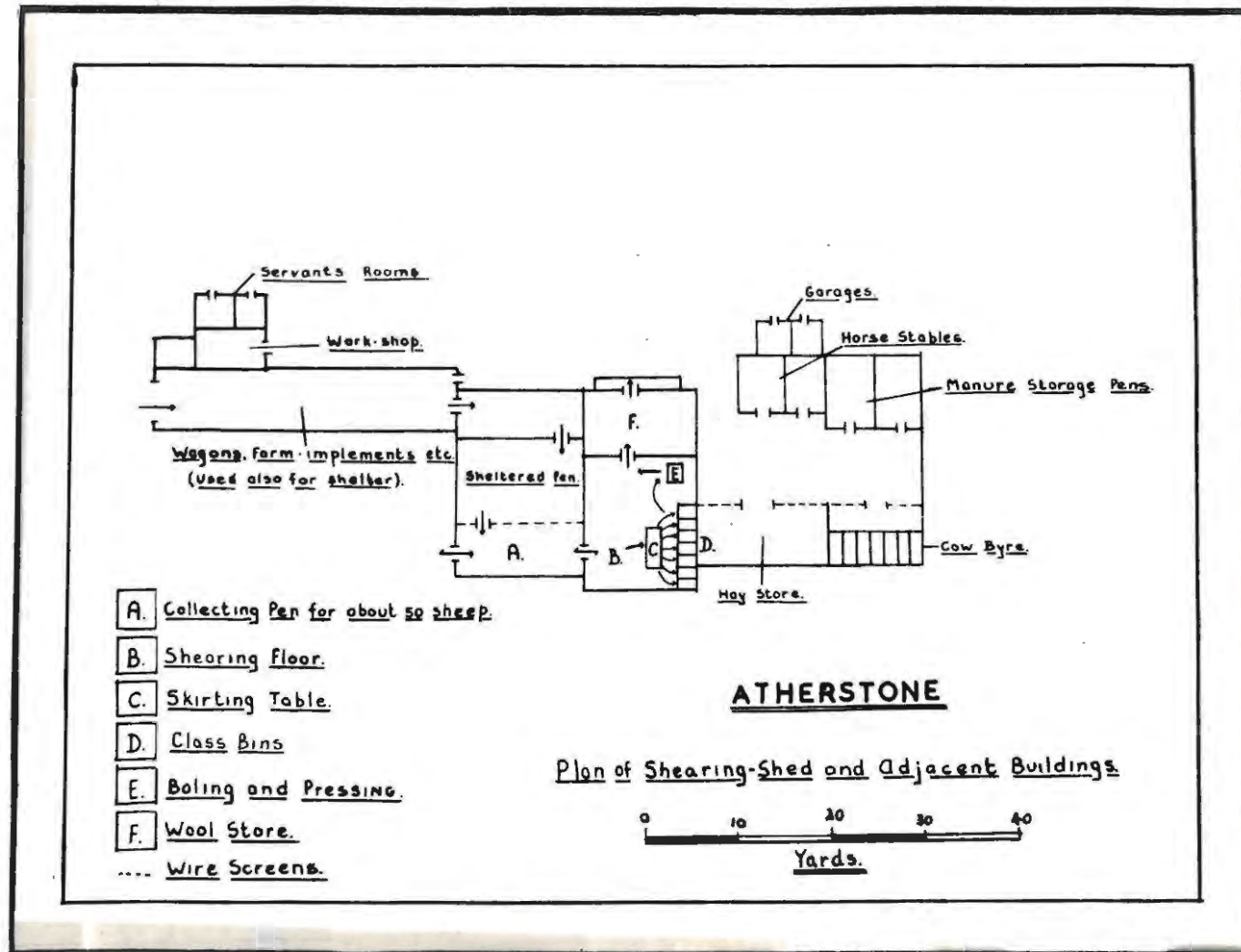
On the average the shearers handle approximately 250 ewes and lambs / day and less than 200 lambs / day because of their larger size, and the shearing season last for from 2 to 3 weeks.

##### THE SHEARING SHED:

The shearing shed completed in 1951, is one of the principal fixed assets of the farm and warrants discussion here.

This/.....

DIAG. I.



This shed, S, is situated roughly at the centre of the farm, within easy reach of all the camps. It was constructed as far as possible using materials available on the farm. The walls are of Witteberg quartzite blocks cheaply quarried on the farm while all rafters and posts are either of pine or wattle, grown and cut on the farm. The shed satisfies certain important requirements e.g. there is plenty of floor space for the workers, the wooden shearing floor is easily cleaned to ensure purity of wool, there is sufficient light from windows and skylights for shearing and wool classing, and spacious bins have been installed to store the classed wool. In addition, the shed incorporates a large wool storage room, and a covered pen to accommodate 200 - 300 sheep during wet weather, since wet sheep cannot be shorn. During the rest of the year these pens are useful also for accommodating sheep, brought in for dosing, out of the rain.

PROCESS OF SHEARING AS SHEWN ON DIAGRAM 1.

A flock of 200 - 400 sheep is brought into the shed paddock, from whence they are taken 40 - 50 at a time to pen A leading to the shearing floor B and are then drawn 8 at a time to be shorn. The fleeces are sorted into types and classes on the skirting table C, separating lambs wool (primarily used for felt manufacture, according to the farmer) from the 12 months growth of mature sheep. The wool is classed according to the standards of the South African Woolgrower's Association. Once classed the wool is placed ready for baling in the Class bins D. The wool is then baled in hessian bales at E, and pressed at intervals until the required weight is reached, whereafter the bales are stitched and stored in store F. The weight of bales varies according to wool type e.g. good fleece line wool weighs  $\pm$  300 lbs, piece wools (bellies and neck fold wool) up to 400 lbs and soiled locks and dirty wool up to 600 lbs.

The bales are then drawn from the wool store and loaded upon an ox-waggon and transported to the railway siding at Atherstone Station, 1 mile distant, whence it is despatched to the Port Elizabeth marts for sale. Port Elizabeth is approximately

95 miles/

95 miles distant by rail, a relatively short distance, making for low transport costs on the wool before being sold.

WOOL CROPS:

The average yield of wool is approximately 8 lbs / sheep which corresponds to the average yields for the sour grassland regions according to the farmer. This mean varies according to the number of lambs shorn and the average age of the sheep. The total yield thus approaches 16 - 20,000 lbs of wool per annum which with present wool prices yields the farmer an attractive annual income.

The wool grown on Atherstone is usually free of excessive impurities such as burr weed, steekgras etc., and it is the practice to await the first spring rains, if possible, before shearing, since this removes much surface dust and grit and gives the wool a desirable "bloom".

NOTE.

(a) Mutton sheep are not reared on Atherstone since, according to the farmer, they are, at the present time at least, somewhat less profitable than woolled-sheep. Moreover he observes that sufficient greenfeeds, for fattening purposes and to supplement the deficiencies of the natural sourgrass-grazing, could not be easily produced here for reasons which will emerge later. It is his belief, therefore, that the Albany Highlands under prevailing conditions are primarily suited to the grazing of woolled-sheep. In the future, however, when land values increase and competition from more intensive types of farming becomes more apparent the area may turn to the grazing of mutton-woolled-sheep which are more profitable under such conditions.

(b) Thus far cattle have been mentioned only with respect to their importance to the grazing system. The herd of oxen comprises from 200 - 300 Shorthorn-Afrikander crossbred animals.

Unlike the sheep, however, they do not represent a primary source of income, only the older steers (6-7 years) being sold

for/.....

for slaughter each year. These are sold either out of hand to butchers or on stock fairs in Grahamstown. Only about 20 such animals are sold each year.

The oxen are the main source of traction power here for such work as ploughing, hauling and the scraping of dams. Mechanised traction is not employed since the outlay on a tractor is not warranted when the volume of work it would have to perform is considered.

A small herd of some 12 Jersey Cows is grazed on the farm to supply it with milk and other dairy products.

In addition there are the 30 - 40 Native Cattle which are grazed together with the farmer's herd on Atherstone.

CULTIVATED LAND:

Agricultural land occupies the small total of approximately 10 morgen, or < 1% of the total farm area. Practically all the ploughland is utilized for fodder crops, a few acres being utilized for fruit trees and a vegetable garden at the homestead F.

Among the factors which have determined the restricted area occupied by agricultural land, according to the farmer the following may be noted:-

- (a) Poor soils.
- (b) Sloping land.
- (c) Adequate natural grazing.
- (d) Intermittent droughts.

(a) POOR SOILS:

The grey-black sandy soils developed on the Witteberg quartzites are not fertile, and according to Analyses are poor in the most essential minerals such as Phosphorus, Calcium etc. as also in organic matter. The farmer notes therefore, that once the natural equilibrium between vegetation and soil is disturbed, heavy fertilisation is necessary, making for excessive expenses which discourage agriculture.

(b)/.....

(b) SLOPING LAND:

Only small stretches of land with slopes of < 2% are available on the farm, as noted above, and contour banks and drainage furrows are essential for the most part on plough land. However, in spite of such soil conservation features, it has been found that even relatively low-gradient slopes are generally unsuitable to cultivation because of silting up of furrows by the readily washed sandy soils. In Camp D, for example, on gently sloping ground, a now abandoned land soon developed serious erosion features and still possesses no less than 14 formidable and enlarging dongas some 10-15 feet deep in cases. In Camp H the area shown as artificial pasture, was up to recently a contour-banked land which developed similar tendencies. The time and expense involved in maintaining such lands is thus a further deterrent to agriculture on the farm.

(c) ADEQUATE NATURAL GRAZING:

Although it is desirable, according to the farmer, to cultivate supplementary feedstuffs for use in lambing seasons and in the winter poor-grass period, the area devoted to fodder crops on Atherstone, supplemented by a further 5-10 morgen on a neighbouring farm, is normally sufficient for that purpose, since with normal climatic conditions the natural grazing adequately satisfies the requirements of the sheep. In drought years, however, the farmer resorts to purchased feeds.

(d) DROUGHTS:

Although not very frequent, droughts are an additional factor limiting agriculture on a large scale.

CROPS CULTIVATED:

Of the 10 morgen of cultivated land only 5 are actually devoted to annual fodder crops, the remainder being devoted to artificial pasture grasses (mainly Kikuyu). These pasture grasses occupy the land in Camp H where they serve the dual purpose of restoring a donga scarred land and providing succulent stock feed.

As/.....

As noted above 5-10 morgen of crop land are also available on the neighbouring farm "Oakwell" which belongs to the farmer but is run as a separate unit from Atherstone and is thus not included in this discussion.

The croplands on Atherstone have been sited on small stretches of level valley land below the dam on the Iron Pot where they may be occasionally irrigated if the rainfall fails.

The chief fodder crops cultivated are oats and cowpeas (chiefly on the "Oakwell" lands) grown in rotation to maintain what fertility the soil initially possessed.

Sowing of the crops is adjusted to ensure a constant supply of green feed for the poor grazing season which extends from Autumn through the Winter. For early Autumn green feed, cowpeas are sown from October onwards depending on suitable rains. The sheep are turned in to graze about mid-March. This leguminous crop is an important fattening protein source and the prime condition into which it brings the sheep in the Autumn accounts for the greatest sale of slaughter stock (culled and old sheep) at that season.

Oats is grown for late Autumn and Winter feeding and is sown from March onwards, depending on the Autumnal rainfalls. The sheep normally commence grazing the oats some 6-8 weeks after the sowings.

It should be noted, however, that because of the small <sup>sickly</sup> area cultivated, all the sheep cannot be grazed on it and only/Ewes, lambs and fattening slaughter stock are normally allowed to graze it.

Lucerne as a green feed has been tried with little success on Atherstone because it becomes too rapidly "grassed up" and is difficult to keep clear. A small patch, however, is cultivated on the orchard lands adjacent to the homestead, where it is used as green fodder for a small Jersey dairy herd of about 12 cows, which supply the farm with milk. The homestead orchard, although it once boasted over 300 fruit trees, now only has

approximately/.....

approximately 30 and these are used for home consumption. Most of the land is now used for vegetable production, also for home consumption. This terraced orchard land is, apart from the small lands in the Iron Pot valley below, the only stretch of land regularly irrigated. It is irrigated from a concrete swimming bath-cum-storage-dam adjacent to the homestead.

In the large paddock immediately to the North of the homestead F, as on Map 10, on a gently sloping stretch of land, the farmer has established a small plantation of American Aloe, which is a useful feed for the dairy cows especially during drought, when the leaves are machine shredded and fed at milking times.

#### FUTURE:

It is not the farmer's intention to extend the area devoted to crop cultivation, except perhaps to increase the area at present occupied by artificial pastures in Camp H; and it is evident therefore that agriculture must remain a relatively insignificant feature of the landscape of Atherstone.

#### HAY MAKING:

With sloping land it has been found too difficult to cut natural veld hay, while with little or no surplus of fodder crops very little hay is produced on the farm.

#### COMMUNICATIONS, AND FARM TRANSPORT:

From Map 7 it may be seen that the farm centre is within 1 mile of the nearest railway station at Atherstone Station, 95 miles from Port Elizabeth and 13 miles from Grahamstown, and is also linked, by a fair farm road, to the highway linking Grahamstown and Alicedale. It is served also by a telephone extension from Grahamstown.

The farm possesses several ox-waggons for the transport of wool to the station or for goods railed to the farm, and a light motor truck which is used chiefly for rapid transport of goods or animals from one part of the farm to another or for carrying goods quickly from town to the farm. In addition the farmer possesses a

modern/.....

modern car for use on farm business or for pleasure. Traction power is supplied chiefly by cattle, since with restricted ploughing of agricultural land and relatively infrequent use of vehicles, the expensive outlay for a tractor is hardly justified. In addition, since cattle are essential to the farm system, their use for traction is a practical and economic adaption of farm resources.

FARM POWER:

The farm has no large electrical plant, the farm house being lit by acetylene gas from a gas plant while green feed shredding machines, shearing and the like are all hand operated.

FARM LABOUR:

Farm labour is supplied by 12 workers and their families numbering in all over 60 persons. These people, except for 2 Coloured families, are all of local Native extraction.

The workers are clothed and fed by the farmer and each allowed to graze 3 or 4 head of cattle on the farm, for their own use. In addition they receive all the skimmed milk from the dairy herd, which is according to the farmer a significant factor in attracting labour to the farms throughout the area. Unlike many farms in the region, the workers are not allowed to cultivate lands for food - for reasons already advanced elsewhere, and all their food is purchased by the farmer and rationed out to them. In addition to these amenities the permanent workers are paid a monthly wage of from £1. 5. 0. to £1. 10. 0.

Three of the permanent workers are primarily sheep tenders, going through the Camps regularly and tending to the requirements of the sheep, such as their mineral licks and water supplies, and reporting any signs of disease. The remaining workers are normally fully engaged in the many other farm tasks common to most farms. The Native women are employed as domestic servants at the homestead, but chiefly tend only to the needs of their families. The children do many small chores about the farm such as herding the cattle or running errands.

Housing/.....

HOUSING:

The farm labourers are housed in substantial round huts typical of the Eastern Cape region, constructed of wattle and daub and thatched either with grass or the rushlike bobartia. The huts occupy a stretch of land in a paddock to the north of the homestead F separated from it yet near it to make for readily available centralized labour. The Coloured families live in wattle and daub houses in Camp G since they prefer to live apart from the Native families.

The farm homestead is an attractive well-proportioned 9-roomed rambling structure of stone, constructed in the earlier years of the farm by Dr. John Atherstone. It is surrounded by well tended gardens, a tennis court and a swimming bath adding to its social amenities. The house faces eastwards over the poplar and oak woods in the valley below it, and commands a splendid view of the Rand opposite it, rising out of the Iron Pot valley.

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CONISTON.

A GREAT FISH RIVER VALLEY MUTTON AND WOOLLED-SHEEP FARM.

INTRODUCTION:

The farm unit, Coniston, devoted to grazing of mutton and woolled-sheep, is the joint property of Messrs. J.H. and N.L. Douglass (father and son). The farm comprises some 3,000 morgen of land, situated astride a broad entrenched meander of the Great Fish River approximately 25 miles by road to the North of Grahamstown. The farm lies immediately West of Piggott's Bridge, the crossing point of the Great Fish River, on a road linking Grahamstown and Fort Beaufort (Map 7).

The farm today consists of a collection of smaller units viz. Coniston Proper, (Camps A.B.C.D.F.G.I.), Lindsay (Camps H.K.L.M.) and Stockton (Camps E.J.), which were formerly portions of large land grants dating back to the mid-nineteenth century, (Map 12). These grants were gradually subdivided into smaller units by hereditary subdivision and eventually passed out of the hands of the original owners, and have recently been brought under single ownership.

The history of the farm since 1910 when Mr. J.H. Douglas first occupied a portion of Coniston Proper, would appear to have been a series of changes in farming occupation influenced largely by changing economic conditions. Throughout the period, however, such changes have been based upon a policy of active conservation of soil, water and vegetation the results of which are conspicuous in the present landscape.

In 1910 Coniston Proper, presented an aspect of wild and formidable rolling bushy country, prickly pear infested and deeply scored by dongas. There were no fences, no adequate water supplies and no easy communications with Grahamstown the chief marketing centre for the area, to mention only a few of the early hardships which faced the new farmer.

Undaunted, however, the prodigious task of clearing the prickly pear commenced, but without modern biological aids nature was subdued with difficulty and laborious burning of

hand-uprooted/.....

hand-uprooted plants was the only means of extermination. With a labour force of over 100 Native workers, however, the pest was brought under control within the first year of settlement. The farmer thereupon commenced ostrich farming, then perhaps the most profitable type of farming in the Cape Colony. The 500 prime birds, grazed at the time, soon provided a satisfactory income and enabled the farmer to erect a suitable brick homestead, farm sheds and boreholes and to replace fences, hitherto constructed of thorn-bush branches, with wire fences. In addition a start was made on essential irrigated greenfeed lands for rearing ostrich chicks.

The period of prosperity was to be short lived, however, since, in common with many ostrich farmers, the farmer faced bankruptcy on the collapse of the feather market in 1914 with the outbreak of World War I. To tide over the lean period the farmer leased the farm and resumed his Survey Practice, his former occupation, until his return to the farm in 1917.

Thereafter shorthorn beef cattle and pigs replaced the ostrich as prime source of income and the abandoned irrigation and soil conservation works were resumed. Communications had been improved in the interim and a car was kept on the south bank of the river, then not yet bridged in this area, and the farm reached either by fording the river or by a cable thrown across the river.

By 1925 the farming system had expanded to include the Persian mutton sheep.

The financial depression of the early 1930's brought low prices on the meat markets. In order to overcome the necessity of overstocking the farm to realise a suitable income, the greater part of the cattle herd was sold and the farmer commenced the breeding of quick maturing lamb for export. He was thereby able to prove the feasibility of producing quality mutton lamb from semi-arid grazing areas.

The new system necessitated improvement of the coarse Persian stock and several Southdown rams were imported from the flocks of King George V at Sandringham. Later the Dorset Horn

breed/.....

breed was also introduced to complete a quality triangular crossbred lamb.

In 1932 an experimental batch of 50 carcasses was despatched through the Cape Eastern Export Co., and was favourably received on the discriminating Smithfield market in London. Exports developed apace until in 1939 World War II prevented them from being continued. A fair number of carcasses, however, were still sold profitably on the discriminating markets in the Union, such as Johannesburg, Cape Town and Durban.

During the war years, however, it became apparent that the demand was for quantity rather than quality mutton, and very soon the Persian-Dorset-Horn cross became the popular breed in the Union. The farmer's former lucrative sales of Southdown Rams and quality lamb declined and once controlled prices for meat had been introduced during the war, all incentive for the production of quality lamb was removed. Quality breeding has thus been discontinued with consequent deterioration of the flocks as regards their quality if not in their value to the farmer. Today the mutton-sheep are a mixture of the three breeds in no fixed relationship.

With the post war wool boom came a further change in farming occupations with the introduction of Merino sheep, whose importance has since come to equal if not surpass the mutton sheep on Coniston.

In 1949 with increasing labour shortages and the advent of a serious drought the greater part of the remaining cattle, then a Jersey herd of some 75 animals kept for cream production, was sold, retaining only sufficient cows for milk production for use on the farm. The present farming practice emerges therefore as the dual grazing of mutton and woolled-sheep which together provide a satisfactory annual income to the farmer. It may be noted further that the many evidences of active soil conservation must make the farm a model to other farmers within this portion of the Great Fish River valley.

GEOLOGY AND RELIEF:

Geologically, Coniston falls within the region of tilted bands of shales and sandstones belonging to the Ecca Series of the Karroo System, which formation covers much of the area contained within the Great Fish River valley of the Albany Division

The more resistant dark sandstone formations outcrop quite frequently and where they abut on the outer bends of the meandering river, where active undercutting is observed, the formations stand out as rugged almost vertical krantzies in places over 60 and 100 feet in height. Weathered, crumbling, outcrops of shale occur frequently and particularly on the dry slopes on the banks of the Great Fish River.

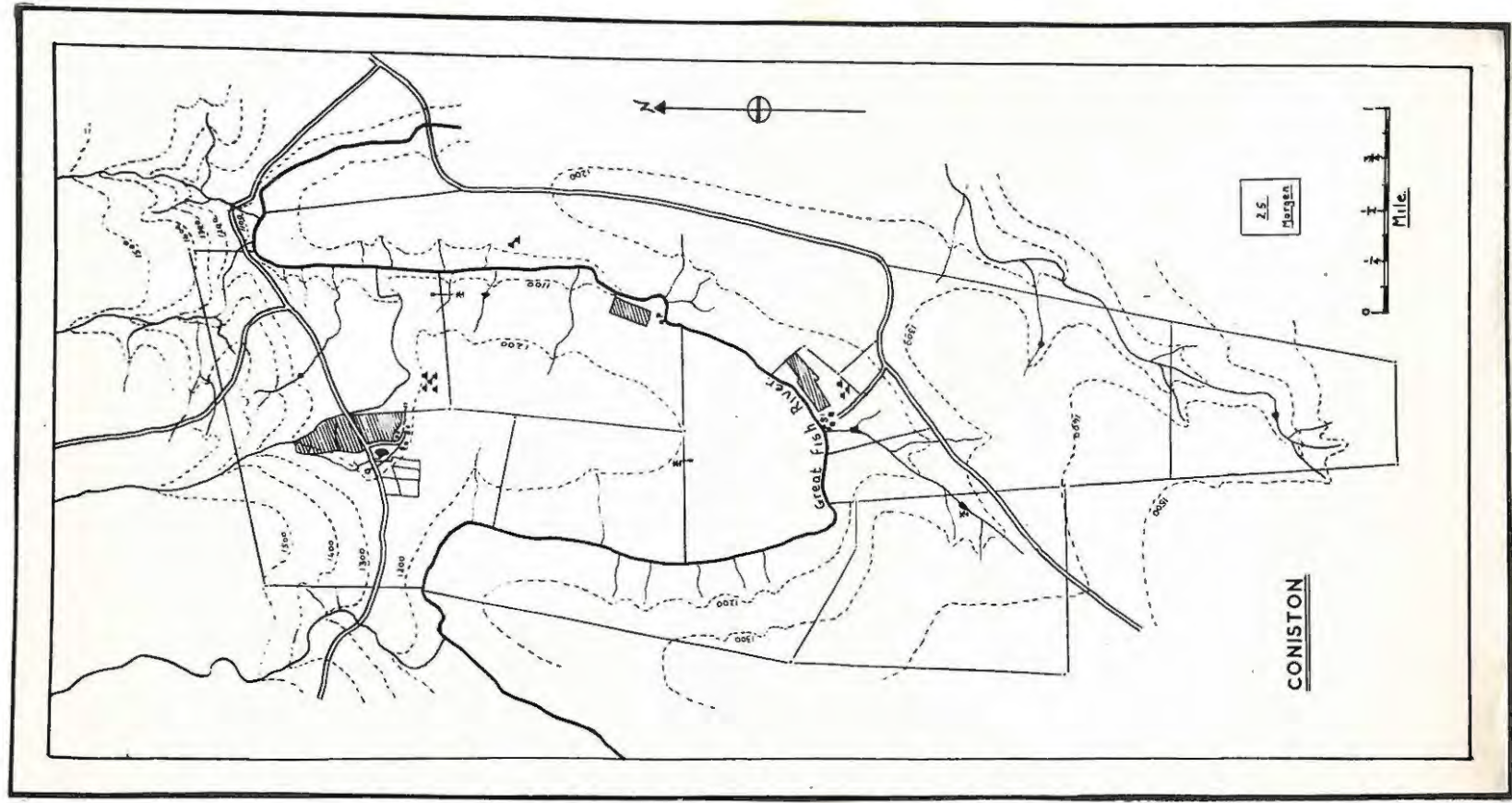
The farm lies astride a broad entrenched meander of the Great Fish River extending on its northern and southern extremities to the rugged slopes of the Fish River Rand and the westward extensions of the Botha's Hill range respectively (Map 11).

The farm occupies a section of the Great Fish River valley here some 3 miles wide, below the 1,300 foot, contour, in which the meandering river bed lies entrenched between low, rolling, worn down interlocking spurs, with gentle gradients, reaching southwards and northwards from the respective highground margins. These low spurs have a mean altitude of 1,200 feet at their crests which are, some 100 - 200 feet above the level of the river bed at 1,000 - 1,100 feet above sea level. In the northern and southern highland margins the altitude reaches some 1,500 feet.

The Great Fish River has as yet not developed any extensive low and level flood plain and only relatively small stretches are occupied by flood terraces, the most prominent of which covers the southern tip of the gently sloping spur which comprises Coniston Proper, where alluvial deposits of silt and sand may be observed.

The small tributary streams draining the farm are all youthful with steep gradients, V-shaped valleys and boulder-strewn watercourses which become raging muddy torrents during

heavy/.....



MAP II.

heavy rains, carrying the flood waters to the river. The Great Fish River today is itself in the nature of an intermittent river which at times may be nothing but a series of stagnant pools while at others it is a raging stream of over 30 foot in depth and many yards in width.

CLIMATE:

The climate of Coniston may be considered as characteristic of the dry inland portions of the Great Fish River valley in the northern regions of Albany.

TEMPERATURE:

As noted earlier, no temperature statistics are available for the drier inland portions of the Great Fish River valley in Albany and it must suffice, therefore, to state that the temperature regime experienced here is somewhat less equable than in the coastal margins of Albany and Bathurst. In summer maximum temperatures frequently exceed 100°F while in winter heavy frosts are fairly common at night when in the dry clear atmosphere radiation of terrestrial heat is greater than in the more humid parts of the two Divisions.

RAINFALL:

Rainfall values are not available for Coniston but figures for the farm Heatherton Towers (Map 4) similarly situated and some 11 miles to the east, may be quoted here to give a general impression of rainfall conditions to be expected on Coniston.

From these values it may be suggested that the farm Coniston, probably has a mean annual rainfall of some 12 to 13 inches distributed as follows:-

TABLE 19 : HEATHERTON TOWERS 18-19 YEARS (RAINFALL NORMALS TO 1935).

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	YEAR.
1.34	1.56	1.59	1.57	0.94	0.74	0.30	0.46	1.23	1.44	1.16	1.34	13.67

From/.....

From table 19 it may be observed that the rainfall, although considerably lower than in the better watered parts of Albany and Bathurst, is characteristically fairly evenly distributed throughout the year. There are two maxima occurring in autumn (March) and spring (October), and a tendency towards a summer maximum of rainfall (O. - A.) and a drier winter (M. - S.). The rainfall is distributed between the two half-years in the proportion of 61% in the summer half-year and 39% in the winter. It should be noted, however, that owing to very high summer temperatures the lower winter rainfall is considered to be more effective to plant growth than the summer rains.

Although no statistics are available it may be suggested that in general the rainfall here is probably less reliable and more variable than in the higher rainfall areas of Albany and Bathurst. Droughts are generally more severe in their effects since with an already low rainfall any reduction in the amount received is more serious than a similar reduction in the better watered areas. According to Dyer (1937) lightning and thunderstorms accompanied by short heavy showers are more often experienced in the Great Fish River valley than over the remainder of Albany and Bathurst and the intensity of the rainfall may be expected to be slightly greater here than the rain for the remaining areas.

#### VEGETATION:

The natural vegetation of Coniston belongs to the Karroid scrub vegetation type which characterises the greater part of the upper Great Fish River valley in Albany. (Map 12).

This vegetation is composed of stunted spiny scrub trees and bushes, low Karroo shrublets, succulents and less prominent grasses, mingled together in varying proportions and presenting a rather drab grey-brown, formidable, if botanically interesting, aspect to the landscape.

The scrub trees, Karroo shrublets and the succulents are perhaps the most conspicuous elements. The tough and gnarled bushes and trees are generally well distributed throughout

the/.....

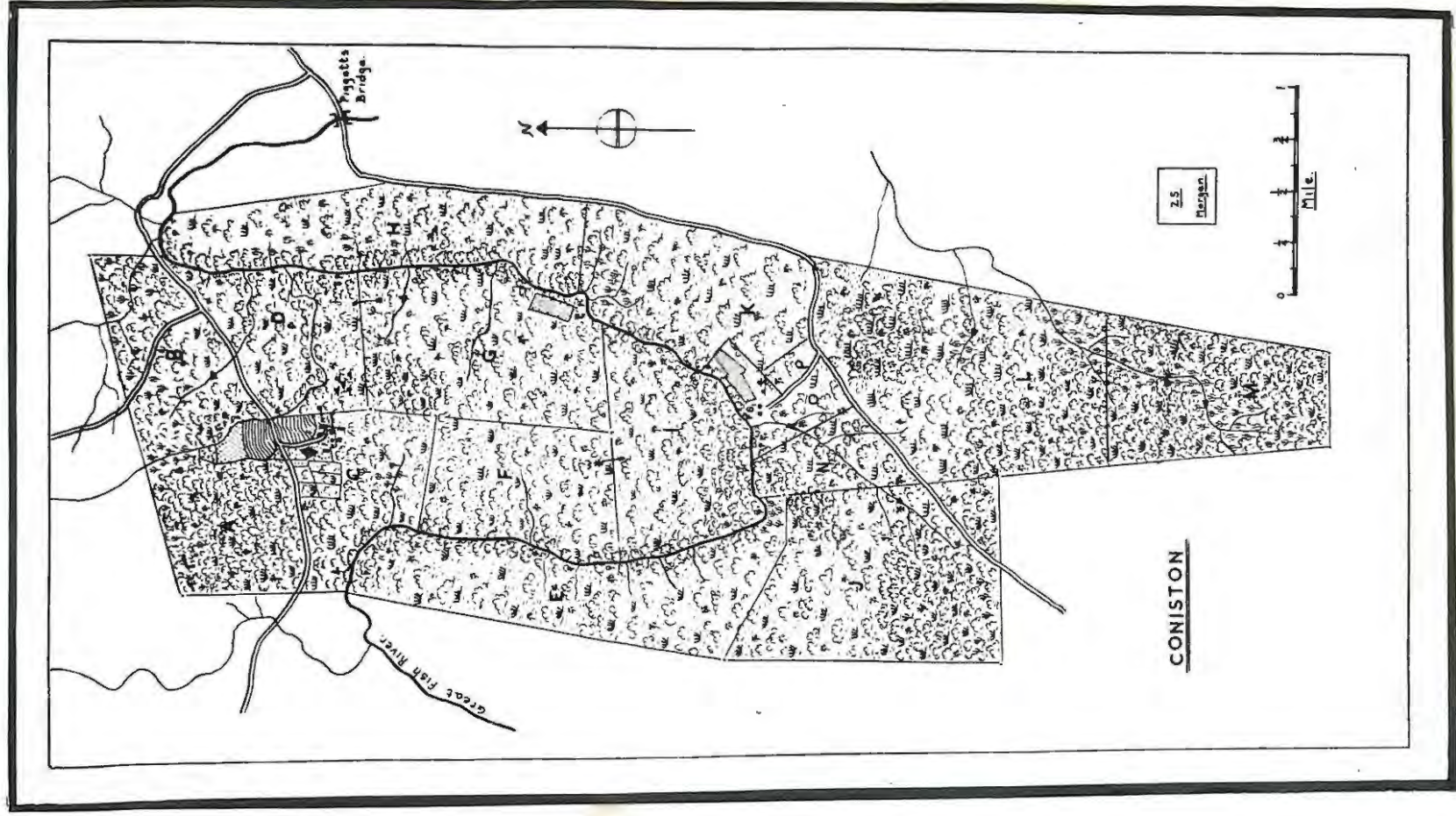
the landscape but become particularly dense on the slopes and in the ravines of the rugged northern and southern highland margins of the farm. The plants are from 3-10 feet tall with shiny, hairy or leathery leaves and most commonly spinescent. Among these bushes and trees the following occur commonly *Cussonia* (cabbage tree), *Schotia* (boerboom and paarboom), *Pappea* (pruimboom), *Euclea* (guarri), *Rhigozum* (drie-doorn), *Acacia* etc. Among the Karroo shrublets *Pentzia* is the most prevalent while the bitter Karroo bush *Chrysocoma*, *Aster* and *Sutera* also occur throughout. Over small areas in the valley these shrublets may be the dominant vegetation cover, especially over those stretches where the bush has been somewhat cleared. These shrublets are normally about 12 inches high and, being drought resistant, are among the most important members of the vegetation as regards land utilization for grazing.

Among the succulent plants the commonly occurring *Spekboom* (*Portulacaria afra*) is the most important for grazing. A 3-4 foot tall *Euphorbia* sp is also particularly characteristic lending parts of the farm an appearance of true Noorsveld whose dominant character is this type of *Euphorbia*.

Aborescent species of *Aloe* and *Euphorbia* are most commonly encountered in the ravines in the hilly country to the north and south. Among the many species of low growing succulents found on Coniston, *Mesembrianthemum* and several low growing aloes are most commonly observed. In spring the succulents lend brilliant splashes of colour to the landscape, during their short flowering spell.

The grasses, although important as regards grazing, are far less prominent in the vegetation than in the better watered parts of the Albany and Bathurst Divisions. Nowhere do they form anything resembling a dense mat and appear instead as scattered tussocks. Since they are a favoured grazing element they are normally short (1-2 inches) except in camps from which animals have been excluded temporarily, when they are taller and up to 4 inches in height. This sparse grass cover may be

attributed/.....



MAP 12.

attributed primarily to the lower rainfall of the area.

The landscape is thus further characterised by many bare patches of soil and shaly outcrops with an interrupted lower vegetation and with soil erosion a real danger in disturbed areas.

Along the banks of the Great Fish River and its tributaries where the soil moisture is more plentiful grow linear stands of trees among which acacia is particularly common.

### LAND USE AND THE FARMING SYSTEM.

#### INTRODUCTION:

The farm landscape of Coniston is taken to represent the mutton and woolled-sheep farming industry commonly encountered in the Great Fish River valley of northern Albany. It should be stressed, however, that this is not the only farming type encountered in the area, but owing to limited time and space such other types as cattle ranching and citrus growing have not been considered here. As noted earlier the farming type selected, is a major feature of the western portion of the valley in Albany (Map 6).

The evolution of the present system of landuse has been briefly discussed above where it was noted that it has emerged largely as the result of changing economic factors. It should be noted, however, that although economic factors have influenced the development of the present system, it is a system for which the natural environment is particularly suited, and represents therefore a well conditioned example of man's use of the land to his most profitable advantage, within the bounds of the possibilities offered by the environment.

It may be noted further that although the farm has been found suitable to the grazing of merino woolled-sheep, the farmer believes that the grazing of both woolled and mutton sheep together makes for greater stability in the farm economy. For, although serious attempts have been made to stabilize the

wool/.....

wool industry, he believes that wool may be subject to fluctuations in demand and prices in the future at which time his farm economy will not have to rely entirely upon the sale of a wool clip, but will be supported by the sale of mutton for which the demand is more constant and prices generally more stable. In addition since the wool clip brings in a single annual cheque the grazing of mutton sheep which are sold periodically throughout the year provides a means by which debts may be avoided and from which monthly running expenses may be paid.

The landuse system of Coniston is one in which the major farm activities are directed primarily towards the profitable production of wool and mutton for sale. It is concerned thus chiefly with merino and crossbred mutton-sheep grazing with limited dairying and the cultivation of greenfeed and fodder crops for use on the farm.

FACTORS AFFECTING THE LANDUSE SYSTEM:

SIZE OF FARM UNIT:

The size of Coniston at present approaches 3,000 morgen which is somewhat larger than the average for the Albany district as a whole, but corresponds roughly (according to the farmer) to the average size of farms in the drier more sparsely vegetated portions of the Great Fish River valley of northern Albany. In fact in the Master plan of the Fort Brown Soil Conservation District of which the farm is a part (Map 8) 3,000 morgen is considered the most economical size for farm units in the area and one which is readily managed by a single farmer.

GRAZING:

(a) VEGETATION AND GRAZING:

In contrast to farms in the better watered parts of the region in the Albany highlands and Lower Albany and Bathurst, the Karroo shrublets (especially *Pentzia*) and the succulent scrub bush, are here the major source of pasturage for both sheep and cattle, while the grasses although important also, are normally considered as a secondary source of feeding material.

The/.....

The importance of the Karroo shrublets and many members of the scrub bush rests not only in their excellent grazing qualities but also in their drought resisting qualities in a region of low rainfall. They constitute therefore a reliable grazing which rarely fails to supply the necessary nourishment for livestock except in very severe droughts of which 1949 ( $\pm 5''$ ) is the most recent example when several hundred sheep were lost primarily through lack of sufficient grazing.

(2) PALATABILITY:

With a low mean annual rainfall the grazing is essentially sweet, remaining palatable throughout the year even when dry and dormant.

(3) NUTRITIONAL VALUE OF THE GRAZING:

In contrast to the grazing of Atherstone in the highland sour grassland region, the grazing of Coniston shews no obvious deficiency of such essential minerals as phosphates, calcium and magnesium and the feeding of these minerals is normally found unnecessary. The general absence of mineral deficiency is attributed by the farmer to the greater content of the minerals in the soils which, due to lower rainfall, are less leached than in the better watered region. Moreover, they are considered to be more fertile generally than the grey-black soils developed on the Witteberg formations which largely underlie the better watered regions<sup>of Albany</sup>%. It may be suggested also that since the bushes and shrublets play such an important role in animal feeding they may be instrumental in supplying a sufficiency of mineral matter since, as already noted for Atherstone they contain considerable fractions of the essential minerals. The feeding of bonemeal is only rarely necessary in winter.

In addition the farmer observes that the grazing normally provides sufficient protein matter e.g. the mutton lambs are fattened directly off the natural grazing, receiving only small quantities of supplementary green feeds. During severe droughts,

however/.....

however, due rather to lack of bulk than quality the stocking rate is necessarily lowered to prevent overgrazing.

(4) SEASONAL RYTHM OF GRAZING:

The distribution of annual rainfall gives rise to a nourishment cycle similar to such other inland farms as Atherstone and Mosslands. Animal condition is normally best in the late spring and early summer (O.N.D.) when the vegetation has recovered its quality following the spring rains. It declines during the winter season during which the vegetation deteriorates in quality.

(5) CARRYING CAPACITY OF THE GRAZING:

Considering present farming practices in the Soil Conservation District of Fort Brown, of which Coniston is a part, the officially recommended stocking rate for the lower rainfall areas (8 - 16" p.a.) is of the order of 1 morgen / sheep and 4-6 morgen / beast (cf better watered areas - 1 to 2 sheep / m).

At its maximum during lambing seasons the stocking rate of Coniston is the equivalent of 1,500 to 1,600 sheep grazed on roughly 3,000 morgen giving on stock density of some 2 morgen / sheep. The farm is thus understocked at the present time, a factor which bears relation mainly to the principles of conservation farming which play a large part in the farm landscape as noted earlier.

According to the farmer the grazing quality is relatively uniform throughout the farm and it may be assumed that the stocking rate noted above is representative of most parts of the farm.

(6) FENCING AND CAMPING:

Fencing and subdivision are also important features of the farm landscape and represent once more man's endeavours to utilize the land and grazing to the best and most profitable effect.

All fences on Coniston have been erected since 1910 and at present total approximately 28 miles in length. The fences ± 4 feet high, are all constructed of stout strand or barbed wire and/.....

and wire mesh as a protection against the jackal. Fencing posts are for the most part indigenous sneezewood poles which in places have been replaced by iron standard or chemically treated bluegum posts.

These fences subdivide the farm into 13 large camps varying in size from 500 morgen to 60 morgen. In addition there are a number of smaller paddocks mainly centred around the homestead, where they are conveniently situated for the handling of animals. Further, there are the enclosures bounding the cultivated lands, homesteads and farm sheds. All the camps have interleading gates of tubular metal construction to facilitate the movement of the livestock across the farm.

The pattern of the fencing system (Map 12) is <sup>aligned</sup> on the roughly rectangular shape of the farm and is locally influenced by the natural bounding lines provided by the river or by the passage of the roadways across the farm when the bounding fences logically follow these features.

The fencing scheme of Coniston proper excluding Camps A and B and including Camps E and K on Lindsay and Stockton, has recently been reorganized to conform to a farm grazing plan drawn up for merino sheep grazing, on these portions of the farm by the Central Committee of the For Brown Soil Conservation District. The sizes of the camps have been determined primarily by the carrying capacity of the grazing. Camps E and G, for example, are considerably larger than the remaining camps largely due to the more open less bushed and sparser grazing available and in the case of Camp G, especially, to a greater tendency toward soil erosion and a lower carrying capacity (Map 13).

The camps here are all supplied with permanent water from boreholes or pipeline extensions from boreholes except in Camp E which relies entirely on the river in which pools exist even in the dry season. No further subdivision is planned for this section of the farm, since according to the farmer and confirmed by Bosman & Bonsma (1937) the expenditure on the extra fencing and extensions of the present water supplies would not be warranted when the carrying capacity and production of wool per unit area is considered.

Over/.....

Over the remainder of the farm the system of camps bears strong relation to the available water supplies with camps either aligned along the Great Fish River, Camps H and K or supplied from small dams - Camps J L M and the paddocks surrounding the shearing shed on Lindsay. Only Camp J is supplied by a permanent water supply from a borehole. Any further subdivision or reorganization of camping in this portion of the farm will depend therefore on the extension of the present water supplies primarily by the installation of more boreholes, the expense of which, however, is prohibitive to further camping at the present time. For the present, however, the available camping is at least adequate for the needs of the farm.

GRAZING MANAGEMENT:

The management of grazing on Coniston is complicated through the grazing of two distinct flocks of sheep and the farmer observes that the following features have been taken into consideration:-

- (a) The two flocks must be kept apart to prevent inter breeding.
- (b) The wool fleeced merinos should not be grazed in Camps which have been grazed by the hairy mutton sheep for fear of adulterating the wool with undesirable hair.
- (c) The more open grazing Camps are more desirable for Merino sheep since the spines of heavily bushed areas pull wool off the sheep while the thorns may break off in the fleece adding to impurities.
- (d) The less hardy merinos are more susceptible to diseases and have to be frequently treated against them and are thus more conveniently grazed in those Camps within easy reach of the control centre at the homestead.

The grazing has thus been divided up as follows:-

Merino Sheep - Camps. C D E F G I and K.  
Mutton Sheep - Camps. A B H J L and M.

As/.....

As noted above a comprehensive grazing plan has been evolved for the Merino Sheep, which may be summarised as follows:-

TABLE 20 : ROTATIONAL GRAZING SCHEME.

Camps.	1953.	1954.	1955.	1956.
I & F	Sp. ES	LS. A.	EW, LW.	Rest.
G & E	LS. A.	EW, LW.	Rest	Sp. ES.
D & C	EW, LW.	Rest	Sp ES.	LS. A.
K	Rest	Sp ES.	LS. A.	EW, LW.

Where:- Sp. = Spring, ES. = Early Summer, LS. = Late Summer, A. = Autumn, EW. = Early Winter LW. = Late Winter.

From Table 20 it may be observed that the year is divided into 3 grazing Seasons each group of camps being grazed for 4 months in the year, at different seasons in each of 3 years out of 4. For the remaining 8 months of the year the divisions are allowed to regenerate, the Spring and Early Summer periods being especially important in this respect. Once in 4 years, each of the camps is allowed a full years rest which allows the relatively slow growing vegetation full opportunity to regenerate. The long sparing season is to be compared with those in the rapid growing grassland areas over the highlands of Albany and Southwards to the coast where a few months are sufficient and where a longer period leads to excess growth and accumulation of grazing.

The successful implementation of the scheme naturally depends on rainfall conditions and if a severe drought were to occur, in the planned period, rotational grazing will go by the board and the sheep be spread out over the entire grazing area allotted to them.

No rigid rotational grazing scheme as the above exists for the mutton sheep and their grazing is adjusted primarily to the breeding and rearing requirements of the flock.

The/.....

The lambing of mutton breeds extends throughout the year on Coniston and since lambs of different age groups are kept apart the grazing scheme operates as follows:-

- (a) Ewes without lambs are run in Camp H with the rams, until they are about to lamb.
- (b) Once the ewes have lambed, they are drafted into either of Camps J or L depending on which is already in use by the preceding age group. These camps are close to the lambing Camp H and in addition they are near to the green-feed lands on Lindsay where the ewes are allowed to graze if the grazing in the camps is particularly sparse. Moreover, they are open and less rugged in character and thus suitable for young lamb grazing.
- (c) At 3 months of age the lambs and ewes are drafted to camp M and their place taken by a new age group from camp H. Here in camp M they remain until the age of  $4\frac{1}{2}$  - 5 months when they are moved to camp A or B in which they are fattened for sale, the ewes returning once more to camp H.

This system appears to allow no resting of the grazing, but due to irregular lambing some resting is possible.

With heavy lambing camps J, L and M are heavily stocked and camp H experiences the equivalent of a resting spell while with minimum lambing, camps J, L and M are somewhat rested and camp H heavily stocked. As far as possible also each camp is allowed from 6-12 months rest every few years when the paddocks N O P supplemented by greenfeed grazing are used instead. Further subdivision of the farm would alleviate the present pressure on the grazing, but as noted above, the expense involved at present is prohibitive.

NOTE:

The grazing of cattle and sheep together is not necessary here as there is little danger of the grazing outgrowing the requirements of the sheep.

STOCK/.....

STOCK WATERING:

Situated in an area of low and erratic rainfall Coniston is not as well endowed with natural water sources as e.g. Atherstone. The erratic flow of the Great Fish River is not entirely reliable as a permanent water source and the farm relies mainly on supplies from boreholes and storage dams.

There are 4 boreholes, operated by windpumps on Coniston, situated in camps F G and J and in the Coniston homestead paddock. The water from these boreholes is led into concrete troughs for stock watering. In addition the water is piped from the boreholes to troughs in neighbouring camps, camps A, C, D and I being served in this manner.

The water obtained from the boreholes is largely mineralized and is considered an important source of essential minerals for the livestock.

The maintenance of the underground water reserves is recognized by the farmer as essential, and the flow of water from the boreholes is automatically controlled using a large float as in a normal cistern system. The boreholes are of medium depth and have never been known to fail even during such exceptional droughts as in 1949.

Storage dams are situated in Camps B, J, L and M and in the shearing-shed paddock on Lindsay. Apart from the large irrigation dam in the Coniston homestead paddock these dams are reliable only under normal rainfall conditions and are liable to dry up in droughts. At such times water is carried into the camps in a large mobile water tank or else, where the camps abut on the Fish River, the stock is watered from water holes in the river.

Camps E, H and K rely entirely on the river water-holes which may also be unreliable due to the erratically flowing river. In addition the driving of stock over the valley slopes makes for soil erosion.

Over large stretches of the farm, therefore, water supplies are a limiting factor in the environment and with the

prohibitive/.....

prohibitive expense of installing further boreholes at present, intermittent water shortages will remain a feature on the farm for some time to come.

THE DISEASE FACTOR IN THE ENVIRONMENT:

The application of modern preventive methods has considerably reduced the importance of the disease factor as a limitation to stock farming on Coniston.

Ticks and their associated diseases (heartwater and redwater for example) are perhaps the most important factor. The less hardy Merino sheep are more affected since they are not dipped regularly as explained in the case of Atherstone. It is the practice to hand treat these sheep against tick infestation at least once every two weeks throughout the year. The normal treatment, it may be noted, is a mixture of DDT and benzine hexa chloride mixed in old motor oil, and smeared into the ears and crutches, the most vulnerable spots. In addition, after each treatment, the sheep are herded through a shallow footbath of strong dipping solution which kills off ticks on the legs and bellies without damaging the fleece. The Merinos are again dipped only once a year after shearing.

The crossbred mutton sheep on the other hand are regularly plunge dipped once a month in winter and once a fortnight in summer.

The two dipping tanks are situated respectively in close proximity to the two control centres of the farm at the Coniston homestead (F) and the shearing-shed on Lindsay (S<sub>1</sub>).

All sheep are regularly dosed against internal parasites and similar results would probably be found to those quoted for Atherstone in this respect. In addition they are all inoculated against diseases such as Black quarter and Blue-tongue, usually in July or August before the spring and summer when these diseases are most prevalent.

THE/.....

THE BREEDING OF SHEEP ON CONISTON:

SIZE OF FLOCKS:

Merino Sheep - 400 Ewes, 10 Rams and a varying number of lambs, depending on the lamb crops.

Mutton Breeds - 400 crossbred Ewes, 150 Persian Ewes, 10 Rams (Southdown-Persian, and Dorset horn breeds) and approximately 400 lambs from 1-8 months of age.

MERINO SHEEP:

As on Atherstone the sheep are all high quality Merino stock carefully selected for their breeding properties and the aims in breeding are essentially similar.

BREEDING SEASONS:

Similar to Atherstone, lambing takes place twice a year in Autumn (M.A.) and Spring (S.O.) but due to the short period of time in which Merinos have been grazed on Coniston the major season has not yet been determined. The farmer observes, however, that it is likely to be the Autumn season since a similar combination of environmental factors found on Atherstone are encountered here. In fact already the majority of ewes do lamb during the Autumn season.

LAMBING CAMPS:

During lambing the ewes are grazed in either of Camps D, G or K which are adjacent to greenfeed lands where the ewes are allowed to graze for a few hours each day to make for better milking and more rapid growth of lambs.

The necessity for separating lamb age groups does not arise in this case and the whole flock is moved en-bloc, according to the rotation scheme, after the lambing has been completed.

LAMB CROPS:

Each Merino ewe normally produces 1 lamb per year either in Autumn or Spring. Normally up to 80 - 90% lambing may be expected (i.e.) approximately 350 lambs each year. Abnormal drought, however, may seriously affect lambing making for greater mortality/.....

mortality with consequent reduction of lamb numbers.

The emasculated "hamels" of Coniston are kept on the farm to an age of 14-18 months after which they are sold especially to farmers of the sourgrassland regions where, due to the smaller size of sheep bred, many farmers prefer to buy the large wool producing hamels from these sweetgrazing regions (c.f. Atherstone). According to the farmer it is more economical to concentrate mainly on the ewes who because of their greater size are good wool yielders and are in addition able to produce lambs which may later be sold at handsome prices under prevailing conditions.

CROSSBRED SHEEP:

As noted above the careful triangular crossbreeding of Persian-Dorset horn-Southdown export quality lamb has declined in recent years due to the lack of demand for such high quality meat, and the more popular Dorsian (DorsetHorn-Persian) cross is becoming the main breed of the farm. However, as far as it is economically sound the old scheme is adhered to excepting that the flocks are no longer kept apart which has resulted in a flock with the breeds in no fixed relationship.

FACTORS GOVERNING THE CHOICE OF BREEDING STOCK:

(a) PERSIAN MOTHER STOCK:

These sheep although quite frequently used for mutton production in South Africa, have according to the farmer, the following disadvantages - deficient shoulders, too much oily fat concentrated in the tail and poor milking qualities. They are, however, suitable for crossbreeding because of their prolificness and their hardiness in environmental extremes and in resisting disease, features which are stamped on their progeny.

(b) DORSET HORN RAMS:

These sheep are included chiefly because of their excellent milking properties, making for greater nourishment for the lambs, and their prolific breeding. They produce a  
crossbred/.....

crossbred sheep of greater weight and quality than the pure Persian. The fat is more uniformly distributed and the carcasses under present conditions are quite acceptable to the meat trade, although the inclusion of the Southdown breed produces a higher quality lamb.

(e) SOUTHDOWN RAMS:

The Southdown is recognised as a premier mutton sheep throughout the world and they stamp such good qualities as - good shoulders, no "legginess", small bones, and well "marbled" flesh (fat and meat well proportioned) on their progeny. It should be noted that to overcome the difficulty of adjustment of the exotic pure Southdown breed to the severe conditions on the farm, the rams have been based on the hardy Persian stock and then bred back to more or less pure Southdown stock.

BREEDING SEASON:

For the crossbred sheep there is no particular lambing season. The rams and ewes are allowed to run together throughout the year and all year round lambing is the order.

It is essential, according to the farmer, to maintain a high condition in the ewes and lambs and with a low erratic rainfall it is important not to be saddled with a large single lamb crop for fattening, when the grazing may not be sufficient to allow for rapid and continuous growth of the lambs. All the year round lambing ensures that there will always be plenty of grazing matter for the fat lambs. In addition, under this system, there are always a number of saleable lambs and the farmer does not have to rely on market conditions at any one particular period of the year.

The only serious limitation to successful lambing is drought which is often more severe than in the higher rainfall regions of the area. In 1949 e.g. the drought was so severe ( $\pm$  5") that the grazing could not support the sheep and a large number were perforce sold leaving only 350 mutton ewes on the farm which were fed by scattering purchased maize in

the/.....

the grazing.

(NOTE: The organization of grazing has been dealt with above.)

LAMB CROPS:

The mean lamb yield per crossbred ewe on Coniston is 2 lambs each 14 months (i.e.) approximately 800 mutton lambs in each 14 months. It is the farmer's experience that from 80-90% lambing may be expected with lamb mortality being made up largely by the birth of twins.

FATTENING MUTTON LAMBS FOR SALE:

The progress of the lambs up to age of 4-5 months while grazing with the ewes has already been noted above.

Normally little supplementary greenfeed is necessary for pre-sale fattening of lambs on Coniston according to the farmer, and they are usually sold off the natural grazing.

However, to bring them to prime condition the lambs are drafted for a few hours each day prior to sale onto the lucerne grazing.

At 6-8 months of age the lambs weigh from 80-90 pounds and at this stage are ready for market. (In pre-war years when export quality was produced, the lambs were sold at 4-6 months and weighed 60-65 pounds).

Lamb produced on Coniston falls within the following quality grades - Super Grades 1, 2 and 3 and Prime Grade 1. Of these approximately 25% of the lambs are of Super grade and the remainder chiefly Prime grade.

The lambs are sold mainly on the surrounding local markets among which Grahamstown, Fort Beaufort, Adelaide and Bedford are the chief. The lambs are conveyed to market by lorry to prevent any loss in condition by driving on the hoof. Up to 4 years ago (1947), however, it was the normal practice to drive the lambs over the 25 miles to Grahamstown stock sales. Normally a number of old ewes and ewes with poor breeding properties are also sold at such times for slaughter stock.

SHEARING/.....

SHEARING AND PREPARATION OF WOOL FOR MARKET:

SHEARING SEASON:

In 1949, 1950 and 1951 the sheep were shorn twice a year in late October and early June primarily due to the instability of the high wool prices during those years. The October season was, however, considered the major season, but if wool prices were high in June the sheep were shorn at that season also. The June season, however, was not well favoured since with several intensely cold spells in the winter the farmer experienced losses of sheep through exposure.

The farmer believes, however, that the wool industry has become more stable and the single spring shearing season is now the order. In spring the temperatures are rising, making for less exposure to shorn sheep, diseases are not yet too prevalent and in addition the wool clip of 12 months' growth is more valuable than the former 7 and 5 months' growth clips. Moreover, the dense winter fleece obtained in spring shearing further adds to the advantage of the spring as the favoured season.

LABOUR:

As on Atherstone shearing is done by migratory Native and Coloured shearers who contract their labour to the sheep farmer on a piece-work basis. Normally 5 shearers are employed in the shearing season.

For similar reasons quoted in the case of Atherstone, hand operated clippers are employed in shearing. The shearers normally handle up to 125 sheep per day and shearing is completed within 7-10 days with approximately 700 sheep being shorn (including lambs).

THE SHEARING SHED:

The old homestead on Lindsay has been converted into an admirable shearing shed (S<sub>1</sub>) and although perhaps not as proficient as that of Atherstone is sufficient for the present needs of the farm.

The/.....

The process involved in shearing, skirting, classing and baling the wool is essentially similar to that on Atherstone and need not be reiterated here.

The baled wool is transported from the farm by lorry to Grahamstown station from whence it is despatched to the wool sales in Port Elizabeth. The farm is not as conveniently placed as Atherstone as regards transport facilities but is nevertheless more favourably situated for example than many wool farms in the expansive Karroo regions.

#### WOOL CROPS:

The mean yield of wool per sheep on Coniston is, according to the farmer, of the order of 12-15 pounds to be compared with  $\pm$  8 lbs from the sourgrassland sheep. The reason of course lies chiefly in the greater size of sheep in the sweet grazing regions. The annual yield of wool from all the woolled-sheep including lambs is thus from 4,000-6,000 lbs per year.

The grazing of Coniston contains among others burrweeds which together with spines and twigs may cause considerable impurity of wool produced. The burrs, twigs etc. are carefully removed before baling by hand picking. The necessity for keeping hair which considerably reduces the value, out of the wool has already been noted above.

#### SKINS:

The skins of home slaughtered sheep are cured on the farm and are sold on the Port Elizabeth skins and hides market. The number of such skins is very small, however, and in comparison to wool and lambs do not play any significant role in the farm economy.

#### CULTIVATED LAND, IRRIGATION AND SOIL CONSERVATION:

Agricultural land on Coniston occupies from 20-25 morgen of land representing .8% of the total area of the farm. The cultivated land is utilized entirely for fodder crop production

except/.....

except for a small area used for growing vegetables and fruit (chiefly citrus) for home use.

Whereas on Atherstone the cultivation of greenfeed lands for sheep was limited mainly by sloping land and poverty of the soils, on Coniston the chief limitation to agriculture is the low annual rainfall and intermittent droughts, which due to the low rainfalls (10-15") have more serious effects than in the higher rainfall regions (20-25"). In addition the deficiency of large scale irrigation facilities, upon which agriculture must depend in this region, is a serious limitation. When the proposed large scale irrigation scheme involving the Orange and Fish River is undertaken, however, it is likely, according to the farmer, that the more fertile soils of the Fish River valley will be profitably used for the cultivation of citrus, cereals and fodder crops on a far more extensive basis than at present. Further, although not as important as the limitation quoted above, the occasional thunderstorms with accompanying heavy down-pours of rain, experienced in the region, may lead to soil wash and erosion on exposed agricultural land.

SOILS:

Comprehensive soil analyses have not been made for Coniston, but according to the farmer, the soils, on the whole, may be considered to be more fertile and less leached than the grey-black sandy soils of the Witteberg formations of central and lower Albany and Bathurst. Over fairly large tracts of the farm, e.g. the southern tip of camp I, the northern tips of camps E and H and the irrigated lands adjacent to camps A and B, fertile alluvial soils may be observed. For the remainder of the farm the soils vary from brown sandy loams to clay loams. It may be noted also, however, that over large areas, according to the farmer, the soil cover is relatively shallow and, that exposed and weathered shale and sandstone outcrops are encountered quite frequently.

CROPS/.....

CROPS CULTIVATED:

At least 80% of the land cultivated is devoted to the growing of lucerne under irrigation as a green fodder and hay crop, mixed with Prairie Fescue grass (*Bromus* sp.). A small maize crop is cultivated for silage while oats is cultivated for green feeding and hay. No cash crop is produced since the object is chiefly to produce supplementary fodder crops to increase the grazing capacity of the farm and to ensure sufficient feeding in times of drought while with the limited irrigation facilities no land may be spared for cash crop cultivation at present.

The 20-25 morgen of cultivated land of Coniston is entirely under irrigation and is distributed as follows. (Map 12).

- (a) 8 morgen of lucerne and pasture grass situated in Camp G and irrigated from a pump on the Fish River.
- (b) 5 morgen of lucerne and pasture grass in Camp K irrigated again from a pump on the Fish River.
- (c)  $\pm$  10 morgen of land divided approximately equally between lucerne and pasture grass, and maize and oats situated in Camp A. The upper parts of these lands is irrigated by flood waters from the Kloof, at the foot of which the lands are situated, and the lower portions both by any surplus flood waters from the upper lands and from the large irrigation dam adjacent to the homestead enclosure.

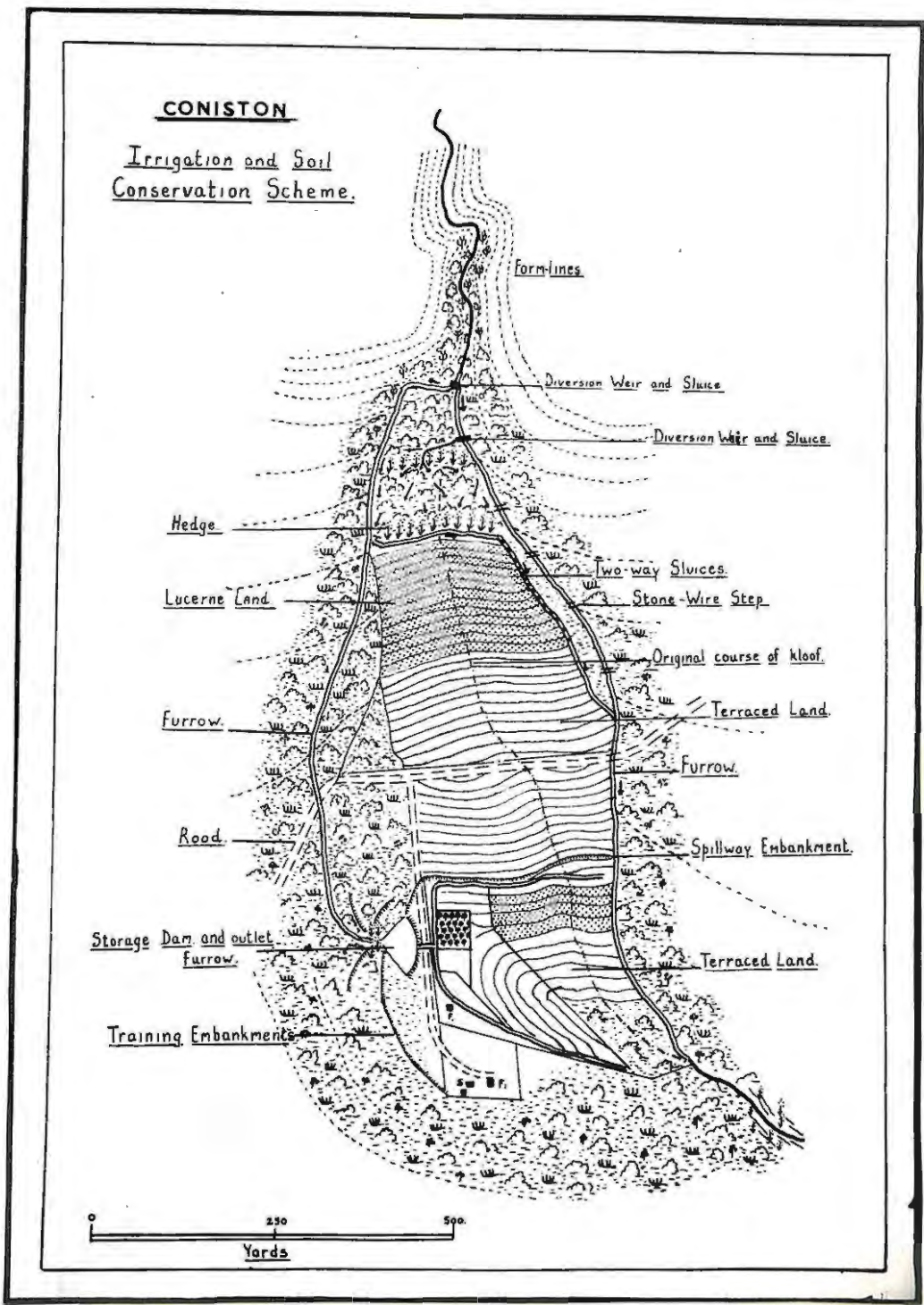
This latter irrigation scheme warrants further attention. The scheme had its inception during the ostrich period when the need was experienced for greenfeed for chick rearing, and for this purpose the stretch of donga ridden lands at the mouth of the Kloof was reclaimed. The scheme is illustrated in diagram 2. Little capital was available at the time and the work was undertaken by the farmer and two native workers using a span of oxen for traction power.

A diversion weir was constructed across the mouth of

the/.....

**CONISTON**

Irrigation and Soil Conservation Scheme.



DIAG. 2.

the Kloof to divert flood waters, from their normal course through the deep dongas, along an artificial furrow, in which the water flows over a series of 4 stone, wire encaged, steps, imbedded some 15 foot in the soil, to an outlet into the Fish River.

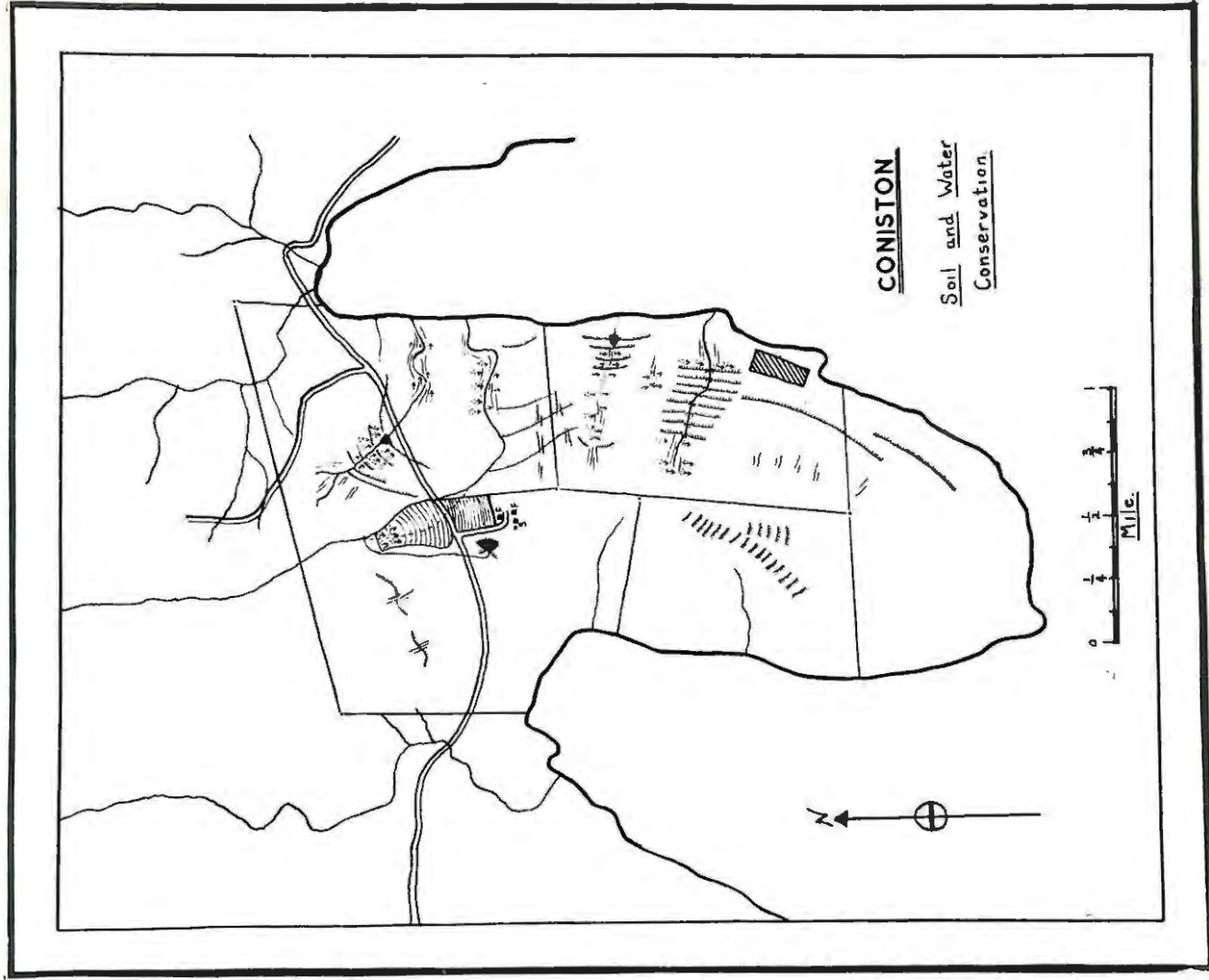
On the site of each of these steps a two way sluice was built and commencing with the lowermost sluice the silt-laden flood waters were led into the donga-ridden land where the silt was trapped behind dense hedges of bushes, trees, American aloe and grass. Gradually the silt filled the dongas and once the lower reaches were reclaimed the second sluice was opened and the same process gone through again until eventually the land was entirely reclaimed as it appears today.

In the interim, work commenced on storage facilities to impound a portion of <sup>the</sup> flood waters. The large irrigation dam with a stout earthen wall some 130 yards long and impounding up to 12,000,000 gallons of water was constructed, fed by a furrow from the first diversion weir in the Kloof. To prevent the dam from silting up this feeder furrow has been constructed to run for some distance over a low gradient course interrupted by steps over exposed rock face before reaching the dam. In this way most of the silt is deposited in the furrow before reaching the dam. The sand and silt is periodically scooped out of the furrow and when sifted and cleaned forms a valuable source of building sand on the farm.

The completed scheme comprises an elongated fan shaped area, terraced into steps and planted to fodder crops as noted above. The upper reaches beyond the farm road (Diagram 2) rely entirely on flood irrigation from water diverted by the second diversion weir in a furrow along which is a series of two way sluices each feeding a terrace of lucerne. The lower reaches are furrow irrigated by water from the irrigation dam.

This irrigation cum-conservation scheme, is however, by no means the only evidence of water and soil conservation on the farm. From Map 13 it may be observed that such

features/.....



MAP 13.

features as contour banks, drainage furrows, retention hedges across valleys and small storage dams are very much in evidence. This conservation work, completed on Goniston proper, has yet to be extended to Lindsay and Stockton, but already the general absence of dongas and over grazed veld is a remarkable feature of the farm.

FUTURE:

Until large scale irrigation facilities are constructed on the Fish River, it is unlikely that the present agricultural land will be extended to any considerable extent.

SOILAGE, SILAGE AND HAY:

Except for stall feeding of the 15 Jersey cows kept for milk production for farm use, very little soilage is cut on the farm from either lucerne or the summer maize and winter oats crops. The maize crop is utilized in the making of silage which is stored in three small concrete tanks for use as cattle feed in times of shortage. The surplus lucerne and pasture grass as also the oats crop are cut for hay making. Grown under irrigation the farmer normally obtains up to 7 cuttings of lucerne each year, and from each cutting up to 2 tons of hay are produced. The hay is used mainly for feeding the milk cows, draught oxen and sickly sheep brought in for attention. In addition the leaves of the American Aloe are shredded and used for succulent dairy cow feed as on Atherstone.

FARM LABOUR:

Farm labour is supplied by 8 Native male workers and their families numbering in all 30 persons.

The permanent workers are clothed and fed by the farmer and each is allowed to graze 2 or 3 head of cattle on the farm for his own use. In addition they receive all the surplus skimmed milk from the dairy herd. The workers are, as on Atherstone, not allowed to cultivate their own lands on the farm due to the limited irrigated area available, all their food

being/.....

being purchased by the farmer and rationed out to each family once a week. Wages earned by the workers are essentially similar to those quoted for Atherstone.

Again as on Atherstone 3 of the workers are primarily sheep tenders the remaining workers being employed chiefly for work on anti-erosion works, dam scooping, cutting cow fodder, repairing fences and the like.

The women are employed only as casual piece workers for the collection of weeds, hoeing and housework, and again chiefly attend to the needs of their families.

COMMUNICATIONS, FARM TRANSPORT AND POWER:

From Map 7 it may be observed that Coniston is situated conveniently on a railway bus route from Grahamstown to Fort Beaufort, some 25 miles from Grahamstown and 30 miles from Fort Beaufort over fair gravel roads. The twice weekly bus service in both directions provides ample rapid and relatively cheap transport for the farm according to the farmer.

The farm is also linked by a telephone extension to the exchange centre in Grahamstown.

In addition to several light waggons, a heavy duty lorry is available for farm portage as also for transporting mutton lambs and wool to market. In addition both farmers own modern cars for farm business and pleasure.

The chief source of traction power on the farm is a heavy tractor used for ploughing, dam scooping, soil conservation works and road building. In addition a span of 16 Afrikander oxen is kept as a reserve source of traction power.

For farm power production 6 internal combustion engines are in use on Coniston. Two of these engines, heavy diesel plants, are used for pumping irrigation water from the Fish River, two small plants produce an electricity supply for lighting the two homesteads while the remaining two are used respectively for operating the fodder shredding machine and for pumping water from the homestead camp borehole for use as household/.....

household, farmyard and stock water supplies.

HOUSING:

The typical round, thatched, mud huts are the homes of the Native workers. These huts are concentrated chiefly near the controlling centres at the homesteads on Coniston proper and at the shearing shed control point S<sub>1</sub> on Lindsay, Map 12, where the workers are centralized and always ready at hand. Two huts are situated in Camp H where the workers are always on the spot to supervise the lambing of the mutton breed ewes.

The old homestead of Coniston (F) belonging to Mr. Douglass Senior is a 5 roomed rambling bungalow-styled house of brick under iron while the house of Mr. Douglas Junior (F<sub>1</sub>) in contrast is a substantial modern 8 roomed house of brick under iron. Both these houses overlook well tended flower and vegetable gardens and are surrounded by jacaranda, pepper, poplar and other ornamental trees which together with the green lucerne lands running up into the Kloof immediately to the north constitute an oasis in an otherwise drab landscape.

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THARFIELD. - A COASTAL BEEF CATTLE FARM OF  
BATHURST.

INTRODUCTION:

The farm unit Tharfield, devoted to the grazing of beef cattle with complementary pineapple growing and small scale dairying, is the property of Mr. V. Webb. The farm covers an area of some 1,800 morgen bounded by the sea in the S.E. and extending inland, towards the N.W., for about 3 miles along a low divide bounded on the S.W. and N.E. by the Riet and Kleinemond rivers respectively. The farm occupies a distinct, if small, geographic unit bounded on 3 sides by natural boundaries, whilst the fourth, running across the divide, is an artificial boundary-fence. The farm is situated about 14 miles by road N.E. from Port Alfred, the nearest shopping centre, and railhead. It lies some 9 miles east of the nearest railway station at Bathurst which is 32 miles by rail from Grahamstown the closest major marketing centre (Map 6).

Historically the farm is among the best-known in early eastern Cape history. The original extent of the farm, settled by the well-known 1820 Settler, Miles Bowker, covered some 1,300 morgen of land bounded by the Riet River (then known as the George River) on the S.W. and by artificial surveyed boundaries on the N.W. and N.E., and by the stretch of coastal dune-land on the S.E. This land grant was extended in 1845 to include the land enclosed by the present boundaries, except in the S.E. where the dune-land and beaches remained outside the farm.

This stretch of coastal-dune Crown land was annexed to the farm in 1932 by which time considerable damage to the dune-land vegetation had been accomplished by unrestricted chopping out of firewood by Natives with the consequent removal of the natural windbreak. The blown sands thereupon began to encroach alarmingly on the coastal grassland grazing of the farm. Since 1932, however, the dune-land has been under the farmer's protection, the vegetation has been largely restored

and/.....

and the dunes stabilized, thus ensuring little further danger from encroaching sand. This area of coastal scrub has in addition been reserved by the farmer as a game sanctuary, and Duiker, Bushbuck and Bluebuck are commonly encountered here today.

Barborton (1934) notes that the Bowkers were one of the principal 1820 Settler families. Unlike the majority of other parties, who banded themselves together, each paying their own way, Miles Bowker's party consisted, for the most part, of his family, retainers and farm servants, all of whose passages he paid. Prior to the 1820 emigration Bowker had been sheep farming in Wiltshire and in his emigration application to the Colonial Office he observed that he had considerable experience in sheep and wool farming. Considering the composition of his party and the size of the land grant which could be run as a single unit, and his experience in woolled-sheep farming it is not surprising that sheep farming became the first occupation on Tharfield. Barborton notes that Miles Bowker was the first breeder of wool sheep in the Eastern Province.

The wool from the Tharfield flocks was spun into yarn by women of the party and was at first manufactured into blankets by a Settler by the name of Bradshaw. This industry did not pay, however, and Barborton notes that thereafter the wool was sold in Grahamstown to a Mr. Allison who manufactured it into felt hats.

Barborton relates that during the 1835 war most of the sheep were stolen by Kaffirs and the remainder moved to the Koonap area. He observes, however, that Tharfield was not much harassed by the Kaffirs since Bowker, his nine sons and other men living on the farm comprised a formidable "household cavalry" who "fired first and asked questions afterwards". The interesting tale, related by Barborton, of <sup>the</sup> Bowker "treasure", which was buried on the farm during this time, when severe attacks by Kaffirs threatened, is so well

known/.....

known that it need not be repeated here. The "treasure" has never been found and remains an intriguing mystery associated with the farm.

Except for a break in residence during the 1846 Kaffir War, the farm was continuously farmed by the Bowker family for some 100 years before it passed out of their hands.

The present farmer observes that it is likely that cattle replaced sheep farming on Tharfield, during the latter half of the 19th Century. He believes that at that time a small port was established at the mouth of the Kleinmond River and was known as Port Jessie. The sailing vessels apparently stood out off the river mouth and lighters carried prepared beef carcasses out to them. The old stone quays may still be seen at the river mouth.

During the ostrich era, the farmer notes, Tharfield was a prominent ostrich farm and he believes that up to 900 birds were grazed on it.

The father of the present farmer first occupied Tharfield some 30 year ago, when he commenced the grazing of beef cattle and the farm has since been devoted almost solely to this farming type. Eight years ago, however, a small pinery was established as a complementary farm occupation.

The present farming practice emerges, therefore, as the grazing of a herd of high quality Shorthorn beef cattle and the growing of pineapples as a supplementary source of farm income, with small-scale dairying mainly for home use and for a small cream sale.

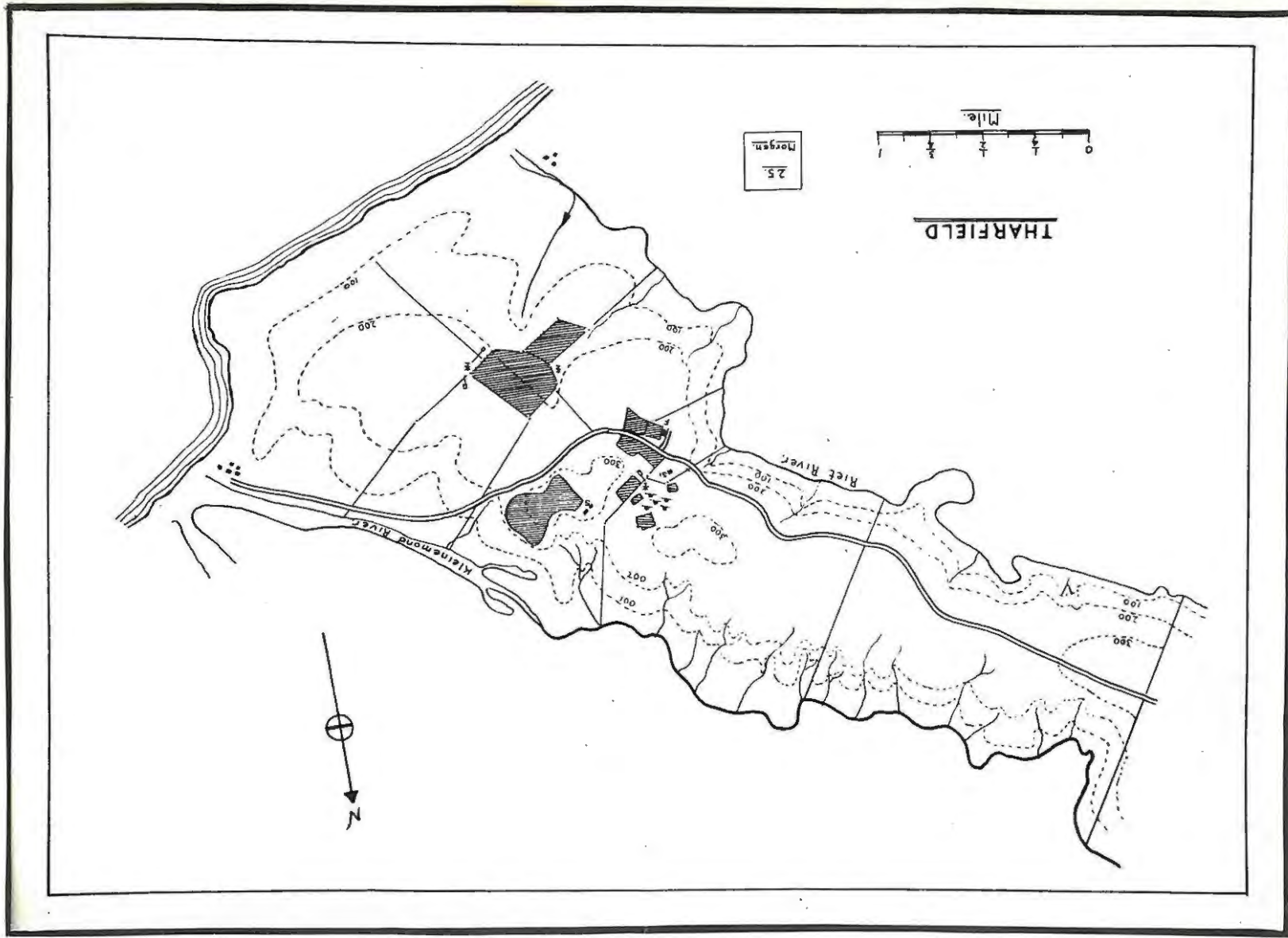
#### GEOLOGY AND RELIEF:

Geologically Tharfield falls within the coastal margins of the truncated and peneplaned folded formations of the Bokkeveld and Witteberg series of the Cape System and conformable Lower Dwyka Shales of the Karroo System.

The formations in this area occupy a broad truncated

synclinal/.....

MAP 14.



synclinal structure, the area covered by the farm comprising the north eastern limb of this syncline. The formations dip towards the S.W. and strike roughly N.W - S.E. so that the Bokkeveld Series occupies the Kleinemonde River valley, the Witteberg Series comprises the hard core of the divide between the Kleinemonde and Riet rivers while the latter river valley is underlain by the eastern margins of the Lower Dwyka Shales in this region.

Unconformably overlying these peneplaned folded formations are Alexandria Limestone beds of the Tertiary System which on Tharfield occupy about  $\frac{1}{2}$  the total farm area extending inland from the coast for some 2 miles along the crest of the divide. This once continuous formation of limestone has been considerably eroded and worn down subsequently to its deposition and it reveals today the underlying folded formations in the river valleys and across the N.W. extremities of the farm.

Marine blown sands and dunes occupy a relatively narrow belt of some 100-200 yards wide along the coastal fringe of the farm. Projecting from these sands are several large blocks of consolidated calcareous dunerock, which are being rapidly worn away by marine erosion.

The major drainage lines, occupied by the two consequent streams, the Kleinemonde and the Riet rivers, which flow across the more easily eroded Bokkeveld and Dwyka formations have determined the relief features of Tharfield. In its broader aspect the farm belongs physiographically to the Port Alfred peneplane at 350 feet. Its relief is essentially simple (Map 14) comprising a broad divide  $\frac{1}{2}$  to 1 mile wide between the two rivers, small tributaries of which have cut back into the divide to lend it a rolling character. On Map 14, this undulating surface is clearly revealed especially in the S.E. half of the farm where the land rolls gently up from the sea to reach the highest point on Tharfield, at 350 feet, immediately to the north of the homestead F. The N.W. portion of the divide has a very gently rolling surface at some 300 feet

above/.....

above the river valleys at from 0 to 100 feet above sea-level.

The Riet River valley has the typical V shaped profile of youth and has a boulder-strewn watercourse except towards its mouth where it widens out into its narrow estuary. The Kleinmond valley, on the other hand, is mature with a slow flowing watercourse. Furthermore there is a tendency for the development of a narrow flood plain, at present consisting of mudflats and marshes, which is periodically inundated during floods or when exceptionally high-tides sweep up the river from the sea.

Both rivers are tidal when their mouths are open to the sea and not blocked by sand bars, whilst saline water percolating through these bars reaches the 1 mile mark inland on the Riet. The Kleinmond is saline for its entire frontage on the farm.

CLIMATE:

Tharfield being situated on the coast exhibits the characteristic temperate climatic regime of the coastal belt of the region, with moderate summer and winter temperatures, a frostless year and a small mean annual range of temperature. The farm experiences a mean annual rainfall of some 27 inches.

TEMPERATURE:

Accurate temperature values are not available for Tharfield, but statistics for Port Alfred at an altitude of 200 feet and situated on the coast some 7 miles to the S.W. may be included here to give some idea of the prevailing temperature conditions on Tharfield. From temperature tables the following features emerge for Port Alfred for the period 1923 to 1936 (Schuman 1941).

(a) Mean Annual Temperature 64.4°F.

(b) Mean Seasonal Temperature.

Spring	(S.O.N.)	63.4°F.
Summer	(D.J.F.)	69.9°F.
Autumn	(M.A.M.)	65.6°F.
Winter	(J.J.A.)	58.6°F.

(c)/.....

(c) Mean Seasonal Maxima and Minima:

	<u>Maxima.</u>	<u>Minima.</u>
Spring (S.O.N.)	72.2°F.	54.6°F.
Summer (D.J.F.)	78.2°F.	61.4°F.
Autumn (M.A.M.)	75.1°F.	56.2°F.
Winter (J.J.A.)	69.8°F.	47.3°F.

(d) Mean Seasonal Absolute Temperatures:

	<u>M.A. Maxima.</u>	<u>M.A. Minima.</u>
Spring (S.O.N.)	84.4°F.	44.8°F.
Summer (D.J.F.)	90.9°F.	52.2°F.
Autumn (M.A.M.)	92.8°F.	46.2°F.
Winter (J.J.A.)	85.8°F.	39.1°F.

(e) Some Absolute Temperatures:

A. Maximum	108°F.	(March 1936)
A. Minimum	34°F.	(July 1934).

(f) Mean Annual and Daily Ranges:

M.A.R.	12°F.
M.D.R.	19°F.

It may be suggested, therefore, that on Tharfield mean annual temperatures are moderate ( $\pm 64^{\circ}\text{F.}$ ) with warm to hot summers ( $\pm 70^{\circ}\text{F.}$ ) and mild winters ( $\pm 59^{\circ}\text{F.}$ ) with a moderate mean annual range of  $12^{\circ}\text{F.}$ , the temperature regime being tempered by marine influences.

Hot conditions are experienced during the summer days with mean maximum temperatures of  $\pm 78^{\circ}\text{F.}$  while on occasions maximum temperatures may exceed  $90^{\circ}\text{F.}$  As noted for Mayfair, such very hot days are usually mitigated by cooling sea breezes.

Winter days on the other hand are warm ( $\pm 69^{\circ}\text{F.}$ ) with mild to cool nights ( $\pm 47^{\circ}\text{F.}$ ).

Winter temperatures rarely descend below  $\pm 39^{\circ}\text{F.}$  except to some extent in the valley floors. The entire farm, however, is normally frost free except on very rare occasions when light valley frosts occur.

RAINFALL:

Rainfall records are available for Tharfield for the

Period/

period 1939 to 1952, from which a general impression of rainfall conditions may be derived.

At Tharfield the mean annual rainfall over the 12 year period was 27 inches distributed over the year as follows:-

TABLE 21: Period 1939-1952 (12 years).

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	YEAR.
1.74	3.48	2.74	2.57	1.96	1.71	1.26	1.28	2.14	3.41	2.79	2.55	27.63

From Table 21 it may be observed that the rainfall is characteristically distributed fairly evenly over the year, with a tendency towards a slight balance in favour of the Summer half-year (Summer O - M 60%, Winter A -S 40%) and with maxima in the Spring (October) and Autumn (February - March).

Although it may be expected that the reliability, variability and intensity of the rainfall follows the general pattern for the region as a whole, the farmer notes that the rainfall of Tharfield is slightly more reliable than over areas further inland especially as regards drought spells. He observes that for additional reasons droughts are not nearly as serious in their effect on the coast as further inland primarily due to the greater incidence of cloud-cover, sea-fog and humidity over the coastal strip. In the 1945 and 1949 drought years for example, Tharfield received 20.1" and 21.3" respectively to be compared with 16.8" and 13.2" at Atherstone in the interior highland of the better-watered region<sup>of</sup> Albany.

The farmer observes, therefore, that the amount of effective rainfall received by Tharfield is normally ample for maintaining the grazing and for dry land agriculture. Nevertheless drought spells do have an effect on the farm since it should be remembered that cattle, unlike sheep, require good, long, grass for grazing, so that deterioration of the veld through low rainfall will affect them more rapidly than sheep. In fact a considerable number of cattle had to be sold during 1949 and others railed out of the area to other grazing lands, because  
of/.....

of veld deterioration brought about by poorly distributed rainfall. In that year the months April to October received only 5 inches of rain although the total for the year was 22 inches.

NATURAL VEGETATION:

The natural vegetation of Tharfield belongs to both the Grassland and Valley Bushland types and includes also a narrow belt of coastal Littoral Scrub (Dyer 1937).

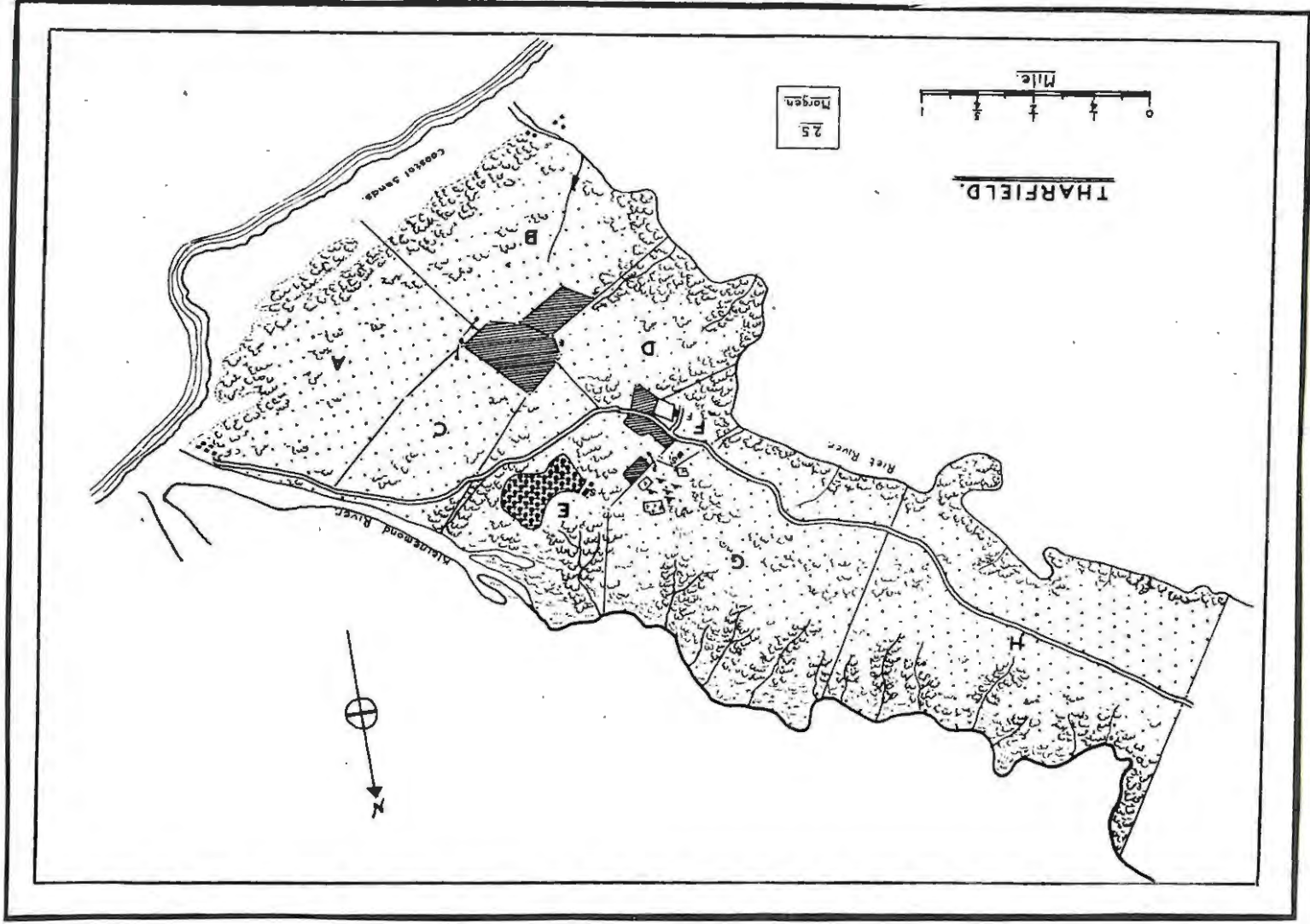
Broadly the grasslands occupy the greater area, covering approximately three-fifths of the farm mostly on the rolling divide and grading gradually into the Valley Bush which occupies the lower slopes of the main river valleys and extends upwards along the Kloofs and minor tributary valleys of the Riet and Kleinmond rivers (Map 15). The Littoral Scrub occupies the narrow belt of coastal dune sand fringing the farm on the S.E. These features are illustrated in Map 15 .

The grassland divide is interrupted at intervals by clumps of bushes and low trees. The grasses here and on the moist South-West-facing slopes of the Riet river valley, are closely growing and are normally 4 to 5 inches tall but at seeding time they reach heights of 18 to 24 inches. Over these areas the grassland contains many elements typical of the Fynbos vegetation type. The drier North-East-facing Kleinmond slopes, on the other hand, have grasses which are more widely spaced and generally slightly lower growing, and are mingled here with succulents and low scrub bushes.

The grassland contains the typical members of the area among which species of *Themeda* (especially the glauca form) and *Eragrostis* together with *Tristycha* are perhaps the most common while *Panicum* is frequently encountered in areas dominated by bushland.

NOTE. The grasslands of the undulating S.E. portion of the farm below the homestead F and stretching towards the coast, cover an area formerly occupied by greenfeed lands for ostrich rearing.

They/.....



MAP 15.

They contain today, valuable clovers and vetches inadvertently introduced to this portion of the farm by the sowing of impure fodder-crop seed at that time. These legumes materially enhance the value of the grassland for grazing purposes as will emerge later.

The Valley Bushland on Tharfield has been considerably thinned by animal grazing and chopping out for firewood and timber. In the deep kloofs and ravines, however, really dense stands, difficult to penetrate, are still encountered today. Over the divide the bushland occurs as a scattered interrupted formation occasionally forming dense thickets. Tree growth is generally more luxuriant in the Riet River valley representing a small stretch of the coastal forests and includes remnants of former stands of yellow-wood and sneezewood trees. These are now protected by the farmer from further destruction. In the valley-floor of the Riet especially, members of the palm family lend a subtropical flavour to the vegetation.

The commonly occurring species of shrubs and bushes are similar to those noted in the discussion of this vegetation type for Albany and Bathurst as a whole.

The Littoral Scrub, as Dyer (1937) observes, has a regular, densely matted canopy of up to a few feet in height, due mainly to the effect of wind. In contrast the Valley Bushland for example has elements of between 10 and 20 feet in height or more.

The composition of the Scrub is very heterogeneous and the reader is referred to a list of the commonly occurring species compiled by Dyer (1937 pg. 45.). Here the Littoral Scrub is of relatively minor importance as regards its areal extent, but is of vital importance in preserving the stability of the dune sands as noted above.

#### LAND USE AND THE FARMING SYSTEM.

##### INTRODUCTION:

The farming system on Tharfield since the present family first occupied the farm, has been concerned primarily with

the/.....

the fattening of cattle for slaughter.

Up to 8 years ago it was the practice to buy oxen on stock fairs, fatten them on the farm and then to sell them at a profit. Breeding played a minor role in the system at this stage.

The advent of high prices for animals on stock fairs and the increased demands for beef in the post Second World War years, however, led the farmer to the conclusion that it would be more profitable to institute the present system which is based on the building up a herd of beef cattle by home breeding. The process is lengthy, however, and the necessity for buying fattening stock remains today, but already these purchases are of smaller proportions and will eventually be reduced to a minimum. Apart from the lower farm costs under this system, the farmer observes that among others the following advantages are also evident:-

- (a) The quality of the animals may be improved resulting in a higher sale price.
- (b) With the relatively high quality natural grazing, animals bred on the farm could be sold at an earlier age, resulting in a more rapid turnover while the younger animals demand higher prices on sale.
- (c) Beef animals bred on the farm are not trained as trek-oxen as so many of those bought on stock fairs have been. The beef obtained from trek oxen is definitely of a lower quality and hence undesirable.
- (d) Breeding animals on the farm minimises the dangers of introducing diseases to animals already on the farm, from stock purchased from outside.

The improved system, however, requires considerable extensions to the existing facilities of the farm. The farmer intends to extend the system of camps and to introduce comprehensive rotational grazing. A scheme of centralised watering points and the planting of fodder banks of artificial pasture grasses and fodder crops are also planned.

These/.....

These improvements, including the purchase of high grade breeding stock, require a considerable capital expenditure. According to the farmer, capital from the sale of slaughter cattle accumulates slowly, and to speed up the change-over he has employed the aid of the pineapple which as noted elsewhere is today one of the most profitable crops of the area, the growing of which leads to fairly rapid accumulation of capital. Approximately 25 morgen of land have thus been prepared and planted to pineapples in the past 8 years.

The pinery is considered semi-permanent and in the nature of an important side-line occupation and will persist, until such time as the cash derived from the crop is no longer required, when the area devoted to pineapples will be allowed to decline considerably. Whilst conditions are ideal for pineapple cultivation, the farmer observes that the land is best used for cattle grazing. The reason lies partly in a personal preference for cattle farming but also because the sandy soils of the farm are particularly prone to wind erosion especially since the pineapple is a clean-cultivated crop. The temptation to gain riches from pineapples is great, but the maintenance of the grazing in the coastal areas, which are considered to be among the best of the Unions cattle areas, is a sounder policy according to the farmer and the one which is to be employed on Tharfield.

#### BEEF CATTLE GRAZING.

##### SIZE OF HERD:

The herd of cattle totals some 500 head of the Shorthorn beef breed, and is composed of; 100 breeding cows; 50 heifers (  $3\frac{1}{2}$  years old); 70 calves ( 9 months old); 140 steers varying in age from 1 to 4 years; 120 steers, 5 years of age and ready for fattening for sale; 45 trek-oxen and 2 bulls.

These numbers exclude about 40 Native cattle also grazed on the farm by the permanent farm labourers.

GRAZING/.....

GRAZING.

THE VEGETATION AND GRAZING:

The grassland forms the chief source of natural grazing, while the bushland and other vegetation elements are relatively of minor importance, except as a complementary source of natural feedstuffs. The bushland is of special importance in droughts, however, when it is liberally browsed by the cattle.

As noted earlier the grasses normally reach a height of 4-6 inches which is considered suitable for cattle grazing. One wonders, however, how sheep succeeded on this grassland in the earlier history of the farm. It may be assumed that sheep grazing was probably coupled with cattle grazing in a system similar to that encountered on Atherstone at present.

Among the grasses noted earlier, the indigenous Themeda, especially the Glauca form, and Eragrostis, Digitaria and Panicum are the most important grazing materials, the Panicum especially so in the areas dominated by bush cover.

The importance of the exotic clovers and vetches in the grassland over the S.E. section of the farm has already been referred to. These plants are protein-rich and are particularly desirable for fattening stock, a factor accounting for the choice of camps A and B as the fattening camps.

PALATABILITY:

The climatic regime experienced on Tharfield with its relatively evenly distributed rainfall and frostless year makes for an all-year-round growing season, which results in 12 months grazing being obtained. According to the farmer, the grazing may be considered as mixed (i.e.) it contains both sweet and sour grasses intermingled, the latter becoming impalatable to stock, on reaching maturity. The relatively narrow stretch of grassland on the drier Kleinmond slopes on the other hand is essentially sweet.

On/.....

On the whole, however, the grazing provides sufficient palatable material throughout the year to provide good grazing for cattle.

NUTRITIONAL VALUE OF THE GRAZING:

The underlying limestone formations make for calcium-rich grazing. As regards protein matter, Camps A and B as also camps C and D may be assumed to have the greatest values while the farmer observes that the remaining areas normally possess sufficient protein even during the winter season to maintain the animals in good condition, although the Spring and Early Summer are naturally the best seasons in this respect.

Phosphorus appears to be the only major element lacking in the grazing and measures are undertaken to overcome the deficiency. Here, as on Mosslands, bone meal is regularly administered to the cattle by the spoon-feeding method at least once every week throughout the year. Apart from this the natural grazing supplies practically all the animal nourishment and no supplementary feeding is practised.

NUTRITIONAL CYCLE:

The mild conditions, normally coupled with sufficient rainfall in winter allow for continuous growth of the grazing. In the winter, however, the growth is naturally somewhat slower and nutritive value slightly lower. This slow growth, however, is not as marked as in areas further inland, and it is normally possible for the animals to maintain, in winter, the improvements to their condition made in the Spring and Summer.

The excellence of the grazing in Spring and Summer makes these seasons the favourite fattening periods, the cattle being sold thereafter during the Autumn.

CARRYING CAPACITY:

No official mean stocking rate is available for the area, but on Tharfield the present average stocking rate of 4-5 morgen per beast is considered normal for the coastal areas

and/.....

and is in adjustment to the average capacity of the grazing during the winter or in droughts.

In general, except for the clover and vetch grassland which has a higher capacity, the carrying capacity may be considered to be fairly uniform over the whole of the farm.

The stocking rate varies, however, depending on the requirements of the animals. Mature fattening steers are grazed at a rate of 4-5 morgen per beast due to the greater feeding requirements of these animals, while the other categories are more crowded, the younger steers for example being grazed at the rate of 2½-3 morgen per beast which is sufficient to allow for their normal growth.

In droughts the capacity may decline to the extent that overgrazing commences and at such times, e.g. in 1949, much stock is sold or transferred to grazing areas beyond the region. In that year fully half the herd was despatched by train to the Northern Transvaal for grazing.

#### FENCING SYSTEM:

As on other farms considered the fencing system plays an important role in grazing management.

The Tharfield fences are all stockproof and constructed of stout strand and barbed wire, using locally obtained sneeze-wood poles as fencing posts. The total length of fences on the farm at present is about 20 miles. Fencing on Tharfield is an expensive item due to the rapid deterioration of wire in the corrosive sea air and fences, especially across the open and exposed grassland areas, have to be repaired or replaced at relatively short intervals.

The farm is subdivided into 8 large camps of varying size from 400 morgen to 80 morgen. Some of these camps contain small fenced enclosures of agricultural land, the location of which is determined by their suitability for cultivation and will be discussed below. In addition there are a number of smaller paddocks clustered conveniently close to the homestead and surrounding the milking shed S<sub>1</sub> as illustrated

in/.....

in Map 15.

Along the Kleinmond River fences are unnecessary since the depth of the water always in it provides a natural barrier to stock movement. Along the Riet River, however, which is easily forded by stock, fences are necessary, and as noted in the case of Mayfair, zig-zag from one bank to the other to allow for a fair division of the water.

The grazing of Tharfield is sufficiently uniform in character to make fencing in relation to grazing type unnecessary. In planning the present camp scheme, however, stock watering posed the major problem.

The waters of the Kleinmond for its entire frontage on the farm and those of the Riet River for about a mile upstream from the mouth are saline and useless for stock watering. Over the N.W. sector of the farm, on the other hand, by straddling the camps across the divide, stock could water along the Riet River. In consequence over the latter areas camps occupy whole sections of the divide stretching from river to river and are far greater in size than camps over the S.E. areas, where, with boreholes, greater subdivision was possible as illustrated on Map 15.

Further subdivision is planned in the future, especially over the N.W. areas when sufficient capital is available to establish more boreholes.

#### GRAZING MANAGEMENT:

The present camp system does not allow for the development of any comprehensive rotational grazing plan, since in view of the necessity of separating the various categories which make up the beef herd, all the available camps on the farm are occupied constantly or for the greater part of the year. Further subdivision as planned for the future, however, will alleviate this pressure on the grazing, and allow for rotational grazing.

Grazing management at present primarily concerns on

adjustment/.....

adjustment to the requirements of the categories and depends largely on the farmer's judgement and experience of grazing conditions on Tharfield, and on the capabilities of the grazing to sustain beef stock in prime condition.

Among the important factors relating to the separation of the various categories the following may be noted:-

- (a) Calves from 1 month old until they are weaned are separated from the cows to ensure a higher milk and cream yield, while the calves adjust themselves more rapidly to a purely pasture diet.
- (b) The steers, although sterile, are best kept apart from the cows, since they become restless when run with them which may lead to retardation of their development.
- (c) The steers ready for fattening (5 years old) are separated from the growing steers into special fattening camps because of the greater feeding requirements of these animals.
- (d) The heifers are kept apart from the breeding cows until such time as they are considered sufficiently mature for successful calving (about 3½ years old).

Under the present camp facilities the herd is distributed as follows:-

CATEGORIES	CAMPS.
1. Fattening steers (5 years)	A, B.
2. Heifers & calves up to 9 months	C.
3. Breeding Cows & calves up to 1 month	D.
4. Dry Cows	E.
5. Trek oxen and growing steers 1-4 years old	G.
6. Growing Steers 1-4 years old	H.

Camp F, the homestead camp, is utilized for a variety

of/.....

of purposes. It is much smaller than the other camps and is not normally used for the permanent grazing of any category.

The allocation of these camps is not entirely arbitrary but has been determined mainly by the grazing requirements of the animals.

(a) THE FATTENING CAMPS:

The grazing of Camps A and B is unsurpassed in quality throughout the rest of the farm. It contains a variety of good closely growing grasses and the protein-rich clover and vetch noted earlier, and is ideal for fattening steers without resorting to supplementary feedstuffs. The camps support 1 steer on every 4-5 morgen of grazing which allows for ample feeding for these animals.

(b) THE BREEDING COW CAMP:

Camp D, the breeding cow camp, enjoys a fair measure of the advantages of the fattening camps and also contains much clover and vetch.

The stocking rate is higher, however, with 1 beast to 2-2½ morgen of land; since the farmer believes that breeding stock should be kept thrifty and in vigorous condition at all times. The Farmers' Handbook (1937) observes that protein feeds are preferred to starches while succulence is valued especially in the winter, conditions which are largely satisfied by the grazing in Camp D.

The farmer observes that since milk production is not the major consideration on Tharfield the feeding of supplementary feedstuffs is not necessary for the breeding cows.

In addition to favourable grazing, Camp D is conveniently situated in relation to the milking kraals at the homestead, for collecting the cows at the milking times in the early morning and evening.

(c) HEIFER CAMP:

Camp C, the heifer camp, enjoys similar grazing conditions

to/.....

to Camp D and here again because of the smaller feeding requirements the stocking rate is moderately high with 1 beast to 1-1½ morgen.

The calves separated from the cows are also grazed in this camp and are brought in at the milking times when they are suckled by the cows after milking.

(d) THE DRY COW CAMP:

Camp E contains a large stretch of cultivated land comprising the pinery and maize lands. It possesses also a fair proportion of bushland and for a large section of its area covers a stretch of the slightly sparser grazing on the Kleinmond slopes. Its grazing capacity is thus slightly lower than for other camps on the farm and it is useful for the grazing of a small category such as the dry cows which, at the time<sup>of</sup>/this survey, numbered approximately 30, there being approximately 1½-2 morgen of grazing available per cow. The grazing is, however, sufficient to maintain the animals in good condition without supplementary feeding.

(e) THE GROWING STEER CAMPS:

Camps G and H are given over to the growing steers from 1-4 years old. These animals require good grazing for normal growth but not necessarily the high quality grazing required by the fattening steers. The grassland occupying these camps fully satisfies the needs of this category, according to the farmer, and the stocking rate is again moderately high with about 2 morgen per beast.

The trek-oxen (draught oxen) are grazed in Camp G where the stocking rate and the grazing keep them well nourished without allowing them to become too fat and thus lethargic. In Camp G, further, they are conveniently close by to the homestead and agricultural lands when collecting them for work.

(f) THE HOMESTEAD CAMP:

Camp F, although not used for the regular grazing of any category, serves other important purposes. It is used

for/.....

for grazing cows with newly born calves or for animals who are ill or convalescing, where they are convenient for the farmer to supervise their requirements. In addition the camp contains the organising centre of the farm at the homestead, the dipping tanks, the collecting kraals and milking shed.

The above distribution scheme under present camp facilities is, through experience, considered to yield the most favourable results, and until further subdivision is carried out it is unlikely to be altered. In each case the number of animals is adjusted to feeding requirements and the carrying capacity of the grazing. There is no overloading of the grazing but instead deliberate understocking due to the lack of rotational grazing. Consequently few setbacks are normally experienced on Tharfield through under-nourishment of animals.

The two fattening camps are the only ones which enjoy a resting spell each year. The steers are sold normally in December, January and February and the camps are restocked only 3 months afterwards. This allows for the regeneration of the clovers, vetches and grasses in the Autumn before the new fattening season begins. It is unfortunate that the cow and heifer camps cannot also be rested since in these the legumes and good grasses are tending to become sparser.

Veld burning has been reduced to a minimum on Tharfield since the climatic regime allows for all-year-round growth of the grazing, and there is thus no need for stimulating the growth by burning. In addition under the present grazing-system excessive accumulation of dead growth is rarely experienced. Further, although the tick is particularly prevalent, burning to destroy it would be futile since reinfestation from neighbouring farms would be almost immediate.

#### STOCK WATERING:

On Tharfield stock water is supplied from boreholes, a small storage dam, the Riet River and impermanent natural water-holes. The problem of watering-points and the subdivision of

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the farm has been noted above where it was found that any further fencing will depend upon the establishment of more watering-points.

There are 3 boreholes, operated by wind-mills, on the farm, situated in Camps A, D and G where the water is pumped into concrete storage tanks from which it is piped into concrete drinking troughs as on Coniston. The water is also piped into Camps B, C and E from these boreholes. The borehole in Camp G in addition supplies the homestead F. The boreholes are of moderate depth and the water is for the most part mineralized and valued by the farmer for its laxative properties which he considers an additional factor to the maintenance of the condition of the stock.

it The only storage dam on Tharfield is situated in Camp B, impounds only a few thousand gallons and cannot be relied upon to provide a permanent water supply. Camps G and H each have a ~~dam~~ which are probably shallow sink holes developed in the limestone formations. They are semi-permanent and become empty during dry spells.

The waters of the Riet River are sweet, upstream from a point roughly one mile from the estuary, as already noted, and Camps F, H and a fair proportion of Camp G rely entirely on this water for the stock. The stream is fed by 2 permanent fountains along its course. The farmer observes, however, that the cattle-paths into the valley are undesirable and promote erosion. He notes in addition that in general the single watering spots in the large camps are also undesirable since the cattle constantly converging on these points rapidly wear paths across the grasslands, which may be seriously eroded in heavy rains.

The farm rarely experiences water shortages since it is supplied from permanent boreholes and by a reliable flow in the Riet River.

#### THE DISEASE FACTOR IN THE ENVIRONMENT:

Tick-borne diseases such as heartwater, and redwater are a major factor in the environment of Tharfield, since with a mild

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winter and no veld burning there is no time when the tick is not prevalent. Animals bred on the farm are to some extent resistant to attack but those purchased from outside, especially from areas where the ticks are less prominent, are particularly affected and normally great care is exercised to purchase only animals that have been reared in tick-infected regions.

Modern preventive methods have, however, considerably reduced the limitations to successful cattle grazing. During the summer peak tick prevalence, cattle are dipped regularly once a week, and once a fortnight during the slight winter ebb. The herd totals some 500 animals and it is clear that dipping on Tharfield is a major farm task especially during summer when some cattle are being dipped on every day of the week.

The centrally situated dipping tank in Camp F is convenient to all the camps, thus avoiding time wastage in collecting the animals. The daily convergence of the cattle on the dipping tank has again resulted in cattle paths in the grazing, as noted earlier in the case of stock watering. It is unfortunate that until the day when the tick in South Africa is conquered, this daily trek to the dipping tank will remain a feature of the farm.

In recent years the ticks became immune to the normal arsenical dips, however, and increased to an alarming extent on Tharfield until the animals were almost covered by the parasites. Fortunately, however, the new DDT and benzine hexachloride dips have since been developed and have brought the tick under control once more. The farmer observes, however, that it is not known how long such dips will remain effective and he advocates that a Union-wide campaign, to permanently eradicate the pest from the grazing should be undertaken by the Department of Agriculture. He observes that the efforts of a few individual farmers would be of no avail since re-infestation from neighbouring farms would be almost immediate. It is apparent, therefore, that the tick could become a serious limiting factor in the use of the environment for stock rearing were it to develop an immunity against the chemicals now used to hold it in check.

Other/.....

Other pests occurring on Tharfield are the blowfly and the screw-worm. The latter is a new disease on the farm, introduced after a herd was sent to the Northern Transvaal for grazing in the 1949 drought. The latter feature serves to illustrate the danger of bringing animals to the farm from other areas and the desirability for home bred cattle.

Climatically the area has been found suited to the grazing of the exotic Shorthorn breed and no physiological difficulties are experienced here, as in hotter districts, where they are unable to thrive successfully.

#### BREEDING OF CATTLE ON THARFIELD.

##### BREEDING STOCK.

The recency of breeding on Tharfield has already been noted and at present about 40% of the steers sold each year have been bred there. This proportion will, however, increase in the future as the home-bred herd is enlarged.

The aim in breeding on Tharfield is for animals of high quality but without producing exceptional stud animals. The selection of breeding-stock is thus an important feature. The bulls are purchased at 2-3 years of age and are sold and replaced 3-4 years later to prevent interbreeding. The bulls are normally purchased from recognised Shorthorn breeders in the Queenstown, Somerset East and Victoria East districts. Breeding cows are also carefully selected for quality, and those shewing poor characters are culled from the herd each year.

##### BREEDING SEASON:

Calving on Tharfield takes place mainly in the Spring during September and October. At this season the grazing is at the peak of its nutritional cycle making for well nourished cows, high milk yields and a strong progeny. The farmer observes that since tick borne diseases especially, are prevalent at all times of the year there appears to be little point in adjusting calving either to the Autumn or Winter as is the case on farms

further/.....

further inland. These diseases decline considerably in Autumn and Winter making those the favoured calving seasons.

A number of cows calve in other seasons, however, but as far as possible such out-of-season calving is kept to a minimum to maintain uniform age-groups in the herd. For Spring calving the bulls are put to the cows in January.

Calf mortality is usually low, according to the farmer, and only a Spring drought or particularly heavy attacks by ticks may occasionally cause losses.

The calves graze with the cows until one month old, when they are removed to the heifer Camp, C, where they are kept until weaned at 9 months old. In this time they are allowed the company of the cows only after the daily milking which takes place in the evenings; this ensures the highest possible milk yield from the cows.

The bull calves are castrated within the first month of their life. The heifers remain in Camp C until ready for breeding purposes, at about  $3\frac{1}{2}$  years of age. The steers on the other hand, after weaning, are removed to Camps G and H, where they remain until 5 years old when they are ready for fattening. Thereupon they are drafted to the fattening camps A and B.

#### CALF CROPS:

Under normal conditions the farmer expects from 80 to 85% calving each year and usually from 75 to 80 calves are reared annually.

#### FARM PRODUCTS:

Products obtained from the herd on Tharfield are milk, cream and beef, of which only cream and beef are produced for sale, the milk being retained for use by the native farm labour.

#### BEEF STEERS:

The beef steers are sold after fattening when about 5 years of age with weights up to 1,500 lbs (live weight) and are truly in magnificent condition. The farmer normally sells from 60 to 120 steers annually. In addition to the steers some 15-20 old/....

old cows and culled animals are also sold each year.

The cattle are usually sold out of hand to butchers who visit the farm in the early autumn when the steers are at their best after the spring and summer fattening period. A few are also sold by auction on Stock fairs. The farmer observes that the Grahamstown butchers are his chief buyers but a few steers are also bought by other butchers, from Queenstown especially.

The steers sold on the farm and those being despatched to Stock Fairs are driven some 9 miles to the railway station at Bathurst where they are trucked and transported to the Grahamstown abattoirs and Stock fairs.

In normal years cattle sales on Tharfield contribute from 45-60% of the annual farm income and because of the prevailing prices for beef cattle, which are often above £50 or £60 / beast, a highly favourable annual cash return is obtained by the farmer.

CREAM:

Cream production is not a major source of income on Tharfield, and it is sold mainly to provide a regular monthly income from which the minor running expenses of the farm may be paid.

The Tharfield cows are milked once daily, in the evenings, in the cow byre S situated in Camp F. The byre is conveniently close to the homestead, where the milk is separated and the cream stored before being despatched. The cream is taken twice weekly by car to the railway station at Fort Alfred from which it travels by rail to a butter-making factory in Grahamstown. It may be observed here that although Bathurst is the nearest railway station (Map 7) the farmer prefers to travel to Fort Alfred because of such conveniences as the shops, post and Magistrate's offices and other places of business.

The yields of milk on Tharfield are lower proportionately than on both Mosslands and Watersmeet for example since on the one hand the Shorthorn breed is not a heavy milk yielder and on the other the cows here do not receive any supplementary feed.

The/.....

The normal annual production of cream from Tharfield is about 400 gallons the sale of which contributes from 10 to 15% of the annual farm income.

PINEAPPLE GROWING ON THARFIELD:

INTRODUCTION:

The place of pineapple growing in the farming economy of Tharfield, as a complementary source of income to beef cattle has already been noted above and need not be repeated here. Furthermore since the farming practices involved in the growing of pineapples here have been found to closely resemble those encountered on Mayfair, it is necessary here to relate only some of the salient features, so as to avoid repetition of detail.

AREA DEVOTED TO PINEAPPLE GROWING:

The Tharfield pinery occupies some 25 to 30 morgen of land representing 1.5% of the total farm area. The pinery is situated on a sloping land in Camp E as illustrated on Map 15.

The total number of plants at present established here, is approximately 440,000. This total is considerably lower than in the case of Mayfair, for example, with 1,410,000 plants, and is considered somewhat lower than for the average pineapple farm of the area.

The area devoted to pineapples on Tharfield is unlikely to expand much beyond its present extent. Instead, the farmer observes, it is expected that the area will decline in the future as the projected farm development plans, to improve cattle grazing conditions, are carried into effect. At that stage the cash income from the crop will no longer be required and its cultivation will be discontinued.

The pinery is at present being replanted after some eight years of bearing. Plant ages are consequently low and the majority of plants are non-bearing and from 9-15 months of age.

VARIETIES/.....

VARIETIES CULTIVATED:

The Cayenne because of its larger yielding capacity and its popularity to the canning trade, is here, as on Mayfair, gaining in favour over the Queen variety. Nevertheless, for the present at least, the Queen variety is still the dominant variety cultivated. There are today some 400,000 plants of the latter variety established as against only 40,000 of the Cayenne. It is planned to reduce the cultivation of the Queen to a minimum, however, so as to produce sufficient only to provide for a small export trade in fresh-fruit.

ENVIRONMENTAL FACTORS:

Climatic conditions affecting the cultivation of pineapples here, are similar in most respects to those which are noted in the case of Mayfair. Rainfall is normally adequate (26 inches p.a.) and is frequently complemented by coastal fogs. The temperature regime, moreover, is temperate and frost-free throughout the year conditions which favour the cultivation of the pineapple. Wind, although not a limiting factor in the cultivation of the crop, has deleterious effects on the sandy, easily eroded, soils of the farm. This factor as already noted, is one of the chief reasons for the cultivation of pineapples, on Tharfield, being carried on upon a temporary basis.

The soils are particularly sweet being derived from underlying limestone formations. Liberal applications of acid  $(\text{NH}_4) \text{SO}_4$  fertilizer is, therefore, essential for successful cultivation of pineapples. It is the practice, here, to apply from 1-1½ tons of the fertilizer to every 4 morgen of pineapple land.

Diseases and insect pests affecting pineapples on Tharfield are of relatively minor importance as a limiting/<sup>factor</sup>in the environment of the farm.

THE SITE OF THE PINERY:

The pinery is located on sloping, well drained soils with a low gradient of from 2 to 5% on the upper slopes of the

Kleinmond/.....

Kleinmond valley as illustrated on Maps 14 and 15.

Contour banks and furrows have been constructed in the lands and the pineapples planted in rows along the contour to prevent soil wash on the sloping site.

The pinery has a N.E. facing aspect, facing away from the direct rays of the hot afternoon sun while planting on due South facing slopes, with their lower concentration of insolation and exposure to cold winds from the sea, has also been avoided.

The lands are readily accessible to heavy transport vehicles over a low gradient gravel road making for easy transportation and little danger from damage to the fruit by bruising in transit.

#### FRUIT CROPS:

Two main fruit crops are obtained each year a heavy summer crop in January and February and a lighter winter crop in July and August. The summer crop normally produces from 60 to 70% of the annual total and the winter crop from 30 to 40%.

In the picking and packing seasons a large labour force is an essential factor and normally a complement of over 20 workers is engaged in the work. This labour force is composed of experienced Native women pickers and male workers for the packing of the fruit.

On Tharfield the fruit is packed in a shed (S) compared to open-air packing, in the pineries on Mayfair to be discussed later. The farmer observes that because of variable weather conditions and owing to the inconvenience of having to carry tables, boxes and packing materials around the pinery he prefers to handle the fruit in a pack-house. Moreover since the shed is situated conveniently adjacent to the pinery, fruit does not have to be transported for any distance before being packed. It may be observed here that that would be the case on Mayfair, as will emerge later, where the pineries are widely separated.

All fruit sold from Tharfield is administered by the Bathurst Farmers' Union in Grahamstown. At the present time 15%

of/.....

of the annual crop is exported to the U.K., 30% is sold on South African markets and 55% is despatched to a canning factory in Port Elizabeth. As on Mayfair, the Queen variety is grown mainly for fresh fruit sales although a considerable quantity is canned while the Cayennes are produced entirely for canning purposes.

The quantity of fruit sold at present is relatively small owing both to the <sup>great</sup> age of some of the plants and to the large number of young plants below bearing age which have only recently been established. The yield in 1952, for example, was 80 tons and in 1953 it totalled only 20 tons. As soon as the young plants commence bearing, however, the annual production is expected to reach approximately 250 tons of fruit.

The yields / morgen obtained on Tharfield are about 3 tons for the Queen and 6 tons for the Cayenne variety.

#### TRANSPORTATION OF THE FRUIT CROPS:

As illustrated on Map 7 it may be observed that Tharfield is situated about 9 miles from the nearest railway station at Bathurst.

The fruit is transported to that point by lorry and is then despatched in ventilated fruit trucks to Grahamstown. From here it travels either to Port Elizabeth in the case of the export and canning fruit or further afield to the major Union produce markets. The fruit normally leaves the farm on the same day as it is picked to prevent any deterioration in quality through delayed marketing.

(NOTE: The marketing of the fruit from a pineapple farm is discussed in greater detail in the account of farming on Mayfair.)

#### INCOME FROM PINEAPPLES:

At present the income derived from pineapples is relatively small as compared to that obtained from cattle sales. When the pinery is in full bearing once more, however, pineapple sales are expected to contribute about 30% to annual farm income.

FARM/.....

FARM LABOUR:

The labour complement on Tharfield comprises the farmer and 17 permanent Native male workers. These workers together with their families total over 70 persons all of whom live on the farm.

Each of the male workers cultivates about a morgen of land growing subsistence crops such as maize, kaffircorn, kaffir-melons, sweet potatoes and beans. The native women, furthermore, cultivate small kraal gardens of similar crops arround their huts situated in Camp E as illustrated on Map 15.

In addition to food obtained from these crops the male workers each draw a weekly 35 lb. maize ration from the farmer. They receive also all of the excess skimmed milk from the dairy.

The average wage obtained by these male workers is about £1. 5. 0. per month in addition to their rations and a gift of clothing usually of about £4 in value which they receive halfyearly. Their poll-tax is also paid by the farmer.

The Native women, wives and daughters of the permanent workers, are employed as pieceworkers and are paid at the rate of 1/6d per day of work in addition to a ration of about 3 lbs of maize.

The male workers are gainfully employed at all times either in attending to the management of the cattle or in the cultivation of pineapples and maize.

The women on the other hand are periodically employed in hoeing and cultivating the pinery, picking the fruit and in the reaping of maize.

FARM POWER AND TRANSPORTATION:

Up to 1952 all haulage power on Tharfield was supplied by teams of oxen. Since then, however, a tractor has been purchased for ploughing, subsoiling and land preparation for pineapples, and the trek oxen have now been relegated a relatively minor place in this respect since they are too slow for the large

amount/.....

amount of work that has to be done.

Borehole pumps are all wind-mill operated, while a small internal combustion engine is employed to supply the homestead (F) with electricity for lighting purposes.

For farm transportation a 4 ton lorry, a light motor van, a heavy ox-waggon and a scotch-cart are available and are adequate for the needs of the farm.

In addition the farmer owns a large modern car which is used for farm business and pleasure.

#### HOUSING:

The Native families are housed in the typical round, thatched wattle and daub huts which they build themselves. These huts are clustered together in kraals to the North of the homestead (F) in Camp G as illustrated on Map 15. The huts are all out of sight from the homestead but conveniently close at hand to make the labour readily available when required.

There are in fact two homesteads on Tharfield situated side by side in Camp F. The one is the original 1820 cottage styled homestead of the Bowker family and remains in a remarkable state of preservation. It is occupied today by the farmer's father. The main homestead, a house of modern construction is situated immediately adjacent. It is a brick under iron house whitewashed and presents a marked contrast in architectural design to the older stone under slate homestead which adjoins it.

The two homesteads are situated about  $1\frac{1}{2}$  miles inland on high ground at the centre of the farm from where they command a magnificent panoramic view over the coast to the South-East and over the rolling grassland country stretching inland towards the Albany Highlands to the North and North-West.

At the mouths of the Kleinmond and Riet Rivers, as illustrated on Map 15, are situated a number of beach cottages built on land rented from the farmer. These cottages are the summer holiday retreats of people mainly from the surrounding districts but also for a few from further afield who come to

enjoy/.....

enjoy the pleasures of a broad sweep of beach and safe surf bathing, fishing both in the rivers and in the surf or boating on the river estuaries. This minor holiday resort is popularly known as Kleinemond a familiar title in Albany and Bathurst.

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MOSSLANDS.

INTRODUCTION:

The farm unit Mosslands, devoted to the cultivation of citrus and dairying, is the property of Mr. J.C. Moss. The farm covers an area of some 1,750 morgen of land situated some 8 miles South of the Albany highland region. The farm is bounded on the South by the Assegaibush River and extends northwards over the narrow divide between that river and the Kariega River to include a considerable stretch of the valley of the Kariega. The farm abuts on the National Road linking Port Elizabeth and Grahamstown approximately 14 miles to the South-West from the latter.

The present farm unit is composed of two smaller units being Lots 1 and 2 of the 1820 settlement known as Gardner's Location. Edward Gardner settled Lot 1 naming it Birmingham New,<sup>(1)</sup> after his English home town while Isaac Dugmore occupied Lot 2<sup>(11)</sup>.

According to the present owner, the farm was originally devoted chiefly to cattle and sheep grazing, after the failure of the wheat crops in this region in the early years of the settlement. In addition the cultivation of vegetables and fodder crops for sale on the Grahamstown produce market was a flourishing early occupation on the farm. In the 1840's Dugmore established the first small citrus orchard on Lot 2 on a stretch of level river land below the homestead (F<sub>1</sub>). The fruit from the 50-60 seedling orange trees was used primarily for home use. Again in the 1880's a citrus orchard of some 200 orange trees was being cultivated on Birmingham New, in the large U bend of the Kariega river now occupied by pasture grasses (Map 17).

(1) Lot 1 = Camps C,D,E,F,G,H,Q.      (11) Lot 2 = Camps A,B,I,J,K,  
L,M,N,O,P.

In/.....

In the late 1890's the present farmer's father leased Birmingham New for the grazing of ostriches and cattle. The family moved away in 1904, however, to return once more, after purchasing Lot 2, in 1908.

Ostriches and cattle rearing were again the chief occupations on the farm, while in 1912 a flock of Merino sheep was introduced. The success of the ostrich farming during this period was largely responsible for the development and improvement of the farm at that stage. An ostentatious homestead (F<sub>1</sub>) was erected, sheds built and fences appeared in the landscape for the first time, while large areas of bush were also cleared.

In 1914 the ostrich feather market collapsed, but having established a mixed farming system the farmer was not as seriously affected as many of his colleagues, and a change over to complete reliance on cattle and sheep was soon accomplished.

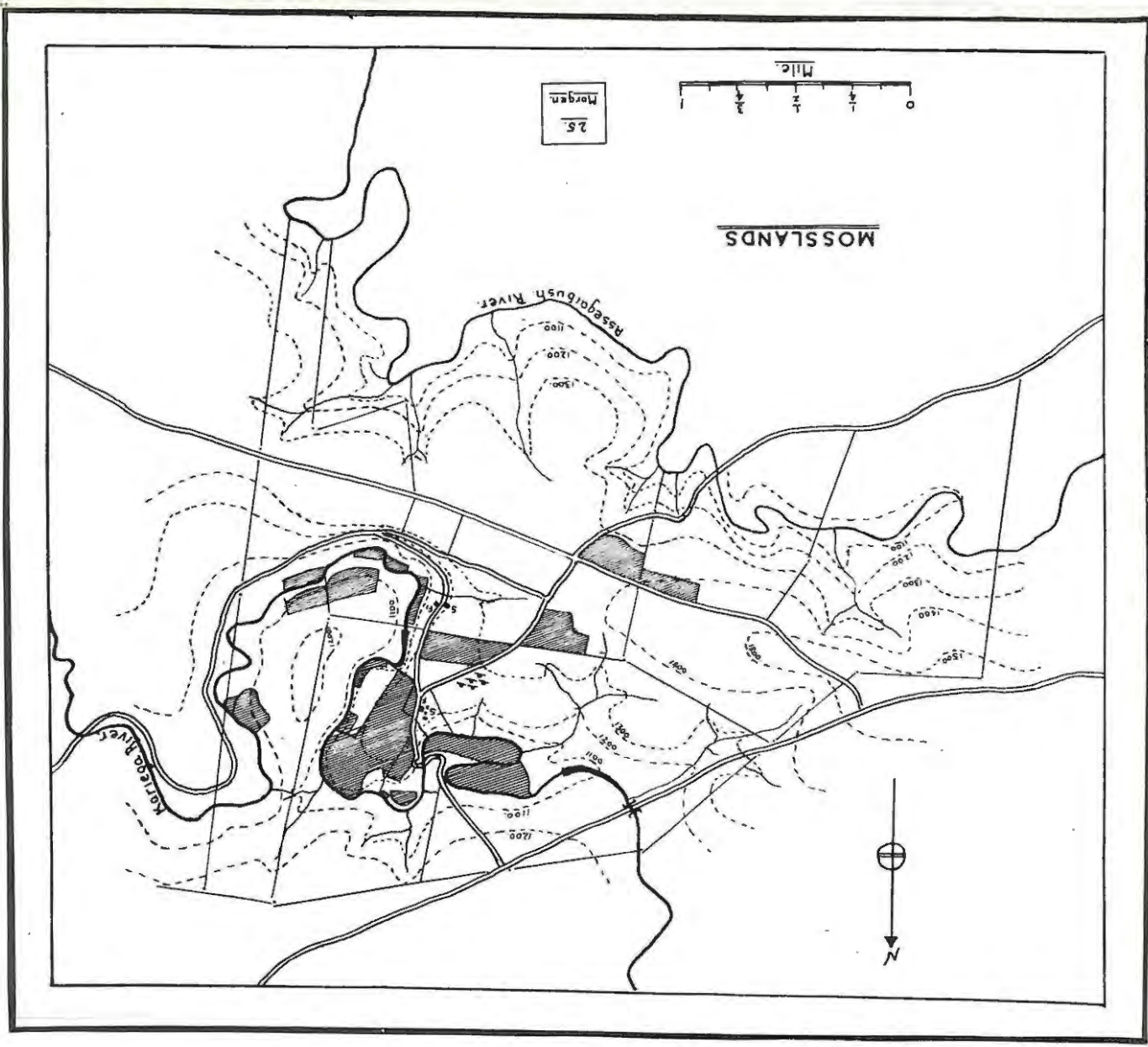
In 1922 Birmingham New was purchased, and thereafter the farm was devoted chiefly to sheep grazing, while the existing small citrus orchards and the cattle provided a small secondary source of income.

By 1938, however, the overseas markets for citrus fruits had been considerably developed and it was decided to extend the cultivation of the crop on Mosslands, and over 30 morgen of orchards were established. The war years 1939-45, however, saw the export of only a small proportion of the citrus crop and with glutted Union markets offering no profitable outlet for the crop, the farmer continued to rely on the sheep for the greater part of his income.

In the post-war years citrus exports were resumed and the cultivation of the orchards and the production of the citrus crops soon demanded more and more of the farmer's attention so that in 1947 the sheep were sold. Their place has since been taken by a dairy herd today numbering about 150 head of Jersey cattle.

In the present farming landscape, therefore, citrus emerges as the main occupation with dairying of secondary importance as regards farm income, but nevertheless an important feature of the farm system as will be noted later.

GEOLOGY/.....



MAP 16.

GEOLOGY AND RELIEF:

Geologically Mosslands falls within the area of truncated and peneplained folded Bokkeveld and Witteberg formations, dissected in this area by the Kariega and Assegaibush rivers. In broad outline it may be observed that the formations occupy a broad truncated anticlinal structure with the older Bokkeveld Series occupying the Northern reaches of the farm while the younger Witteberg formations occupy the Southern reaches.

A study of Map 16 will reveal the marked influence of the geological formations on the relief of the farm. Over the Northern portion the meandering Kariega River and its tributaries have dissected and worn down the less resistant Bokkeveld shales and sandstones into broken country with long sweeping interlocking spurs sloping gradually down into the valley from the high ground margins. Sloping land thus characterizes the Kariega valley area with slopes generally of a low order and with the land rising from  $\pm$  1,100 feet in the valley floor to + 1,200 feet above sea level on the crests of the spurs and highland margins. Over small stretches, notably in the area enclosed by the two interlocking U bends immediately downstream from the irrigation dam, the normally entrenched river has developed a semblance of flood plains, while in others, on the outer bends with active under cutting, the river has developed steep slopes and rocky krantzies.

Over the Southern reaches of the farm on the otherhand, the resistant Witteberg formations stand out as the prominent W - E trending divide between the Kariega and Assegaibush river valleys. The divide is characterised by a uniform gently rolling surface at  $\pm$  1,300 feet above sea level, sloping up gradually in the West to + 1,500 feet.

CLIMATE:

The climate of Mosslands may be considered to be representative of that experienced by the interior of the region which lies below and on the coastward margins of the Albany

highland/.....

highland region. The climate is characterised by moderate Summer and Winter temperatures, a relatively low frost frequency and a mean annual rainfall of 24 inches.

TEMPERATURE CONDITIONS:

No accurate temperature records are available for Mosslands, but statistics for Sydneys Hope, at an altitude of 1,400 feet (Mosslands 1,300 feet) and some 15 miles to the West may be presented here to give some idea of the conditions to be expected on the farm.

From temperature tables the following features emerge for Sydneys Hope (Schuman 1941) for the period 1898 to 1939.

(a) Mean Annual Temperature 62.1°F.

(b) Mean Seasonal Temperature.

Spring (S.O.N.)	60.6°F.
Summer (D.J.F.)	68.1°F.
Autumn (M.A.M.)	63.7°F.
Winter (J.J.A.)	55.9°F.

(c) Mean Seasonal Maxima and Minima.

	Maxima.	Minima.
Spring (S.O.N.)	69.5°F.	41°F.
Summer (D.J.F.)	78.0°F.	49°F.
Autumn (M.A.M.)	71.0°F.	44.5°F.
Winter (J.J.A.)	64.0°F.	36.5°F.

(d) Mean Seasonal Absolute Temperature.

	M.A. Maxima.	M.A. Minima.
Spring (S.O.N.)	91.1°F.	41.2°F.
Summer (D.J.F.)	99.3°F.	49.4°F.
Autumn (M.A.M.)	90.4°F.	43.0°F.
Winter (J.J.A.)	79.5°F.	37.0°F.

(e) Some Absolute Temperatures.

Absolute Maximum	109.5°F.	(February 1919).
Absolute Minimum	28.0°F.	(June 1915).

(f)/.....

(f) Mean Annual Range. 14.8°F.

(g) Mean Daily Range. 18.8°F.

It may be suggested therefore that on Mosslands mean Summer temperatures are warm-hot (68°F.) and the mean Winter temperatures cool-warm ( $\pm$  55°F) making for a temperate regime with a mean annual temperature of 62.1°F. and a range of 14.8°F.

During midsummer very hot conditions may be expected on occasions with mean absolute temperatures of the order of 100°F. In winter on the other hand, although days are normally warm, night temperatures may be cold on occasion, especially in the valley floors due to temperature inversions, when temperatures may descend to freezing point (32°F.). The cold spells of the winter, are perhaps the most important feature on Mosslands as regards temperature conditions, since citrus is adversely affected by frosts. The farmer notes, however, that serious frosts are not frequent, from 3-4 each year being considered normal, and then usually only in the valleys.

Temperature conditions may thus be considered as temperate throughout the year with moderate mean temperatures in winter making for an all year round growing season.

RAINFALL:

Rainfall records are available for Mosslands for the period 1935-1951, sufficient to give an indication of the average rainfall conditions to be expected.

From these statistics the mean annual rainfall here is of the order of 24 inches distributed as follows:-

TABLE 22: Mean Rainfall. 1935-1951 (17 Years).

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	YEAR.
2.05	2.27	2.85	2.25	1.72	1.20	1.19	.88	1.72	3.09	2.37	1.82	23.6

From Table 22 it may be observed that the rainfall is typically distributed fairly evenly over the year but with a

slight/.....

slight balance in favour of the Summer half year (October-March) and with maxima in the Spring and Autumn with peaks in October and March. It may be assumed, however, that due to higher Summer temperatures the rainfalls at that season are somewhat less effective than in the winter. The farmer observes that in some years when the rainfall is well distributed in time, it supplies a sufficiency of effective moisture for successful growing of citrus without irrigation. Such years, however, are infrequent and for the most part irrigation is essential in this region to make up the deficiency of effective moisture in most years.

NOTE: The variation, reliability and intensity of the rainfall may be expected to follow the general pattern for the area as a whole and need not be repeated here.

WINDS:

The farmer observes that winds come mainly from the S.E., S.W. and N.W. and may on occasions reach considerable velocities. Of particular significance are the N.W. Bergwinds, of Spring especially, when hot and dry conditions and low humidities are experienced. The farmer estimates that from 8-10 such winds per year each lasting a day or more are normally experienced on Mosslands.

VEGETATION:

The natural vegetation of Mosslands belongs to the Valley Bush and Grassland Vegetation types.

The two vegetation types each occupy roughly half of the farm area (Map 17).

The greater proportion of the Valley Bush occupies the broken Kariëga Valley across the Northern reaches of the farm, while in the Assegaibush valley it occupies narrow belts along the water courses.

As on most farms in the region, the formerly dense bush has been considerably thinned out by clearing, chopping out and animal grazing and much broken grassland now appears in the bush landscape. Really dense stands occur today only in

the/.....

the steep sided tributary valleys of the Kariega and in places along the watercourse of that river. In former years such valuable timber trees as the Yellow-wood and Sneezewood grew along the Kariega River but have been largely chopped out for floor boards, rafter beams etc. and fencing posts respectively. In general the bushland today contains the typical elements already noted elsewhere.

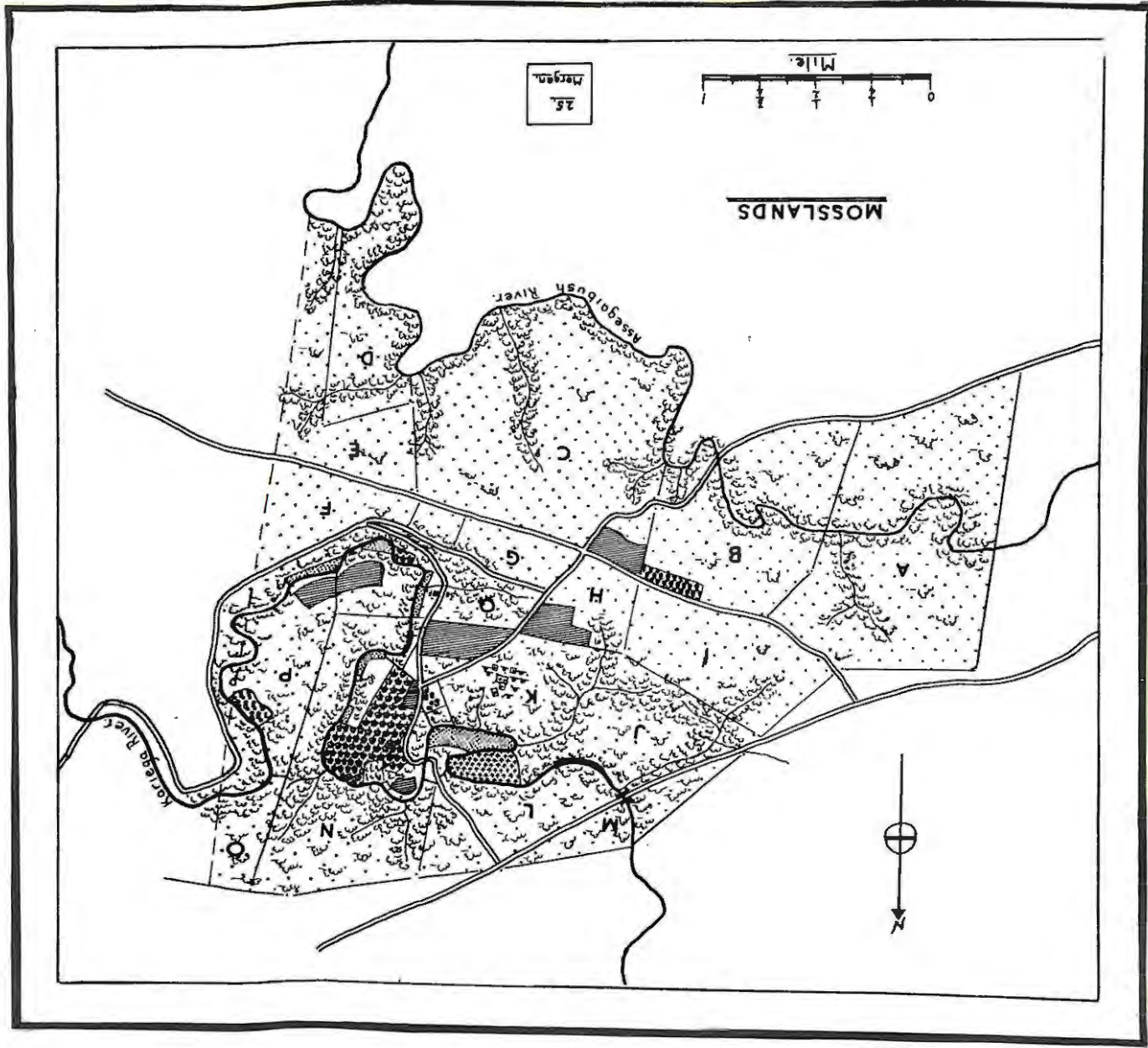
The grassland areas occupy the broad divide separating the two river valleys and for the most part the steep South-facing slopes of the Assegaibush valley. In addition there are the stretches of grassland which now occupy considerable tracts in the formerly dense bushland of the Kariega valley.

As on Atherstone the grassland is by no means pure but contains scattered shrubs and bushes and typical members of the Fynbos vegetation type.

The relatively smooth grassland of the divide must have contrasted sharply with the dense bush in the valleys in the past as regards ease of movement. It is no wonder thus that early travellers in the area kept to the grassland divides as far as possible.

The grasses are normally densely growing as on Atherstone and reach a height of 4-6 inches and up to 18" in the seeding season. The typical grasses of the region are encountered on Mosslands among which *Themeda* sp. (gluaca form) *Eragrostis* sp., *Digitaria* sp., *Setaria* sp., *Tristachya* sp., *Cynodon* sp. etc. are especially prominent. In the bushland in addition the *Panicum* sp. are common.

Such Fynbos shrublets as *Chrysochoma* sp., *Selago* sp., *Aster* sp. etc. occur scattered throughout the farm and especially on newly cleared bushland. Among these plants the *Rhenooster bos* (*Elytropappus* sp.) is considered a pest over the grassland regions and at present occupies much of the land in Camps A, B, I and J. Extensive clearance is planned in the near future. As regards grassland pests the acacia sp. if unchecked, spread rapidly in the grassland areas (cf. Tharfield).



MAP 17.

On the rocky krantz slopes aloes and other succulents are common while in the kloofs and ravines the arborescent sp. of Eupharbia is also encountered.

LAND USE AND THE FARMING SYSTEM.

INTRODUCTION:

Land utilization on Mosslands is essentially bound up in a mixed farming system which here concerns the cultivation of citrus as a cash fruit crop and for the sale of nursery trees, together with the grazing of a dairy herd mainly for cream production for sale. No other cash crop is produced and all cultivated land not used for citrus is devoted to fodder crop growing, for use on the farm. A small pineapple land has been established but as yet it plays no significant part in the farm economy.

Before going on to discuss the land use and farm system in greater detail, several significant factors relating to the economic success of the present farming landscape, should be noted. Of such factors the relation between the total farm size and the area devoted to citrus cultivation is especially important. The size of Mosslands, ± 1,750 morgen, is considerably greater than the average farm size for the majority of farms in the Albany District, and when it is realised that citrus growing, although it contributes about 80% of the annual farm income, is an intensive farm practice, requiring a limited proportion of the total farm area for its cultivation, this factor becomes especially significant. Table 23 below illustrates the small area occupied by citrus on the farm.

TABLE 23: Land Use by Area (Morgen).

Citrus	Fodder Crops.	Pineapples	Grazing
35	100	10	1,600

This factor is significant because unless some

means/.....

means are introduced, by which the very large proportion of land ( $\pm$  98%), not devoted to citrus growing, may be profitably utilized, the idle and unproductive land would be uneconomical and a definite drain on the income derived from citrus. It would therefore become a burden rather than an asset to the farmer. The importance of dairying, which the farmer has found to be a profitable complementary farm occupation in this respect, is therefore of especial significance. Dairying, apart from making economic use of the large area of uncultivated grazing, also allows for the cultivation of fodder crops on agricultural land not under citrus.

Since the sale of the citrus crop each year brings in a single annual cheque at the close of the fruit season, the expenditure involved in the cultivation of the crop prior to its sale may result in unsatisfactory accumulation of debt. With dairying included in the system, however, a regular monthly cash income is available from which many of the normal running expenses may be paid. In addition, were the citrus crop to fail in any season, the income from cream, though relatively small, would at least be sufficient to tide over the lean period. These factors materially promote a sound farm economy.

The provision of quantities of skimmed milk is a decided attraction to farm labourers without whom, the farm could not be managed. In addition, the manure obtained from the cattle is a valuable source of organic nitrogenous fertilizer required for successful cultivation of citrus trees.

It is to be concluded, therefore, that the mixed citrus and dairy farming system is well adapted here to the prevailing conditions.

In addition to such factors as those noted above, it is interesting also to note the farmer's observations and reasons for the importance of citrus production on Mosslands as the major source of income and the main occupation. These may be summarized as follows:-

(a)/.....

- (a) The citrus industry under the control of the Citrus Exchange is one of the most highly organised agricultural industries in the Union and from the sale of fruit, especially for export, a satisfactory farm income is obtained.
- (b) Suitable tracts of land for orchard development and future expansion were available on the farm. In addition, from personal experience of citrus growing in the past, the climatic and soil conditions here were considered suitable for citrus cultivation on a fair scale.
- (c) Adequate water supplies for irrigation could be readily developed on the Kariega River adjacent to the orchards.
- (d) Suitable relatively cheap transport facilities are available, 14 miles by road to the railway station at Grahamstown and thence by rail to the port of export at Port Elizabeth only 108 miles distant, which port offers admirable facilities for exporting perishable fruits.
- (e) A co-operative Citrus packhouse in Grahamstown under the control of the Bathurst Farmers' Union offers facilities for the packing of a large citrus crop and for despatching it to overseas and Union Markets.
- (f) Perhaps the most important factor is the farmer's great interest in the crop and in the considerations involved in its cultivation.

#### CITRUS GROWING ON MOSSLANDS.

The history of citrus growing on the farms already been summarised above and need not be repeated here.

#### AREA DEVOTED TO CITRUS:

The citrus orchards occupy some 35 morgen or about 2% of the total farm area, situated on a gentle slope of the Kariega valley as illustrated on Map 17 . The area is

likely/.....

likely to expand in the near future so as to ensure continuous production once the yields from the present orchards begin to decline. These extensions will cover an area of almost level land adjacent to the National Road in Camp L, where up to 10,000 trees could be accommodated on from 50 to 60 morgen of land. This land will be under irrigation with water pumped from the adjacent storage dam.

The number of citrus trees at present established on Mosslands for commercial production is approximately 5,000. This total, according to the farmer, is greater than that for the average Albany and Bathurst citrus farm, which, he observes, usually have from 2,000 to 3,000 trees.

VARIETIES OF CITRUS CULTIVATED:

Commercial citrus production on Mosslands is confined to 3 orange varieties namely the Washington Navel, Moss Seedless and the Valencia. The Moss ~~Seedless~~ Seedless variety is a sport developed on the farm from two old seedless orange trees established here in the mid 19th Century.

Of the 3 varieties the navel orange is the most important and contributes up to 60-70% of the annual crop while the Moss Seedless contributes 25-30% and the Valencia  $\pm$  5%. The popularity of the navel depends mainly on the fact that it is an early maturing variety, thus escaping the possibilities of winter frosts. It must be noted, however, that in the lower Albany and Bathurst citrus growing areas, frosts are not severe and do not preclude the cultivation of the late maturing Valencia, and fair quantities of these are in fact cultivated.

According to the farmer, the cultivation of only a few varieties is desirable since the markets demand a fruit of standard type and quality while Webber (1925) has noted that "the growing of a few varieties in large solid blocks is the most economical method of production." "It facilitates picking and handling of fruit, the planning of farm work, irrigation etc."

It/.....

It may be observed further that the varieties grown are early, mid-season and late maturing respectively, which extends the fruit season and facilitates more efficient handling of the fruit. The extended fruit season is encouraged by the Citrus Exchange authorities since it makes for greater uniformity in supply and of prices, especially in the overseas markets, and prevents the glutting of markets with resulting low prices. The Navels ripen in the late autumn and picking extends from May to July, followed by the Moss Seedless into late August and then the Valencias, the picking of which may extend into late September.

THE SITE OF THE CITRUS ORCHARD:

The original orchards were situated on the narrow strips of level land along the Kariega River (now occupied by lucerne lands). These orchards had the advantage of deep fertile alluvial soils and were irrigated by gravity flow from the weir impounding the Kariega waters, immediately below the present orchard. These orchards, however, suffered from two disadvantages - (a) the drainage of cold air into the valley bottom, with inversion of temperatures, increases the frost hazard especially, according to the farmer, in early Spring when the trees are in bloom and the new fruit crop is setting. (b) although relatively infrequent, floods caused further losses in fruit and damage to the trees. Once the production from these orchards began to decline, due to age, they were abandoned and the present orchard laid out while the old orchard lands were turned over to lucerne growing.

The present orchard is situated on a broad gently sloping spur sweeping into the Kariega valley as illustrated on Map 17. The gradients of the orchard lands are throughout smaller than 5% and are for the most part < 2%.

Lying for the most part out of the valley floor the site is largely free of damaging frosts. The soils are suitable for proper growth of citrus trees, with river alluvium over

the/.....

the lower valley slopes and a brown sandy loam over the upper parts. The soils are everywhere over 4 feet in depth and are largely free of any significant hardpan, with good subaerial drainage preventing water logging.

The entire site has been brought under irrigation by pumping water from the Kariega which is impounded by the weir noted above. In the near future, fully  $\frac{1}{3}$  of the orchard land (the lower stretches) will be irrigated by gravity flow with water brought by furrow from the recently constructed irrigation dam a small distance upstream from the orchards (Map 17).

The orchard site has a N.E.-facing aspect and derives full benefit from the warm morning sun but escapes the direct rays of the hot afternoon sun while in addition it faces away from the direct impact of the hot dry N.W. Bergwinds which may seriously affect the setting fruit in the Spring, due to low humidities.

The stretch of land is a suitably extensive and continuous tract which is situated close by the homestead F, making for convenient supervision of orchard management.

#### THE CITRUS NURSERY AND THE PROPAGATION OF TREES:

Although citrus trees are propagated on Mosslands, both for use in the home orchard and for sale, the farmer observes that this is not the usual practice of growers in Albany and Bathurst. He notes that, if only to safeguard the buyers of his young trees, their cultivation should not be undertaken unless the grower has considerable experience in this work. This is because the faulty character of a tree will emerge only after a few years of growth by which time a grower may have unnecessarily expended much time and capital on the cultivation of such trees.

#### THE NURSERY:

The Mosslands citrus nursery occupies a stretch of land adjacent to the orchards and covers some 3 morgen. The location of the nursery has been determined by similar factors to those noted above. It may be observed, however, that in

common/.....

common with the orchards, it is not the only suitable site but it has been selected because it is particularly convenient for this purpose. The site is easily irrigated by an extension of the orchard irrigation scheme, but its proximity to the homestead is the major feature since it is immediately at hand for the sale of young trees.

#### PROPAGATION OF TREES:

The trees are not reared as orange seedlings but are propagated by grafting buds from selected orange trees on to a suitable hardy and disease-resisting root stock such as the rough lemon which, according to Webber (1925), is easy to grow, develops rapidly, buds easily, produces a good root system and seems to be well adapted to all soil types. In addition tree growth is good with heavy bearing capacities while it appears that the root stock has little effect on the quality of fruit produced.

The rough lemon seedlings are cultivated in special seedbeds in the homestead gardens and are sown in September - October when the seeds are available, since best germination results are obtained when they are sown before they dry out.

The seedlings are ready for transplanting within 11-12 months and in September - October they are transplanted to the nursery. They are then allowed to grow for a further 12 months in fertile virgin soils in the nursery when they are ready for budding.

The selection of buds for grafting is a vital factor in ensuring the future success of the trees in the orchards, and only buds from specially selected trees are used in the process.

The grafted trees are ready for transplanting in orchards after a further year.

#### SEASONS OF TRANSPLANTING:

Citrus trees have several periods of flush growth and dormancy during the year and according to Webber (1925) one of the dormancy periods should be selected for transplanting.

One of the most favourable periods is the Spring months of September or October and on this account the trees of Mosslands are transplanted in Spring when they make best progress.

THE LAYOUT PATTERN OF THE ORCHARDS:

Once cleared of bush the selected site was deeply ploughed and subsoiled to make for easy root growth and to break up any hardpan.

The selected site, as noted above, is situated on sloping land, and with clean-cultivated orchards the accepted practice, unprotected surface is exposed to soil-wash from storm and irrigation waters, while a too rapid run-off of water results in diminished soakage and consequent drought for the trees. To overcome the disadvantage of excessive slope, therefore, the land has been terraced to control run-off.

The 25-foot-wide terraces follow the contours of the site as far as possible and have a fall of 1 : 300 along their length to allow for the flow of irrigation water. The only serious disadvantage of the terrace pattern is the difficulty experienced in cultivation of the orchard, since mechanical cultivation is possible only along the length of each terrace, the spaces in between trees having to be hand cultivated which necessitates a larger labour force and expense.

The transplanted orchard saplings are pruned to a height of 3 foot and all foliage below 9" of the crown is removed. In this way trees have a uniform height and it allows for the development of a good "Scaffolding" on which future secondary branches will develop, preventing the tree from becoming a bush with excessive foliage.

To protect the tender trunks from sunburn either paper or grass is bound round the stems until the tree has produced a shady canopy for itself.

On Mosslands the trees are planted from 16-20 feet apart towards the edges of the terraces to allow for maximum mechanized cultivation.

Once/.....

Once the tree is established it is rarely pruned unless because of disease it is cut back and allowed to develop a new branch system.

The trees normally bear a full crop within 5 years of their establishment, although small crops are reaped after the first 2 years.

The age at which trees begin to decline in yield varies greatly in different localities depending on the environment and orchard soils. On Mosslands, with adequate irrigation facilities and reasonably fertile soils, the trees are expected to reach 30 years before declining (The present age is an average of  $\pm 15$  years). Before that time, however, within the next 10 years, a new orchard will replace the present, on the proposed new site, which will ensure continuous production in the future.

SOME ENVIRONMENTAL FACTORS AFFECTING THE FRUIT CROPS:

(a) CLIMATIC FACTORS:

Rainfall and Humidity.

The mean annual rainfall supplemented by irrigation is considered ample for successful citrus cultivation on Mosslands. According to the farmer, however, the distribution of the rainfall is of great importance. In this respect the most critical period is during late winter and spring when the trees are in blossom and the next fruit crop begins to set. A dearth of moisture and atmospheric humidity at this stage leads to what is known as "fruit drop." Webber (1925) notes that experiments carried out in California have shown that hot and dry weather bring about fruit drop. Conditions there may be so severe that trees are unable to take up sufficient moisture from the soil to make up fully that which is lost by transpiration from the foliage, and moisture is drawn from the young setting fruit. "This daily drying out apparently sets up a reaction in the plant tissues that leads to the formation of a layer of separative tissue in the pedicles and the throwing off

of/.....

of fruit". (Webber, 1925, p. 93).

Low humidity may also have serious effects on pollination of the blossoms, since it dries out the secretions on the stigma and prevents the germination of the pollen grains.

Although such severe conditions do not normally occur on Mosslands, according to the farmer, a dry spell accentuated by hot and dry conditions brought on by bergwinds, which occur especially in the Spring, may cause some damage and loss in a setting crop.

#### TEMPERATURE:

According to the farmer the trees are able to survive a reasonable amount of excessive heat but do not thrive under lengthy cold spells. Damaging frosts occur from 3-4 times a year on Mosslands, in the valley floors but due to the elevation of the orchards the frosts do little damage except perhaps to the rows of trees on the lower slopes of the valley.

Once the fruit has matured, frosts, if not too severe have little effect and according to the farmer, are found instead to lead to well coloured oranges.

#### SUNSHINE:

Plenty of sunshine is essential for the production of high quality fruit, and on Mosslands sufficient is experienced for successful fruit growing. In the ripening period, however, excessive sunshine may cause sunburn, but due to the aspect of the orchard this factor has little serious effect.

#### WIND:

The occurrence of strong winds is especially deleterious during the setting period when the chaffing of leaves and twigs against the tender fruit produces blemishes which are carried into maturity, resulting in fruit of lower quality as regards appearance.

In addition strong winds may cause much fruit to drop off the trees.

situated/.....

Situated in the relatively sheltered Kariega valley, however, strong winds have little effect on the Mossland orchard. To ensure protection, however, windbreaks (Diagram 3 ) have been established using evergreen pine trees and poplars which offer all the year round protection.

SOILS:

Soil maintenance is as important as favourable climatic conditions for good fruit crops according to the farmer.

On Mosslands, ammonium sulphate, super-phosphate and Kraal manure are the chief fertilizing materials used in maintaining soil fertility.

Lombard (1947) has noted that nitrogen is the most important plant food necessary for optimum tree growth. He observes, however, that excessive applications of inorganic nitrogen results in tree deterioration probably due to the accumulation of alkali in the soils. Hence kraal manure is here the main source of organic nitrogen (according to the farmer) and in this respect the dairy cattle are especially important.

By mulching the orchards with maize stalks from the home-grown maize crop a fair amount of organic matter is also added to the soils. At least  $\frac{1}{2}$  of the orchard is treated in this manner each year.

The fertilizers are applied by the broadcast method, kraal manure being applied in the period January - March and the inorganic fertilizers from April to May so as to give the trees sufficient time to build up reserves of the essential plant foods for the new crop season.

IRRIGATION:

SOURCE OF IRRIGATION WATER ON MOSSLANDS:

Irrigation water is drawn entirely from the Kariega River. This is normally a perennial stream but even when its flow is small there are always large pools of readily available water in its course. The farmer has obtained legal rights over a proportion of the water in the river and has constructed

a large irrigation dam as shown on Map 16, which is able to impound sufficient water to tide over the worst droughts. In addition there is the large pool impounded behind the weir below the citrus orchard. These two storage dams hold upwards of 87,000,000 gallons of water.

The large irrigation dam alone impounds over 80,000,000 gallons. The site of this dam is ideal both from the point of view of the construction of the earthen wall, across a narrow portion of the valley, and for a spillway which runs conveniently over rock into the neighbouring kloof. Water carried in a furrow from the dam will eventually irrigate over  $\frac{1}{3}$  of the orchard and also the river land below the dam. Surplus water is impounded by the weir further down stream which holds  $\pm 7,000,000$  gallons of water while a fair proportion runs free for use by the lower riparian owners.

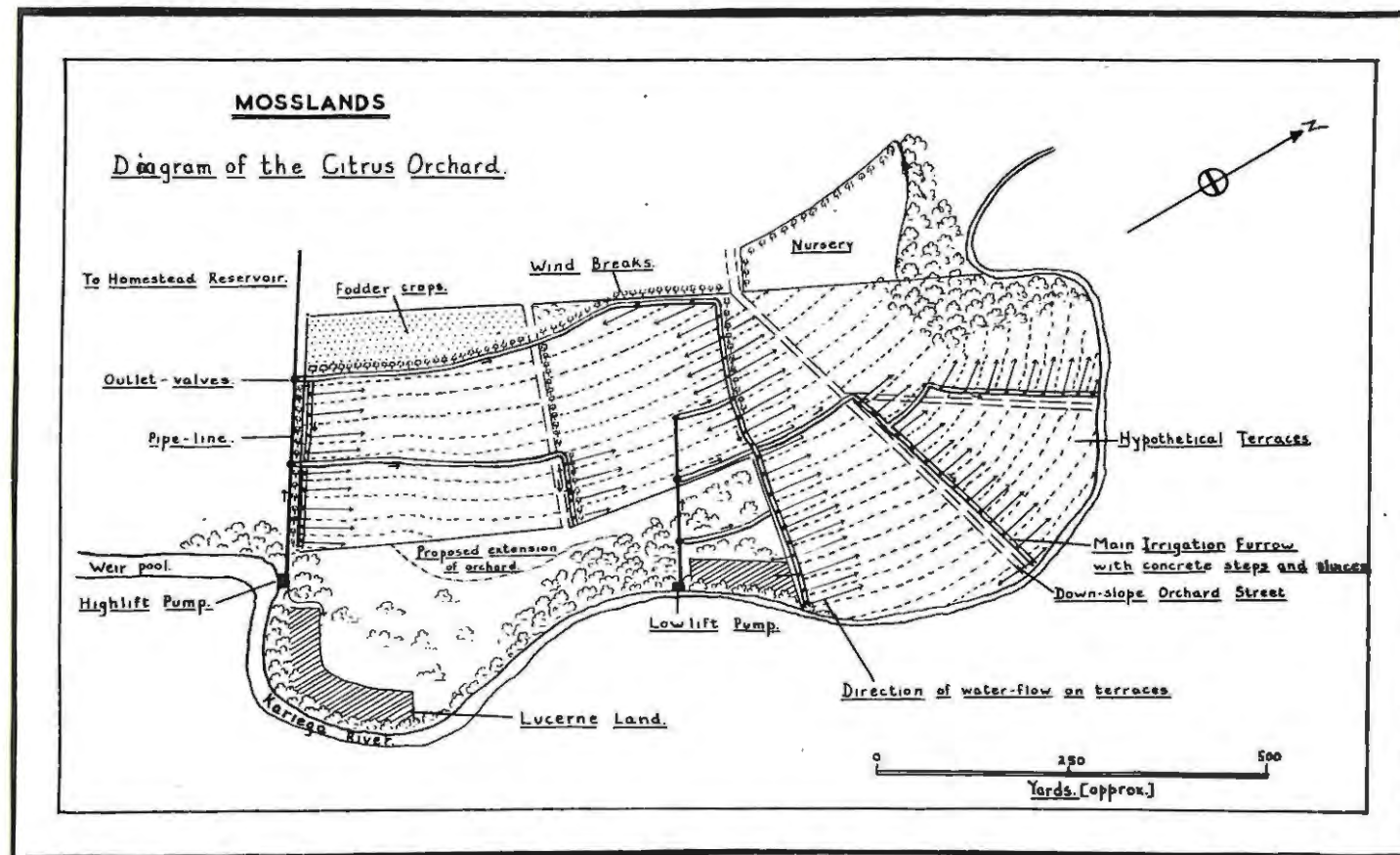
The water from the Kariega is usually not too brack or alkaline for successful irrigation of citrus, according to the farmer, except in severe drought when evaporation concentrates mineral salts in the pools. The farmer notes, however, that only on rare occasions is the water actually useless for irrigation.

#### PUMPING OF IRRIGATION WATER:

At present no part of the orchard is irrigated by gravity flow and all water is raised from the weir pool below the orchards (Diagram 3) by two pumps operated by diesel engines. One of the pumps is a "high-lift" type serving the upper portions of the orchard and the other is a "low-lift" pump serving the lower sections as illustrated in Diagram 3. From both pumping stations a 9 inch, iron, pipeline runs upwards to heights of 110 and 75 feet above the pool respectively. In each case the water travels approximately 200 yards in the pipeline to the highest outlet valves in the orchard. Each pipeline has a number of such outlet valves along its length to allow water to escape at different levels so that expensive, continuous, pumping

to/.....

DIAG. 3.



to the highest points is unnecessary when irrigating.

The water pumped to the different levels is allowed to flow down the slopes in main furrows over concrete steps to prevent soil erosion. (Diagram 3). At each of these steps is a two-way sluice by means of which the water is turned onto the terraces. The water flowing down the main irrigation furrow possesses a considerable velocity and were the entire volume turned at once onto a single terrace considerable soil wash along that terrace would result. Therefore, to ensure a more moderate flow the water is turned onto 3 terraces at a time giving greater control over its velocity and volume.

SYSTEM OF IRRIGATION:

On Mosslands the semi-permanent basin system of irrigation is employed. In this system the water is allowed to flow in a furrow to the extremity of the terrace and is then turned successively into square earth basins, built up for each tree, back along the length of the terrace.

The low earth banks of these basins have to be thrown up at each irrigation after discing and cultivation of the terraces between irrigations. A special mechanical, tractor drawn, implement is employed for this work, accomplishing it rapidly and reducing hand labour costs.

TIMES OF IRRIGATION:

The times of irrigation rely to a large extent on the farmer's judgment of soil moisture. The incidence of the rainfall is variable and so also therefore is the irrigation schedule since it is important not to irrigate wet soils or to under irrigate the orchard.

The maintenance of soil moisture is especially important in the critical blossoming and fruit setting period. Moreover the quality of the fruit may be seriously affected by soil drought in the hot summer months of January and February when the less effective rainfall may not supply sufficient moisture for successful development of the fruit.

QUANTITY/.....

QUANTITY OF WATER REQUIRED BY THE ORCHARD:

The farmer observes that to allow an adequate supply for each trees the number of tree in the orchard should be adjusted to the available water at its lowest ebb. On Mosslands the new irrigation dam has ensured water supplies in excess of the requirements and no water shortages are likely to limit crop production in the future.

Lombard (1947) observes that in this region with normal rainfalls prevailing, from 29-32" of water are necessary annually for successful citrus production. He notes that with approximately 21" (seven irrigations) applied per year about 10" of effective rainfall are needed to make up the deficiency.

CULTIVATION OF ORCHARDS:

To prevent undue competition for moisture and plant foods the orchards are kept clear of weeds by persistent shallow discing of the soils along the terraces.

Cultivation is mechanised and no animal traction is used since it is too slow and the animals are more difficult to control, tending to brush against the trees and damaging the fruit.

The strips of soil between the trees are cultivated by hand hoeing, since the terrace banks prevent down-slope mechanized cultivation.

THE DISEASE FACTOR:

The scale insects, according to the farmer, appear to be the chief pests affecting the citrus crops, while the False Codling Moth, fruit flies and Black Aphis are also important.

The scale insects infect leaves, tree trunks and the fruit which when affected is not suitable for export purposes. The moths and the fruit flies sting the fruit, making it quite useless for sale.

Until recently fumigating with a cyanide gas was the only means of combating scale. At present, however, almost 100% natural control of scale has been achieved since the introduction  
of/.....

of insects which devour the scale and keep it in check. Only rarely is fumigation resorted to when especially severe attacks are experienced.

Fumigation is, according to the farmer, a costly and laborious process requiring ideal working conditions. It has to be done at night with suitable temperatures with, no mist or dew. Each tree is completely covered under a canvas tarpaulin and then fumigated.

The fruit fly is controlled by arsenical bait, especially at the ripening season March - August, when the flies are most active. No efficient method of controlling the False Codling Moth has as yet been developed and they are best kept down by ensuring cleanliness in the orchards to reduce possible breeding spots.

The farmer observes, however, that although a nuisance, diseases and insect pests rarely constitute a serious limiting factor in the environment, for the production of good fruit crops.

#### MARKETING THE FRUIT CROPS:

The fruit ripens in the winter half year in the 5 month period from May to October. The extended season is brought about by the growing of different varieties which ripen at different times.

The prime object of citrus growing on Mosslands is to produce the highest possible quality fruit for export. Thus before picking commences samples of the fruit pass through rigid tests, by citrus experts, to determine the quality. Among such tests are:-

- (i) Colour and appearance. Export fruit must have at least 70% colour (i.e.) 70% yellow rather than green when sold. The fruit is not necessarily yellow when picked but should reach the required standard by the time of sale.
- (ii) The sugar / acid ratio of the juice should conform to the required standards. In addition the juice content is also an important factor.

LABOUR:

During the picking season most other non-essential farm activities are temporarily halted and the regular farm labour is drafted into the orchards for picking. The woman and children - wives and families of the permanent workers, are especially important at this season and normally from 30 - 40 persons in all are actively engaged in the operation.

The workers normally pick upwards of 500 lug boxes of fruit per day, equivalent to 200-300 cases of export fruit of 70 lbs of fruit each.

PICKING METHOD:

The fruit is not man handled when picking it from the trees. The pickers wear soft cotton gloves and special clippers are used to cut the fruit from the pedicles so that the small "button" by which the fruit is attached to the pedicle is retained on the fruit.

It is picked into canvas picking bags and later transferred to wooden lug boxes - usually old paraffin crates, and transported by truck to the collecting centre at the homestead F.

It may be observed from diagram 3 that to minimize excessive carrying of the lug boxes along the terraces, orchard-streets crossing the orchard have been constructed and divide it into blocks, shortening the distances along each terrace. These streets are grass covered, for the most part, to prevent them from becoming the sites of erosion, since they run down slope across the orchard.

The fruit is transferred at the homestead into other lug boxes, the property of the citrus packhouse in Grahamstown, in which it is transported to the packhouse. It is essential, according to the farmer, not to pick fruit directly into these packhouse boxes since taking them into the orchard might spread diseases. These boxes are used by other growers in the fruit season and may have been infected by diseases from other orchards.

The fruit may be picked at any time of the day, according to the farmer, commencing in the morning as soon as the dew

has/.....

has disappeared. The fruit is never picked wet, however, since the skins are then tender and easily bruised when handled, and transported.

Once picked, however, the fruit is never allowed to stand exposed to the direct sunlight when wilting is accelerated, removing the bloom and rendering the fruit less desirable for export.

QUANTITY OF FRUIT PICKED:

The quantity of fruit picked at each picking is controlled by a quota system. The farmer receives a communication from the Citrus Packhouse each week informing him on the amount of fruit he should reap. The weekly quota varies from 1 to 4 pickings a week depending on the quantity of fruit being handled by the packhouse. This procedure is essential because the packhouse is able to handle only a certain amount of fruit at once. The control on the volume of incoming fruit ensures a minimum delay in packing and despatching the perishable fruit.

PACKING:

No fruit is packed on the farm but at the Bathurst Farmers' Union packhouse in Grahamstown, which is run under strict regulations laid down by the Citrus Exchange Board, the co-ordinating body of the citrus industry in South Africa.

Not all growers operate through this packhouse but the farmer has found it the most satisfactory procedure, and he observes that the following advantages accrue.

(a) The shortages of cheap labour in recent years through the drift of labour to the cities, has made picking and packing of fruit on the farm on a relatively large scale very difficult. In addition European workers employed by the packhouse are more efficient in grading and packing the fruit than Native labour on the farm.

(b) One of the essentials of marketing citrus fruit is to have a large volume of fruit under one brand in order

that/.....

that a particular brand may become known to the trade and the public; and co-operative packing enables this point to be achieved. Two export standards are recognised by the packhouse, namely Outspan and Standard grades, the former being the finest quality export oranges.

- (c) Co-operative packing is time-saving and time formerly spent in packing on the farm is now devoted profitably to care of the orchards, especially since the critical fruit setting period follows directly on the picking season.

#### THE MARKETS:

Normally from  $\frac{3}{4}$  -  $\frac{4}{5}$ ths of the Mosslands crops are suitable for export, the remainder being sold on home markets. The proportion of Outspan and Standard grades varies from year to year and an average figure is not available.

The export fruit is sold through the efficient co-ordinating channels of the Citrus Exchange, mainly on the U.K. markets, although small consignments are sometimes sent to Holland, Belgium, Sweden and Germany.

The smaller oranges ( $\pm$  2-2 $\frac{1}{2}$  inches in diameter) corresponding to a count of 252-288 oranges / export case (70 lbs of fruit) are the most preferable for exports. The larger numbers are preferred by buyers since a case is able to serve a greater number of persons. In addition financial gains are greater to the producer. In 1951 e.g. count D (above noted) netted 33/- (excluding production costs) / case while count A (80-112 / case) netted only 13/- / case.

The quantities of fruit exported vary from year to year. In 1951 e.g. 8,000 cases were exported while in 1952 exports were estimated at 4,500 cases - the variations being due to climatic conditions chiefly.

#### HOME MARKETS:

Approximately 25% of the annual fruit crop from Mosslands is retained for sale on local markets (at least 25% of all/....

all citrus crops have to be retained in S.Africa according to the edicts of the Citrus Exchange.)

Through the organisation of the Citrus Exchange the home sold fruit in South Africa is well distributed over all the Union Markets. As far as possible the fruit is sold within the geographical region in which it is grown. According to the farmer, such regions are but vaguely defined and are applicable on a very broad basis only. The chief local markets for Mosslands, therefore, are Port Elizabeth, East London and Grahamstown although Cradock, Graaff Reinet and King William's Town are also important.

In general it is the larger fruit which is sold on these markets, although a fair proportion of the smaller fruit is also sold.

The fruit is sold on the home markets in the well known citrus pockets each containing  $\pm$  30 lbs of fruit.

The number of pockets sold varies again from year to year depending on the crops. In 1951 (good season) 5,000 were sold while in 1952 the estimates were for 2,500 pockets.

#### CROP YIELDS:

As noted above, the annual yields may be expected to vary depending mainly on climatic conditions. The mean yield / tree, however, with normal conditions is estimated at 1-1½ export cases (70 lbs) / tree (or  $\pm$  4 pockets/ tree) corresponding roughly to 100-150 cases per morgen in an average season.

#### TRANSPORT AND COMMUNICATIONS:

From Map 7 it may be observed that Mosslands is situated conveniently on the railway-bus route from Port Elizabeth to Grahamstown some 14 miles from the railway station in Grahamstown, over the excellent tarred National Road.

Efficient transport facilities are essential to the producer of a perishable crop such as citrus. The fruit from Mosslands, is usually delivered to the packhouse, on the same day as it is picked, in special trailers attached to the Road Motor

vehicles/...

vehicles of the South African Railways. These buses pass the farm once daily. The excellent road makes for little bruising and crushing of fruit in transit.

The fruit is packed as soon after its arrival at the packhouse as possible whereafter it is despatched by rail to Port Elizabeth harbour some 108 miles from Grahamstown. The fruit travels in cooled, but not refrigerated trucks. On its arrival in Port Elizabeth it is immediately transferred to the pre-cooling chambers at the harbour. There it awaits loading into refrigerated ocean vessels which carry it to its overseas destination. It is essential that the fruit be handled with care in transit, since it is rigidly inspected at the Port by Government Inspectors and it is not unknown for an entire consignment of unsatisfactory standard to be rejected.

The home sold fruit also travels to market in cooled trucks and should be as carefully handled as the export fruit since it is not protected in a case.

#### DAIRYING ON MOSSLANDS.

##### SIZE OF DAIRY HERD:

The dairy herd of Mosslands numbers approximately 60 mature milk cows, 40 heifers, 25 calves, 2 bulls and about 30 slaughter oxen. All these animals are of a high quality Jersey breed. These figures exclude approximately 50 Native cattle grazed on the farm by the male workers for their own use.

##### GRAZING:

##### THE VEGETATION AND GRAZING:

Situated in the better watered region of Albany, the grasses are the major source of feeding for the cattle, as on most other farms within this area. Among these the farmer considers that the following grasses are the most important as regards grazing:-

Themeda, Digitaria, Setaria, Tristachya, Eragrostis,  
Heteropogon and Panicum.

The/.....

The relatively large tracts of valley bushland are regarded more as secondary sources of grazing representing primarily a valuable fodder bank against grazing shortages. Some of the bush elements, however, taint the milk product and as far as possible, therefore, the dairy cows are grazed in camps where such plants are least common. The most important members of the bushland valuable as grazing have been noted above in the account of the vegetation of the farm.

The elements of the Fynbos in the vegetation are not considered important as grazing while such shrublets as salt bushes *Atriplex* sp. are highly prized.

PALATABILITY:

The farm falls within the veld type described by Scott <sup>(1947)</sup> / as Bush Clump Veld in which a single farm may contain sweet, mixed and sourgrazing. This feature in fact is represented on Mosslands. According to the farmer,  $\frac{1}{3}$  of the grazing is sweet while the remaining area is composed of mixed and sour grazing. The sweet grazing, which remains palatable through most of the year, is confined to the slightly drier Kariega valley slopes while the mixed and sour grazing occupy the divide and the moist south-facing slopes of the Assegaibush valley which it may be noted are especially sour, because of slightly higher rainfalls and mists on these slopes.

NUTRITIONAL VALUE OF THE GRAZING:

In common with most of higher rainfall region of Albany and Bathurst, the grasses especially are deficient in essential minerals, particularly the phosphates. In addition the protein content, although normally sufficient to maintain animal growth, is not entirely satisfactory especially for dairy cows. The milk cows therefore receive supplementary rations of greenfeeds and concentrates chiefly bonemeal. It is normally the practice to stall feed protein-rich green or dried lucerne during the winter poor grazing period and oat or wheaten hay or greenfeed during the Spring and Summer seasons when the grasses are most nutritious.

SEASONAL/.....

SEASONAL RYTHM OF THE GRAZING:

Without repeating unnecessary detail it may be stated that the grazing passes through a similar cycle to that experienced on Atherstone.

CARRYING CAPACITY:

The official estimate of the carrying capacity in the Broekhuizens Poort Soil Conservation District of which Mosslands forms a part, is 1 beast / 6-7 morgen. The natural grazing of the farm is at present stocked at a rate of 8 morgen / beast which is well within the stocking rate prescribed for the area. The farmer observes, however, that once the dairy herd has been enlarged in the future, the stocking rate will rise. It should be remembered that dairying on a fair scale is but a relatively recent development on the farm. The increased stocking rate will be satisfactorily supported in addition by the proposed artificial pasture lands, and fodder crops cultivated on the farm.

In general little obvious variation in carrying capacity is noticeable for different parts of the farm according to the farmer, but he observes that in droughts especially, the bushland areas have a greater carrying capacity which to some extent applies during the winter poor grass period as well.

FENCING AND SUBDIVISION OF THE FARM:

The fences and camps are once more significant features in the management of the grazing.

Fencing on Mosslands commenced in the late 19th Century during the ostrich era, but the present extensive camping system dates back only to 1922 when the farm as it is today, first appeared as a single unit, and when sheep grazing on a large scale necessitated controlled grazing facilities. The fences  $\pm$  4 feet tall total some 30 miles in length and the recency of sheep grazing explains the fact that for most of their length the fences are not only stock-proof but are also jackal-proof, being constructed of strand and mesh wire. Fencing posts are here too

indigenous/.....

indigenous sneezewood posts typical of the region as a whole.

The farm has been subdivided into 17 grazing camps varying in size from  $\pm$  350 morgen to 20 morgen or less. In addition there are a number of smaller paddocks a few morgen in size clustered around the homesteads (F and F<sub>1</sub>) and conveniently situated for handling animals, while further there are the enclosures bounding the cultivated lands and the homesteads (F and F<sub>1</sub>) and farm sheds. All the camps have interleading gates chiefly of tubular metal construction, to facilitate easy movement of animals across the farm.

The fencing system of Mosslands follows no definite or regular pattern and the camps are not only irregular in size but also in shape. The irregularity of the pattern may be traced severally to the awkward shape of the farm unit and the complications produced by the many natural bounding lines which appear in the landscape, among which the irregular major drainage lines and the road system which crosses the farm, (Map 16) are the chief. In most cases, in fact, the camp fences are aligned on the roadways. In places, however, natural boundary lines have been ignored and the camps are seen to lie astride the drainage lines - Camps A and B on a roadway, Camp L for example.

The fencing system is not entirely arbitrary, however, but has been, as far as possible, adjusted to certain major environmental factors especially as regards vegetation type and locations of stock watering facilities. As far as possible, therefore, the open grassland is separated from the areas where bushland is prominent, to allow for easy grazing management. It may be observed also that the camps have been so aligned that where watering points such as storage dams, springs or vleis are not present, the camps abut on the major water courses which in this area of higher rainfall are normally reliable water sources.

The camp system is considered ample for controlled grazing management and no further subdivision is planned for the foreseeable future. It may be noted, however, that when a scientific grazing plan for Mosslands is drawn up by the central

committee/.....

committee of the Broekhuizens Poort Soil Conservation District, some reorganization of camp pattern and size may take place to conform to the proposed plan.

GRAZING MANAGEMENT:

No comprehensive rotational grazing plan has as yet been drawn up, and the grazing system relies primarily on the farmer's judgment of grazing conditions. Grazing is effectively controlled by allowing a camp to be grazed until the farmer judges that sufficient material has been taken from it, whereupon the cattle are moved to another. Under this scheme all camps normally have up to a full season's rest in a year ( $\pm$  3 months) which is considered sufficient in this region of fairly rapidly growing grasses which become unpalatable when longer sparing periods are allowed. At least one camp in addition, is allowed to rest for a longer period of up to 9 months each year to allow for seeding and regeneration. This period will usually include the spring and summer seasons when the grasses are seeding.

The management of grazing recognises the necessity for the separation of the various categories which make up the dairy herd viz. - dairy cows, heifers, calves, bulls, dry cows, and slaughter oxen. The reasons for separating these categories have been noted in the case of cattle farming on Therfield.

The grazing is divided up as follows:-

(a) Milk Dairy Cows:

The milk cows are grazed in Camps G,H,L,N and R. These camps are close to the milking centre at the Birmingham New homestead (F), making for convenient rounding up of the herd at the evening milking time and for a short walk for the dairy cows. In addition the grazing of these camps may be considered as sweet and palatable at all times and they lie near the greenfeed grazing lands mainly centred in this area of the farm.

(b) Calves:

After separation from the cows, the calves from about

two/.....

two weeks after birth, are grazed in the small paddocks surrounding the Birmingham New homestead F, close at hand to the kraals situated in the homestead paddock where they are bedded at night and where proper care may be conveniently taken of them.

(c) The dry cows, heifers and oxen:

These are spread out over the remaining camps in no regular pattern.

(d) The Bulls:

The 2 Jersey bulls are grazed in a small paddock near the Birmingham New homestead F where they are under the constant supervision and observation of the farmer.

STOCK WATERING:

Mosslands with two permanently flowing streams together with several small storage dams, permanent springs and semi-permanent vlei waterholes is considered to be one of the best watered farms within the Albany District. Even during the severest of droughts, as for example in 1949, no failure of water supplies are experienced except perhaps for the drying up of the small storage dams and vleis. In this respect, therefore, it is rather a failure of the grazing capacity of the farm which becomes a limiting factor during droughts.

An important feature is the complete absence of boreholes, Mosslands being similar in this respect to Atherstone with only one borehole and contrasting sharply with conditions on Coniston for example, where borehole water is the only reliable supply for stock watering. Boreholes are considered unnecessary and too expensive to maintain under the prevailing conditions.

THE DISEASE FACTOR IN THE ENVIRONMENT:

The prevalent diseases affecting cattle are essentially similar to those experienced on Tharfield and Watersmeet. For example the ticks with their associated diseases - heartwater, redwater etc., are again a major feature. Modern preventive methods, however, have reduced the importance of diseases as

limiting/.....

limiting factors to successful cattle farming here.

The oxen, bulls and calves are dipped regularly each week throughout the year. On the other hand the dairy cows and heifers are sprayed rather than dipped since the dip is fresh at each spraying and hence more effective; and since the regular dipping of the cows is found, according to the farmer, to reduce milk yields especially in the first few days after dipping. In addition the dipping tanks are situated on the neighbouring farm which belongs to the farmer's brother and which in the past, during the sheep grazing period up to 1947, was run as a unit with Mosslands. The long walk to these tanks is thus undesirable for dairy cows since it causes reduced milk yields.

BREEDING ON MOSSLANDS:

BREEDING STOCK:

The Mosslands dairy cattle (except the Native-owned herd) are all high-grade Jersey stock and without exception graded animals, while the 2 bulls in use are registered stud stock.

Since the production of cream is the major aim the Jersey breed is an admirable choice.

Schreuder and Groenewald (1940) amongst others have noted that the Jersey cows are "economical producers for their size, their milk is richer than that of any other dairy breed, and they are persistent milkers," while in addition "they are very docile, and possess a very highly developed dairy temperament". Moreover, "Jersey heifers mature at a very early age and are of robust constitution and possess great longevity".

The aim is to breed animals which are true to type, have strong constitutions, with good milking properties and which are adjusted to the environment. To this end careful selective<sup>breeding</sup> is the order. It is not the aim, however, to breed the exceptional stud animal.

Bulls are bought as calves and commence work on the farm at an age of some 2 years and are sold at about 6 years of age. The bulls are bought from areas with similar environmental conditions, especially as regards

diseases/.....

diseases and grazing, for reasons already discussed for Tharfield. They are bought normally from breeders in the S.E. Cape Coastal belt such as the lower Sundays River valley and the Hankey area in the Humansdorp District.

BREEDING SEASONS:

On Mosslands the favoured calving-season is the winter and spring (May - October). The choice of this period is mainly an adjustment to economic factors, since during winter cream is in short supply and highest prices are obtained for the product in that season. A fair proportion of the cows calve out of this season, however, and are responsible for maintaining the cream production during the rest of the year.

Adequate supplies of cultivated greenfeeds and hay are available during the winter, and since diseases are then at their lowest ebb the season is particularly favourable to calving. The farmer observes that excessive cold, by local standards, is not of sufficient importance to place a limitation on winter calving.

The calves are separated from the cows after 2 days and subsequently hand-reared on skimmed milk until they are weaned at  $\pm$  9 months of age. This procedure ensures maximum milk and cream yields from the cows.

Bull calves are castrated and grazed as prospective slaughter oxen while heifers after selection are kept for building up or replenishing the herd of dairy cows.

CALF CROPS:

Under normal conditions the farmer expects 50-60% calving each year, making an average of about 30-35 calves annually. Losses are normally small due to adequate provision of grazing and water and effective control of disease.

DAIRY AND ANIMAL PRODUCTS:

Saleable products obtained from the cattle are milk, cream and beef, of which only cream and beef are actually sold.

The/.....

The farm is not from the economic viewpoint outside of the milk zones of either Grahamstown or Port Elizabeth but the farmer considers it less economical to sell milk than cream, on the scale of production on Mosslands, while in addition the skimmed milk is more profitably withheld for use on the farm for the labourers or for feeding the calves, and at times pigs.

CREAM:

Cream produced on Mosslands contributes roughly 20% of the annual farm income which is considered an admirable factor of the farm system as already noted.

CREAM PRODUCTION:

The Mosslands cows are milked twice daily in the cool of the mornings and evenings, in a large brick and concrete airy cow byre near the Birmingham New farmstead F. Milking is done by hand on Mosslands unlike the largely mechanised process on Watersmeet.

The milk cows receive lucerne, hay and other freshly cut greenfeeds at each milking together with a ration of concentrated carbohydrate and protein feeds. The cows are kraaled at night to be conveniently available for the morning milking and for the collection of manure which is utilized for fertilizing citrus.

CREAM OUTPUT:

The cows yield a mean of  $\pm 6,000$  lbs of milk each year from which  $\pm 600$  lbs of cream are obtained. This yield corresponds to  $\pm 300$  lbs of butterfat from each cow per year, a figure which corresponds to the yields on Watersmeet.

The separated cream is kept in 10 gallon cans and collected twice a week by a truck which runs through the surrounding area and transports the cream to a butter factory in Grahamstown where it is manufactured into butter.

BEEF:

The sale of slaughter oxen is not considered an

important/.....

important source of income and varies from year to year. The oxen are sold when  $\pm$  5 years old and approximately 12 are sold each year. They are reared and fattened cheaply off the natural grazing from September to January with small rations of supplementary greenfeeds and sold in the Autumn at the height of their condition. These steers are sold on stock fairs held in Grahamstown to which the oxen are driven over 14 miles. The small distance apparently has little or no effect on their condition.

SUPPLEMENTARY CROP PRODUCTION:

Out of a total of 130 morgen of cultivable land on Mosslands, including the area devoted to citrus, approximately 90 morgen or 5% of the total farm area, is devoted to the cultivation of fodder crops for greenfeed and hay, among which lucerne, oats, cowpeas and maize are the chief while soyabeans, wheat and millet are occasionally sown also. The crops are used entirely for animal feeding and only a small proportion of the maize crop is reaped each year for grain for Native rations.

The pattern of agricultural lands relates primarily to the suitability of the areas for cultivation and over large stretches, such as the citrus orchard land and the river side agricultural lands, to availability of irrigation water.

In general the environmental conditions prevailing on Mosslands contrast favourably, as regards the possibilities for agriculture, with the conditions on Atherstone for example. Although on Mosslands, the area occupied by the greater part of the agricultural lands is characterised by sloping land, the slopes are of a lower order, and with contour ploughing are not readily eroded. The soils are more fertile, comprising for the most part bushland soils developed on the Bokkeveld formation. In addition climatic conditions although not a limiting factor on Atherstone, are generally slightly more temperate here, especially during winter when temperatures are a few degrees higher due to lower altitude and frosts are generally less frequent. Drought

is of lesser importance also, since a fair proportion of the cultivated land is irrigated.

MAIN FODDER CROPS CULTIVATED:

LUCERNE:

Lucerne at present occupies approximately 10 morgen of land situated on the narrow strips of fertile alluvial land adjacent to the Kariega river. Proposed extensions of lucerne cultivation, however, on the flat flood terrace in the U bend of the Kariega River (Map 17) will increase the area to about 20 morgen.

The lucerne lands are semi-permanent and are replanted only after 8-10 years of growth, when they become too heavily grassed up. The lucerne is grown under irrigation with water pumped from the Kariega River. The lands are subject to occasional floods, which was one of the reasons for the abandonment of the citrus orchards which formerly were<sup>sited</sup> here. During such floods, fertile silt is deposited on the lands, replenishing the fertility of the soils.

The lucerne is never grazed on the land but is periodically cut for hay making, and is used mainly for Autumn and Winter feeding when the natural grazing is poor. Apart from hay, however, lucerne is used also for stall greenfeed for the dairy cows.

The lucerne is mown using a tractor drawn mower, when about  $\frac{1}{3}$  in flower when it is considered best for hay making, 6 heavy mowings being obtained in a normal year.

OATS:

The area devoted to oats varies from year to year depending on climatic conditions and <sup>farm</sup> requirements but normally at least two of the undifferentiated lands (Map 17) are sown with oats each year.

It is grown as a winter greenfeed and for hay. It is sown in March depending on suitable autumnal rainfalls, at staggered intervals to ensure a longer grazing period. The

oat/.....

oat fields are grazed for 2-3 hours each day, mainly by the dairy cows, during the late autumn and winter poor grazing season, 4-5 grazings normally being obtained. If the season is favourable the surplus oats is mown for hay making, <sup>and</sup> used in stall feeding in summer.

In some years leguminous crops such as vetches are sown together with the oats which increase the grazing value as also the fertility of the soils. In some years, on the other hand, wheat replaces oats and is used in the same manner.

#### COWPEAS:

Like lucerne this leguminous crop is a valuable source of protein matter and is an excellent soil building rotation crop for the winter cereal crops. The crop is used as a greenfeed for dairy cows and for hay during the summer months. It is sown at staggered intervals in November, depending on the Spring rain-falls. The area devoted to the crop fluctuates from year to year and in some years it is replaced by soyabeans.

The cowpea lands are grazed for a few hours each day and any surplus is again cut for hay. In addition the crop is cut for green stall-feeding for dairy cows.

#### MAIZE:

The maize crop on Mosslands occupies one land of about 6 morgen each year. It is grown mainly for the grain used for labour rations. The stalks, however, are grazed by the cattle after reaping, or are used in mulching the orchard soils.

#### PROPOSED ARTIFICIAL PASTURES:

Within the next few years artificial pastures of Setaria, Napier and Kikuyu grasses will be established on the river land noted in Map 17. Since these pastures will be served by water from the irrigation dam, they will materially increase the grazing capacity of the farm in winter, especially since any surplus will be mown for hay to build up a reserve of fodder for poor seasons.

HAY/.....

HAY MAKING:

As on most farms of the higher rainfall region of Albany and Bathurst, the very changeable weather is often a limiting factor in hay making. No facilities for indoor hay drying are available on Mosslands and the mown material must lie on the lands for a few days to dry before being stacked. A few hot and dry days are desirable but quite often rainy conditions appear at short notice when a hay crop may be entirely ruined.

FUTURE:

Apart from the establishment of the artificial pasture lands, no extension of agricultural land is planned, the present area being considered ample for the needs of the farm.

FARM TRACTION AND TRANSPORT:

For farm haulage 2 light ox-waggons are available as also a light motor-truck, and a heavy lorry which are ample for farm transport needs. In addition 2 modern cars are kept on the farm to serve for business and pleasure.

Ploughing, cultivation and haulage is entirely mechanised, using two tractors. These are light vehicles (Ferguson make) and are easily manoeuvred, especially in the cultivation of the orchards, and are more desirable than a heavy vehicle for the type of work to be done on Mosslands.

FARM POWER:

For farm power production 5 internal-combustion engines are in use. Two of these plants, diesel engines, are used in pumping water for irrigating the orchards and for providing the homestead F with household water. (The Lot 2 homestead, F<sub>1</sub>, is served by a fountain in the Kloof immediately adjacent).

Two of the plants, smaller engines, supply the two homesteads with electricity for lighting purposes. The fifth plant is used in conjunction with a grinding mill used for crushing maize. The hay and greenfeed shredding machine is hand operated on Mosslands.

FARM/.....

FARM LABOUR:

The farm labour complement is made up of the farmer, his two sons and 15-20 male Native workers who together with their families number in all over 100 persons. The Native women cultivate maize and beans in kraal gardens (Map 17) ploughed and sown under the farmer's guidance using the farm's mechanised implements and seeds.

In addition, depending on their personal preference, the permanent workers are allowed to cultivate a stretch of plough-land to supply their food requirements. Otherwise they draw weekly rations from the farmer. At present two workers are cultivating their own lands while the remainder prefer to draw rations. Furthermore each family is allowed to graze 2 or 3 head of cattle on the farm for their own use, while they also consume the surplus skimmed milk from the dairy. All these advantages offered to the workers have led to a stable and contented labour force.

The 15 permanent farm workers are gainfully employed at all times with the mixed farming system (of Watermeet) either in dairying, crop production or in the orchards. The women are employed from time to time on a piecework basis for hoeing, reaping of crops and in picking fruit.

Farm labour, together with machinery depreciation and fuels constitute the major channels of expenditure on Mosslands. The salaries paid to the permanent labourers and to the pieceworkers are similar to those quoted in the case of Mayfair.

HOUSING:

The native families are housed in typical wattle and daub huts which they construct for themselves. These huts are situated on a hillside just to the East of the Birmingham New homestead, F, conveniently close by and yet out of sight from the house.

The Birmingham New homestead, F, is situated above the sloping citrus orchard overlooking the Kariega River valley and has an extensive view of the surrounding hill country. The

house/.....

The house is a brick-under-iron bungalow-type house of 6 rooms, surrounded by a well kept flower and vegetable garden. This homestead is the main control point of Mosslands, and close by to it are the cow byre, dairy and other farm sheds (S).

The homestead on Lot 2, F, now occupied by the farmer's elder son is in contrast a pretentious structure, which was erected during the prosperous ostrich feather era prior to 1914. The house is built of stone, (Witteberg quartzite,) cheaply quarried on the farm, which has been plastered and white-washed, and has an iron roof. The building has a central double storeyed section on either side of which a wing juts out containing a single lofty room. Although the house is beyond its prime and the formal Italian garden, which it formerly overlooked, has fallen into disuse it remains an impressive feature in the landscape and one worthy of preservation.

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MAYFAIR - FERNROCK.

A PINEAPPLE AND BEEF CATTLE FARM OF BATHURST.

INTRODUCTION:

The farm unit Mayfair - Fernrock is devoted to the cultivation of pineapples, beef cattle ranching and small scale dairying and is the property of Mr. D. Jones-Phillipson. It comprises two units which have since 1928 been under the single ownership of the present farmer and for convenience the farm is hereafter referred to simply as Mayfair.

The two units together cover an area of some 1,200 morgen of land situated in the Northern sector of the Bathurst Division. The farm is bounded on the North by the meandering Kap River and on the Southwest by the roadway linking the railway stations at Martindale and Trappes Vallwy and is approximately 27 miles by road from Grahamstown. (Map 7).

The early history of the farm is obscure. It does not appear as a land grant on the maps depicting the location of the 1820 Settlers and according to the farmer it was settled at a slightly later date and was originally a portion of a larger farm owned by a farmer by the name of Joseph Cawood, a son of an 1820 settler. The land was apparently used primarily for cattle grazing although sheep appear to have been important also. In addition the farm was considered favourable for the grazing of ostriches during the ostrich feather boom.

During the period 1910-20 the kloof which bounds the farm on the South-East and known as Diamond Kloof (Map 18) was the scene of active private prospecting for gold and a considerable shaft sunk into the Witteberg formations may still be seen.

The present owner arrived on the farm in 1928 when he commenced farming with a herd of approximately 100 head of cattle for dairying and beef production. At the same time the first pineries on the farm were established which comprised some 200,000 plants of the Queen variety the fruit from which was sold on local and larger Union markets.

The/.....

The farmer, however, having qualified in wool-sheep farming at the Grootfontein Agricultural College, desired to establish sheep farming on Mayfair and forthwith 150 Merino ewes and rams were purchased and grazed on the farm.

Initially the sheep thrived but soon the disease factor, chiefly the tickborne diseases and the blowfly, the rank nature of grassland grazing and serious stock thefts by Native labourers from neighbouring pineapple farms, provided sufficient evidence that the area was not suited to sheep and in 1935 the flock was sold. The farmer, however, believes that with efficient and continuous application of modern disease preventives and by using cattle to graze off the rank growth of the grasses (e.g. Atherstone) sheep may succeed on the farm.

Thereafter home manufactured butter and the sale of a few beef steers from the 100 dual purpose Shorthorn cattle were the mainstay of the farm economy. The butter was sold on the Grahamstown and Port Alfred produce markets. With low prices obtained, however, farm profits were not considered satisfactory and from 1937-39 the pinery acreage was extended to yield a greater farm income.

In 1939, on the outbreak of war, the farmer, having enlisted left the farm in his wife's care. He returned, however, in 1943. Thereafter the chief farm occupation became the sale of fresh milk from the herd of Shorthorn cows - now about 150 in number, to the R.A.F. Air Station then in operation at Port Alfred. To this end a farm some 4 miles from Port Alfred was hired for grazing and convenience in handling the product each day.

At the close of 1944, however, the herd was sold except for 40 selected cows which were to form the basis of the present cattle ranching, and with increasing prices obtained for pineapples the farmer returned to Mayfair to redevelop and extend the pineries which then contained only 150,000 plants. By 1946 the number had increased to 400-500,000 chiefly of the Queen variety of which, the greater proportion of the fruit was

sold/.....

sold to a Port Elizabeth canning factory.

During 1950, with the reintroduction of pineapple exports to the U.K., the farmer despatched the first export fruits from Mayfair although the greater portion of the crop (85%) was still sold to the canning factory. This proportion persists at the present day.

By steadily extending the pineries the number of plants established today has reached 400,000 of the Cayenne (Giant) variety and over 1,000,000 of the Queen.

Concurrently the beef ranching herd has been built up and the present farm landscape emerges therefore with the cultivation of pineapples, as a cash crop, the major farm occupation, complemented by cattle ranching with approximately 400 Afrikaner Shorthorn cross cattle for the sale of young steers to beef farmers and small scale dairying primarily for home use.

(NOTE: The farm unit Mayfair comprises camps A, B, D, G and H, and Fernrock camps C, E, F, I, J and K as illustrated on Map 19).

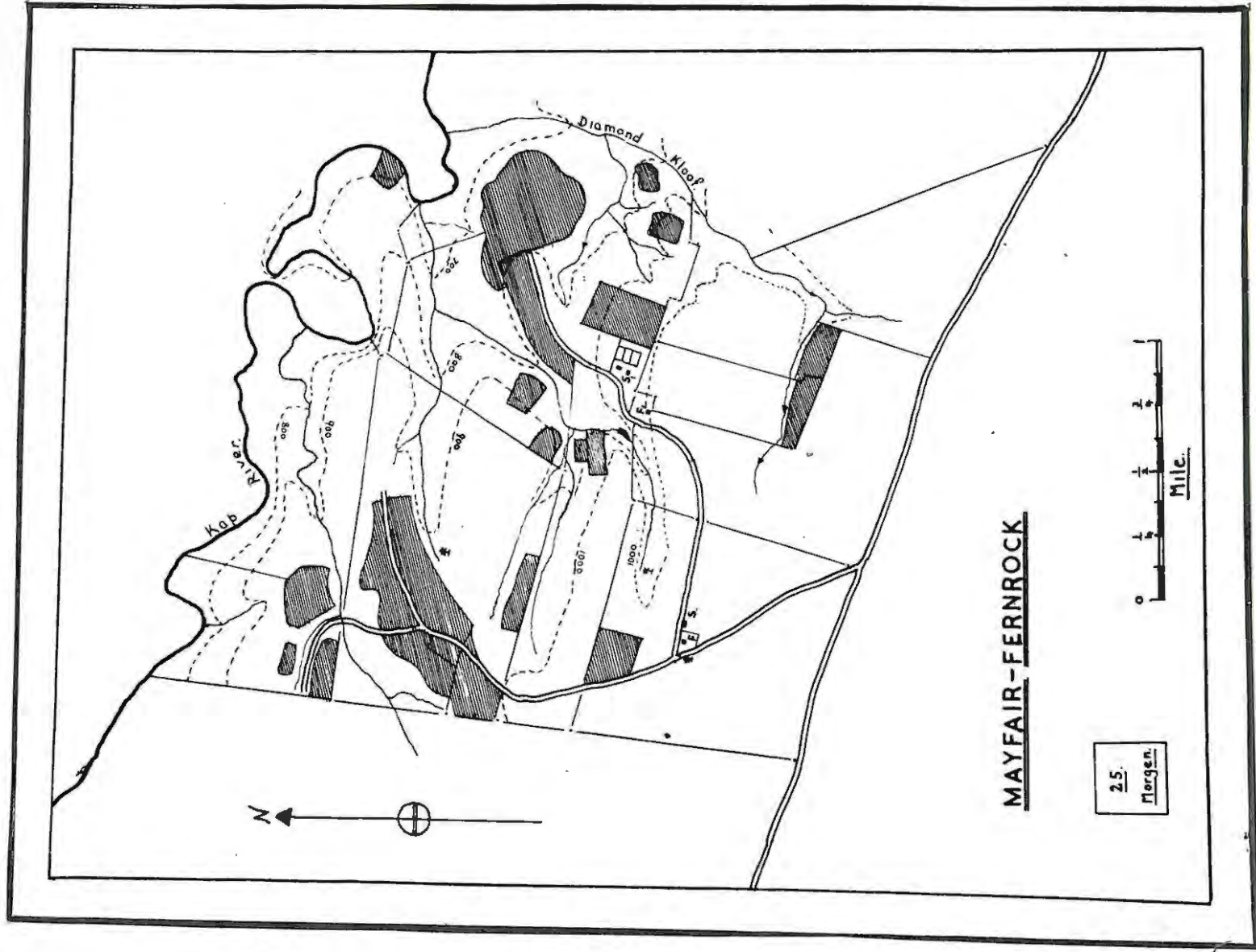
#### GEOLOGY AND RELIEF:

Geologically Mayfair falls within the area of truncated and peneplaned folded Bokkeveld and Witteberg formations of the Cape System dissected in this area by the Kap River and its tributaries.

In broad outline it may be observed that the formations occupy a wide truncated anticlinal structure with the Bokkeveld formations occupying the northern half of the farm and the younger Witteberg formations the southern half.

Physiographically the farm forms part of the larger feature - the Martindale Peneplane at about 1,000 feet above sea level. Across the northern boundaries of the farm the meandering Kap River has entrenched itself in a narrow steep-sided valley. It is joined by northward and eastward flowing tributaries which have cut back into the less resistant Bokkeveld formations dissecting the peneplane surface into a series of

valleys/.....



MAP 18.

valleys and ridges as illustrated in Map 18. For the most part, therefore, the northern portions of the farm are characterised by sloping land with valley flanks generally of a low order/ <sup>of slope</sup> but in places having a cliff-like nature. In this area the land rises from 700-800 feet in the valleys to 900 feet above sea level in the ridges.

The southern portions on the other hand are characterised by the smooth level to gently rolling peneplane surface at an altitude of 1,000 feet above sea level.

CLIMATE:

Mayfair is situated some 12-14 miles inland from the coast on the inland margins of the frostless coastal belt. Its climate is characterised by moderate summer and winter temperatures with a low frost frequency and a mean annual rainfall of about 22 inches.

TEMPERATURE:

Accurate temperature values are not available for the farm but statistics for Langholm at an altitude of  $\pm$  1,000 feet (Mayfair  $\pm$  1,000 feet) and about 6 miles to the South-West, may be included here to give some idea of the prevailing conditions on Mayfair.

From temperature tables the following features emerge for Langholm for the period 1925-1932 (Schuman 1941).

(a) Mean Annual Temperature - 64<sup>o</sup>F.

(b) Mean Seasonal Temperatures.

Spring (S.O.N.)	62.5 <sup>o</sup> F.
Summer (D.J.F.)	70.0 <sup>o</sup> F.
Autumn (M.A.M.)	65.5 <sup>o</sup> F.
Winter (J.J.A.)	58.3 <sup>o</sup> F.

(c) Mean Seasonal Maxima and Minima.

	<u>M. Maxima.</u>	<u>M. Minima.</u>
Spring (S.O.N.)	72 <sup>o</sup> F.	52 <sup>o</sup> F.
Summer (D.J.F.)	79.5 <sup>o</sup> F.	60 <sup>o</sup> F.
Autumn (M.A.M.)	75 <sup>o</sup> F.	56 <sup>o</sup> F.
Winter (J.J.A.)	67 <sup>o</sup> F.	48 <sup>o</sup> F.

(d) Mean Seasonal Absolute Temperatures.

<u>Maxima:-</u>	Spring	91.5 <sup>o</sup> F.	<u>Minima:-</u>	Spring	46.0 <sup>o</sup> F.
	Summer	94.2 <sup>o</sup> F.		Summer	52.0 <sup>o</sup> F.
	Autumn	91.8 <sup>o</sup> F.		Autumn	48.7 <sup>o</sup> F.
	Winter	83.8 <sup>o</sup> F.		Winter	42.9 <sup>o</sup> F.

(e) Some Absolute Temperatures:

- A. Maximum - 111<sup>o</sup>F. (1927).
- B. Minimum - 35<sup>o</sup>F. (1926).

(f) Mean Annual and Daily Ranges.

- M.A.R. 12<sup>o</sup>F.
- M.D.R. 17.8<sup>o</sup>F.

It may be suggested, therefore, that on Mayfair mean annual temperatures are typically moderate ( $\pm 64^{\circ}\text{F.}$ ) with warm to hot summers ( $\pm 70^{\circ}\text{F.}$ ) and mild to warm winters ( $\pm 58^{\circ}\text{F.}$ ) with a moderate mean annual range of  $\pm 12^{\circ}\text{F.}$  Really hot conditions may be experienced in the summer days with a mean maximum temperatures of  $\pm 80^{\circ}\text{F.}$  while on occasions maximum temperatures exceed  $90^{\circ}\text{F.}$  Very hot days, however, are frequently mitigated by cooling sea breezes from the coast, according to the farmer.

Winter days on the other hand are warm ( $\pm 65^{\circ}\text{F.}$ ) with cool nights ( $\pm 42^{\circ}\text{F.}$ ). The winter temperatures rarely descend to below  $37^{\circ}\text{F.}$  except perhaps in the valley floors where temperature inversions are experienced. For the most part, therefore, the farm is frost free for the whole year, and even in the valleys the farmer notes that only 1-2 moderate frosts are experienced annually. Since the cultivation of the frost sensitive pineapple is the major farm occupation here, the frostless regime of the majority of the farm is especially significant.

RAINFALL:

Rainfall records have not been kept on Mayfair and values for Langholm must suffice to obtain an impression of

the/.....

the prevailing conditions.

At Langholm the mean annual rainfall over the period 1927-1949 was  $\pm$  22 inches distributed over the year as follows:-

TABLE 24:    Langholm Mean Monthly Rainfall for 23 years up to the end of 1949.

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	YEAR.
1.9	2.1	2.9	1.9	1.4	1.1	1.0	1.0	1.9	2.6	2.3	1.7	21.7

From table 24 it may be observed that the rainfall is distributed fairly evenly over the whole year but with a slight balance in favour of the summer half-year (Summer O - M = 13.5", Winter A - S = 8.2") There are typically two maxima of rainfall in the Spring and Autumn with peaks in October and March respectively.

The farmer observes that since pineapples do not necessarily require high rainfall for successful cultivation the amount of effective rainfall on Mayfair is sufficient for the cultivation of the crop under dryland conditions.

The variation, reliability and intensity of the rainfall may be expected to follow the general pattern for the area as a whole and need not be repeated here.

WINDS:

VEGETATION:

The natural vegetation of Mayfair belongs to the Valley Bush and Grassland vegetation types.

As illustrated on Map 19 it may be observed that the grassland occupies roughly 2/3rds of the area grading into the valley bushland over the northern 1/3 of the farm. In addition the valley bush extends up the watercourses, as illustrated, into the true grassland regions over the southern portions of the farm. As noted in the case of Mosslands, the bushland has been considerably thinned by animal grazing and

chopping/.....

chopping out and really dense stands are today encountered only in the steep slopes and ravines in the Kap River valley. Valuable timber trees such as the Yellowwood and Sneezewood have largely disappeared from the bushland, having been chopped out for building material, fence posts and fire wood. The typical bushland elements noted earlier are encountered here and need not be repeated.

The grassland area extends across the flat peneplane surface in the south of the farm and reaches out northwards along the ridges of the dissected country in the northern portions, where the grassland grades gradually into the bushland. The latter, today, contains fair stretches of grassland where the bush has been cleared. As in the case of Moselands the grassland contains scattered bush and low tree elements of which the Acacias are most typical as well as characteristic members of the Fynbos vegetation type. The tussock grasses are normally closely growing reaching a height of 4-6 inches but are up to 18" high in the seeding period. The grassland is composed of the commonly occurring grasses of the region such as Themeda and Eragrostis together with many others of lesser importance.

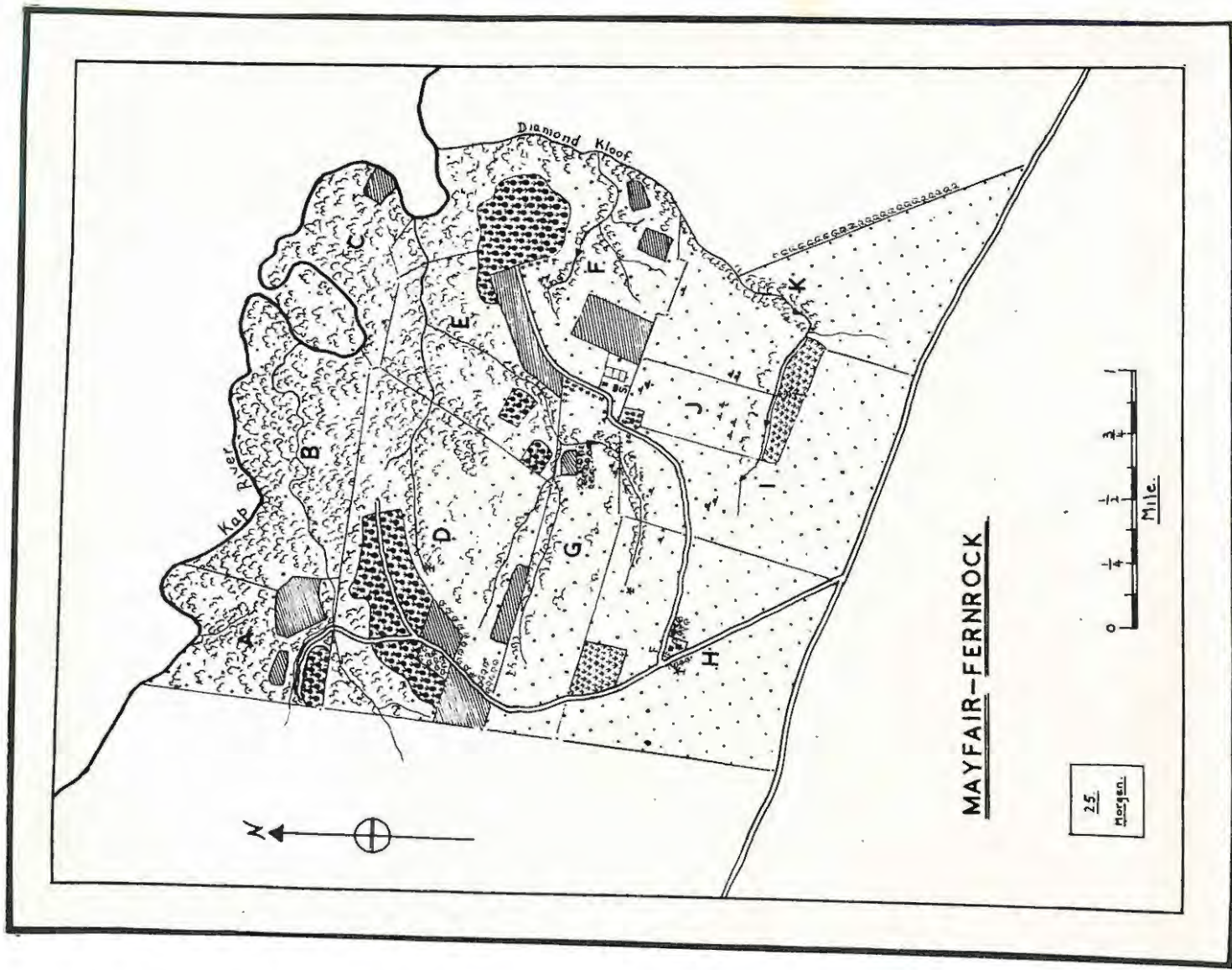
In the steep ravines of the Kap River valley succulents are characteristic while the arborescent species of Euphorbia are also encountered in these areas.

#### LAND USE AND THE FARMING SYSTEM.

##### INTRODUCTION:

The farming system employed on Mayfair is essentially mixed. In this case the major features are the cultivation of pineapples as a cash fruit crop together with the ranching of a herd of Shorthorn-Afrikander crossbred cattle for the sale of young steers and the grazing of a herd of Friesland cows for milk and cream production mainly for use on the farm. In addition, all cultivated land not used for pineapples, is devoted to the growing of fodder crops for the cattle such as

oats/.....



MAP 19.

oats, cowpeas artificial pasture grasses and sweet potatoes together with maize produced both for Native rations and for cattle feed. All such crops are utilized on the farm and are not produced as cash crops.

### PINEAPPLE GROWING ON MAYFAIR.

#### INTRODUCTION:

The history of pineapple cultivation on Mayfair has been briefly traced above and need not be repeated here. It is interesting to note, however, that pineapple growing has come to be the major occupation here not merely through a personal preference for this type of farming but more by that prime factor which governs man's activities - the profit motive. At the present time, the farmer observes, pineapple growing is the most profitable practice, which the environment makes possible, in lower Albany and Bathurst, and this is the chief reason for this type of farming on Mayfair.

It should be noted at the outset, however, that although the choice of pineapples has been determined by the profit to be obtained from the sale of the fruit, the growing of the crop is coupled with sound scientific farming practices which improve from year to year with experience, and tend to bring the farm into close adjustment with the possibilities and limitations of its environment. In fact there appears to be little evidence here of the frantic ploughing up of land without due consideration of soil depletion and erosion especially, which has apparently characterised many farms in the region since the onset of the pineapple boom.

#### AREA DEVOTED TO PINEAPPLES:

The pineapple lands today occupy some 60-65 morgen of land or 5% of the total farm area, situated on gently sloping land in the northern broken country of the farm as illustrated on Map 19.

The total number of plants at present established on these lands is approximately 1,410,000. The farmer observes,  
that/.....

that this total is above the average, for the Divisions of Albany and Bathurst, which he estimates at from 500,000-750,000 plants per farm. It is, however, considerably below that of some of the larger producers in the region. The farm may be considered, therefore, as a good slightly above average producer.

The area under pineapples is likely to expand in the near future both to increase production and to ensure continued production from the pineries whose useful life is usually from 6-8 years. Extensions are at present in operation over the stretch of land south of the right arm of the forking roadway in camp D. where approximately 250,000 plants are to be established. Future extensions, according to the farmer, will occupy the gently sloping land of the flanks of the broad ridge in the S.E. sector of camp D.

THE PINEAPPLE PLANT AND VARIETIES CULTIVATED:

The pineapple plant (*Ananas sativus*) is a native of the tropical regions of South America (Clark 1925). The plant is low growing reaching a height of some 2-3 feet and consists of a rosette of radiating narrow, stiff and sharply pointed leaves. Clark notes further that the plant throws out a single flower stalk, from the centre of the rosette, the flower of which resembles a small pineapple with small violet flowers projecting from under the bracts. Five to six months after the appearance of the flower head, the fruit is fully developed and is ready for picking. A flower stalk will bear only one fruit, but when the fruit is mature, hitherto dormant suckers begin to grow out from the base of the plant and they in turn produce fruit.

On Mayfair, as in the pineapple growing region of the Eastern Cape as a whole, two varieties are cultivated viz. the Queen and Smooth Cayenne the fruit of which, weigh from 1-3 lbs. and 3-8 lbs respectively.

On Mayfair the total number of plants of both varieties, as noted above, is at present 1,410,000, made up and distributed as shown in the table below:-

TABLE/.....

TABLE 25: PINE VARIETIES BY AGE GROUPS:

MAYFAIR LANDS.			FERNROCK LANDS.	
	Age.	Number.	Age.	Number.
<u>Queens.</u>	33 months	150,000	6 Years.	250,000
	19 "	100,000	4 "	250,000
	9 "	100,000	33 months	100,000
Total -		350,000		600,000
<u>Cayennes.</u>	33 months	20,000	33 months.	40,000
	19 "	200,000	9 "	100,000
	9 "	100,000		
Total -		320,000		140,000

The average age at which a plant begins to bear a fruit is 18 months, according to the farmer, It may be observed, therefore, that at present there are 850,000 Queen and 260,000 Cayenne plants of bearing age and 100,000 and 200,000 non-bearing plants respectively. The staggered plant ages reflect the necessity for regular extensions of the pineries to ensure continuous production.

The Queen pineapples are mainly consumed as fresh fruit and are the main variety exported, although considerable quantities are canned. The Queen pineapple has better eating qualities and flavour than the Cayenne and is smaller in size, which makes it more desirable for export and for fresh fruit sales on the home markets. (c f. small oranges on Mosslands). In addition the fruit is less easily damaged by handling and transportation over long distances than the Cayenne and therefore more suitable for fresh fruit sales.

The Cayenne pineapple on the other hand is mainly canned and is not favoured as fresh fruit, since it is too large and acid, according to the farmer, and lacks the flavour of the Queen. Further it does not keep as well as the Queen during handling and transportation.

It should be noted, however, that the Cayenne variety is rapidly gaining favour on Mayfair as it is on many farms in

the/.....

the area, according to the farmer.

If we consider the present fruit yields on Mayfair which are 3 tons per morgen for the Queen variety and 7.5 tons per morgen for the Cayenne together with the planting rate of 12,000 and 15,000 plants per acre (2 and 1/9th acres = 1 morgen) respectively it may be observed that Queens at present contribute about 60% of the crop by weight and the Cayennes 40%. In the near future, however, when the younger plants commence bearing, Cayennes and Queens will contribute roughly equal weights even though there are only about half the number of Cayenne plants as Queens. This reveals the greater productivity of the former variety, as compared to the latter, due to the Cayenne's greater weight and size and the denser planting rate. The planned extensions of the pineries will be devoted, in addition, to Cayennes and it is apparent therefore that this variety is rapidly becoming the dominant one produced on Mayfair, while the farmer intends to allow the Queens to slip gradually into the background.

The decline of the Queen may be traced primarily to economic factors according to the farmer, among which the following may be noted:-

- (i) He notes that although good prices are normally obtained for fresh Queen fruit, the demand as well as the prices are subject to fluctuations. Under contract to supply Cayennes to a canning factory, on the other hand, a constant demand and price (if slightly lower) are guaranteed on a long term basis, leading to a stable farm economy.
- (ii) The marketing of the Cayenne crop through a single, constant channel is more convenient and simpler than having to market Queen fruit through several channels as fresh fruit for which the demand is limited.
- (iii) The regulations of the Deciduous Fruit Board allow only 15% of the crop to be exported each year according to the farmer, to ensure a constant supply to the canneries and home market, which makes exporting, on the scale of  
production/.....

production on Mayfair, hardly worth while. In addition he observes, that the overseas markets, in the U.K., have recently been opened to unrestricted marketing of the canned product. It is probable therefore, he notes, that fresh fruit sales at high prices will decline, in the face of competition from the canned product unless fresh fruit prices are considerably reduced. The canned product in addition, has the advantage of a recognised uniformity, which is likely to increase demands for canned fruit rather than fresh.

It is apparent, therefore, that it is more profitable to grow pineapples chiefly for canning purposes. In this respect the Queen variety suffers the immediate disadvantage of lower productivity per unit area as compared to the Cayenne. In addition the farmer observes that the Cayenne has been found to thrive well on non-virgin, old pineapple land, while the Queen prefers virgin soils for best success. The Queen variety also requires a greater labour force because of the large amount of pruning that has to be done in it, further adding to the advantages of the Cayenne. It may be concluded, therefore, that, since the Cayenne is rapidly gaining favour with the canners, the Queen must gradually decline in importance on Mayfair in the future.

SOME ENVIRONMENTAL FACTORS AFFECTING PINEAPPLE CULTIVATION:

(a) CLIMATIC FACTORS:

Le Roux (1951) has noted that the pineapple plant does well in tropical and sub-tropical climates which are frost free, with maximum temperatures which are not excessive since it requires a fairly even, reasonably warm climate and relatively high humidity. The plant has also been found to do particularly well under conditions of mild breezes and comparatively low wind velocity and where there is a fair amount of overcast weather.

TEMPERATURE/.....

TEMPERATURE:

In the Hawaiian islands for example, le Roux observes that pineapples are produced successfully where the minimum temperatures are seldom below 55°F. and the maximum seldom above 85°F. with a mean annual temperature of  $\pm 70^{\circ}\text{F}$ . and a frost free year.

In the Bathurst area, as on Mayfair, it may be observed that the mean temperatures of the coolest months (J.J.A.) is  $\pm 58^{\circ}\text{F}$ . with the mean minimum temperature of the order of 48°F. and mean maximum  $\pm 67^{\circ}\text{F}$ . In summer on the other hand the mean temperature of the warmest months (D.J.F.) is  $\pm 70^{\circ}\text{F}$ . with the mean maximum temperature during the day of the order of  $\pm 80^{\circ}\text{F}$ . The mean annual temperature for Mayfair may be expected to be  $\pm 64^{\circ}\text{F}$ .

In comparison it is apparent, therefore, that temperature conditions are well suited to pineapple cultivation here.

As noted above high summer temperatures of over 90°F. may be expected on occasions. Such hot days, however, are normally accompanied by cooling breezes from the coast and thus have little effect on the plants and fruit. The farmer observes, however, that hot calm days do occur on occasion when sunburn damage to the fruit may result, although the plants themselves are not affected. These high temperatures are usually experienced in the early afternoon and the farmer notes that in half an hour of such conditions much damage may be done. On some farms in the pineapple region the fruit is protected by covering with wood-wool or paper caps, but according to the farmer, the amount of sunburn experienced is not sufficient to warrant such protective means on Mayfair. In general, however, to avoid the direct rays of the hot afternoon sun, west facing slopes are avoided for planting as far as possible.

The pineapple demands frost free conditions and a frost bitten pine is useless for consumption according to the farmer.

As noted above, however, frosts except in the valley floors, are rare on Mayfair and are not a limiting factor to cultivation there.

Rapid fluctuations of temperatures are undesirable, according to the farmer, since they result in physiological breakdown in the fruit. On Mayfair, however, with a moderate daily range of  $\pm 17^{\circ}\text{F}$ . and with few rapid changes this factor is not considered very important. He observes, however, that they may occur occasionally. In 1952 for example after cool moist weather in October, a scorchingly hot day ( $+ 90^{\circ}\text{F}$ .) was experienced which led to considerable damage to the fruit.

RAINFALLS:

According to le Roux (1951) pineapple growing in Hawaii is carried on with rainfalls from 25-50 inches while Clark (1925) notes that from 35-50 inches are considered necessary for success in Hawaii and Florida. He observes, however, that in the Eastern Cape growing region many growers believe that 20 inches are sufficient, but that, although the pineapple is drought-resisting and can produce a fair crop with from 15-20 inches, it is the consensus of opinion that from 25-30 inches are necessary for best results in this region. This opinion conforms with that of the farmer when he observes that from 24-30 inches would be considered suitable for pineapples. He observes, therefore, that although good crops are produced in Albany and Bathurst, as on Mayfair, with mean annual rainfalls of from 20-25 inches, it is his opinion that the East London Region has more suitable conditions for pineapple growing, and because of higher rainfall East London in fact produces better pineapples (East London 32 inches p.a.).

According to the farmer, a rainfall well distributed over the year is desirable, and since two pineapple crops are produced each year - a heavy crop in summer and a light crop in winter, slight maxima in the two crop-growing seasons September-October-November and March-April-May are also desirable,

which/.....

which it may be observed conforms admirably with the normal annual rainfall distribution. In addition a few showers are especially desirable in the summer fruit ripening season as this reduces the danger from sunburn because of the cloud canopy and increased humidity. Excessive rains at this time, however, may cause breakdown of fruit tissues.

Excessive rains at any time are undesirable since not only do they bring about soil wash on the sloping lands, but excessive moisture is undesirable for the pineapple plant since it becomes waterlogged with deleterious effects on the fruit.

The pineapple can stand a fair amount of drought, according to the farmer, since it is able to benefit from light showers and heavy dews and mists. Any moisture falling or condensing on the fluted leaves drains down into the core of the plant and thence to the soils. In fact in this respect, the pineapple has frequently been found to improve soil moisture and to raise the water table on many farms, according to the farmer, and where formerly no springs existed, water is now flowing strongly.

The ability of the pine to benefit from light precipitation is indeed a favourable feature in this area with its intermittent droughts with light showers, and fairly frequent coastal mists which may have little beneficial effects on most other crops.

#### HUMIDITY:

In Hawaii again an annual average relative humidity of  $\pm 70\%$  is experienced while in this region mean annual relative humidities of  $+ 70\%$  are experienced normally, at Bathurst and Port Alfred, and in this respect it may be suggested, therefore, that the area is suited to pineapple culture. At Mayfair and similar farms slightly further inland, humidity is ample according to the farmer, since frequent breezes drift humid sea air inland from the coast. He observes, however, that in summer with high temperature, humidity may be low and in this respect East London is also considered more favourable

with/.....

with a higher concentration of a heavier rainfall in Summer.

WINDS:

Although pineapples do not favour wind the farmer observes, that on Mayfair, with the pineapple lands located in rather broken country, the winds, which are fairly frequent, but usually not of excessive velocity, have little effect on the plants and are not considered an important limiting factor. In addition protection is provided by wind breaks of tall sugar cane, established at intervals in the upper portions of the pinneries. The farmer observes that such wind breaks should not be too close to each other or they will prevent proper air circulation in the sections they protect, as the restriction of air flow is liable to lead to sunburn on fruit.

EDAPHIC FACTORS:

The farmer observes that the pineapple will thrive on most soils provided that they are well drained as it will not tolerate waterlogging. In the first instance therefore, sloping well drained lands are most suitable. (This feature is confirmed by Le Roux and by Clark).

The grey-brown loam to sandy-loam soils of Mayfair developed from the Bokkeveld series and formerly covered (before clearing) by a mixture of bush and grass contain fair amounts of humus and organic matter, and are considered suitable for pineapple cultivation.

The farmer observes, however, that the pineapple requires an acid soil and will not thrive on those of an alkaline reaction. Le Roux notes that a pH. of 5 is desirable. The Mayfair soils are slightly alkaline due to a considerable lime content, according to the farmer, and it is necessary therefore to add plenty of acid  $(\text{NH}_4)_2\text{SO}_4$  to the soils to make them more acid and suitable for pineapples. The  $(\text{NH}_4)_2\text{SO}_4$  is applied by hand and the normal application is about 1 Ton per 4 morgen of pineapple land annually. In addition the soils have been found to be deficient in zinc and copper which affects the plants

adversely/.....

adversely. It is the practice, therefore, to apply a fraction of  $ZnSO_4$  and  $CuSO_4$  with the  $(NH_4)_2SO_4$ , which has largely overcome this difficulty.

The fertilizers noted above are applied at suitable intervals in the Spring - Autumn vigorous growing season when the plants shew best the results of these treatments.

The farmer notes that much organic matter is lost during the life of a pinery, especially on the exposed clean cultivated soil between the rows. Very little organic matter is added during the life of a pinery on Mayfair for the farmer does not favour kraal manure applications due to its alkalinity and because weed seeds in the manure tend to increase weed growth. Once the pinery is abandoned, therefore, soil building crops are sown - especially good pasture grasses (as noted later) and suitable fertilizers added - especially phosphates. The grasses remain<sup>on</sup>/the land for at least 5 years before replanting the pinery. Immediately prior to replanting, the lands are sown to a suitable legume to build up the nitrogen content in the soils. In addition a suitable application of  $(NH_4)_2SO_4$  added each year prevents the soils from becoming too alkaline.

#### THE SITING OF THE PINERIES ON MAYFAIR:

Although ideal conditions for siting the pineries are not always readily available, the pineries of Mayfair are considered to be well adjusted to major environmental features. They are situated, it may be observed, on gently sloping, low gradient (2-5%), well drained lands of valley slopes in the northern portions of the farm. For the most part they have N, N.E. or S.E. facing aspects where they face away from the scorching afternoon sun on the western slopes. In addition they are planted to avoid the slopes facing due South where they would receive too low a concentration of insolation in the low sun period of winter and where conditions are generally too damp. Although situated on valley slopes, the pineries are further seen to have been placed so as to avoid the valley floors and some 30-40 feet of the lower valley slopes in which areas

frosts/.....

frosts are wont to occur in winter due to air drainage into the valleys. Wind force is largely broken by the hill and valley relief and surrounding bushland and small plantations of Black Wattles and Pine Trees established in the area as illustrated on Map 19.

In addition to favourable location as regards the natural environment, the lands are readily accessible to heavy transport vehicles over low-gradient gravel roads making for easy transportation of the crops which are readily damaged in transit over poor and steep roads.

#### PROPAGATION AND PLANTING SYSTEMS.

##### PLANTING STOCK:

Pineapples are not usually propagated from seed but from several parts of the plant itself. These are:-

- (i) Stumps - a sucker that has borne a fruit.
- (ii) Slips - shoots which develop from buds on the flower stalks.
- (iii) Suckers - shoots which develop from buds in the leaf axils at the base of the plants (le Roux).
- (iv) Crowns - the crown which develops on the top of the fruit.

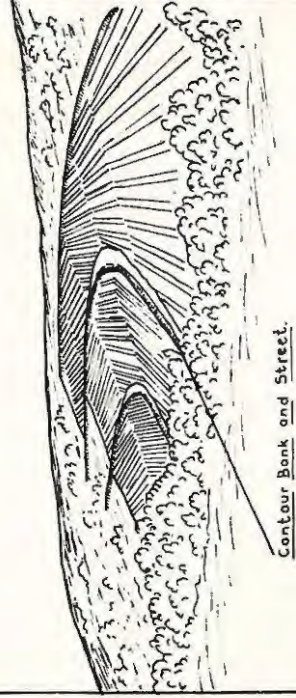
Of these, stumps are preferred for the propagation of Queens while slips and suckers are favoured for the Cayenne. Shortages of planting stock, however, often necessitate the use of suckers for Queens and crowns and stumps for the Cayennes.

The farmer observes that although highly desirable, selection of planting stock is often difficult due to shortages arising from the large demand at the present time within this region.

##### PLANTING SYSTEMS:

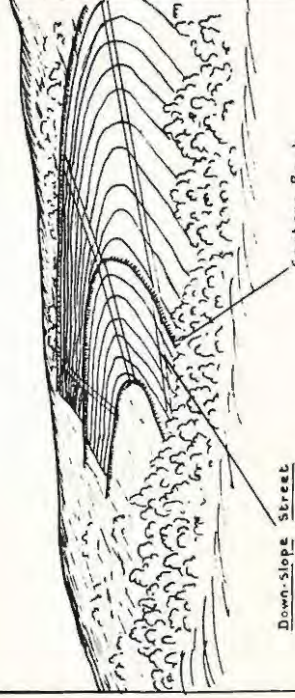
The soils of prospective pinneries are worked in winter in preparation for spring and early summer planting. They are subsoiled (18-20") ploughed, harrowed and disced to break them up into a suitable texture and to destroy all weeds and grass as far as possible. After due consideration has been taken/.....

Rows Planted at an angle to the Contours.



Contour Bank and Street.

Rows Planted along the Contours.



Down-Slope Street

Contour Bank

Pineapple Planting Systems.

DIAG 4

taken of the natural environment of the prospective lands, careful planning of layout pattern is essential, since with sloping lands and a clean cultivated crop, special attention must be paid to possible soil erosion.

In the Mayfair pineries two lay-out patterns are at present employed.

The older system, now largely out of favour on the farm, involved the pegging out of contour lines at a 5 foot vertical interval, along which contour furrows and banks were constructed to prevent soil wash. These furrows have a fall of 1 : 100 along their length to allow for the easy removal of excess run-off waters from the pineries. In this system the pineapples were planted in rows, which follow the contours of the land as closely as possible. Unbroken, these rows are very long, and to facilitate short portages of the bulky crop in the picking season, the rows are broken at intervals by down-slope streets. These streets, however, unless constantly tended, are apt to become the sites of serious soil erosion and are a definite disadvantage. Further, since the rows are often not exactly on the contours, down slope drainage lines develop, down which the excess water flows, washing out plants and carrying soil to the contour furrows which become silted up and liable to breach with consequent damage to down slope pineries.

At present, however, fully half the area of the pineries is planted on the new system. Here contour lines are established in the same way as noted above and at a similar interval but instead of a narrow contour furrow a 12 foot wide, inward sloping, terrace is constructed which not only carries all excess waters with ease but also serves as a contour street with the rows of pineapples planted at an angle of 30-40° to the terrace in a herring-bone pattern as illustrated in diagram 4. In this system rows are short, down-slope streets are unnecessary and the herring-bone pattern effectively controls rapid run-off and is found more efficient in draining the pineries.

These/.....

These two systems are illustrated in diagram 4.

ESPACEMENT OF PLANTS:

QUEEN VARIETY:

On Mayfair queens have been found to give best results when planted in single rows, 4 feet apart, and with plants 6-9" apart giving about 12,000 plants per acre. The single rows, although not as effective in shading the soils in between the rows as a double row, makes for minimum cultivation between plants, facilitates animal drawn cultivators and makes pruning of the plants easier.

CAYENNE VARIETY:

This variety on the other hand is always planted in double rows 4-5 feet apart with each pair of rows 2 feet apart and with plants in each row 1 foot apart, giving 15,000 plants per acre. The heavy fruit of the Cayenne necessitates double row planting since the plants support each other and prevent the fruit from toppling over.

Le Roux notes that close spacing of plants is desirable since the fruit is shaded, plants support each other preventing toppling of fruit and sun scalding. They are better protected against wind. The soils are shaded, making for even soil temperatures which favour soil organisms. Weed growth is retarded by shady conditions and the crowding of plants, while fertilizers are more easily absorbed since the plants have limited root systems.

PLANTING SEASON:

The planting season extends from September to December in the sharp growing season of Spring and early Summer with the Spring rains and rising temperatures.

Since the age of an average pinery is 6-8 years on Mayfair, the pineries are extended each year to ensure continuous production. The average yearly planting varies widely depending on the availability of labour, and planting material and on suitable climatic conditions.

CULTIVATION/.....

CULTIVATION OF THE PINERIES:

The pineapple tolerates its own company but will not thrive in competition with weeds, and clean cultivation is thus an essential feature. A large labour force of Native women ( $\pm$  20) is kept constantly busy hoeing the pineries and clearing weeds. In youthful pineries, before the root systems have developed to any extent, a horse-drawn scarifier is used in cultivating, whereafter a horse-drawn ridger, which scrapes only the surface and does not rip up roots, is utilized. The ridger builds up the soil in the rows and helps to support the top-heavy plants.

The farmer observes that although mulching the soils between rows with paper strips, as is done in Hawaii, is exceptionally effective in controlling weed growth the method would prove too expensive at present with fair amounts of cheap Native women labour still available for hoeing and weed clearance.

THE DISEASE AND INSECT PEST FACTORS:

The farmer observes that the pineapple growing regions of South Africa are remarkably free from diseases and insect pests which here rarely play a major role in limiting crop production. This advantage is in strong contrast to the conditions prevailing in Hawaii, for example, where diseases and insect pests are a serious limitation.

There the average life of a pinery is only 2-3 years while here a pinery, if well cared for and fertilized regularly, may profitably bear for up to 10 years or more.

The farmer notes that the only serious pests affecting pineapples here are the Mealie bug and scale insects. These are affectively controlled, however, by such natural enemies of the pests as for example the ladybird.

Little is as yet known of such diseases as Blackspot, Yellowspot and of wilt, which affect the fruit but research is at present being conducted into these diseases at the Bathurst Pineapple Research Station. The farmer observes, however, that the diseases have up to the present not been of any serious

importance/.....

importance on Mayfair.

FRUIT CROPS:

Although the fruit may ripen at any time during the year, the bulk of it is produced in two major ripening seasons giving a heavy summer crop in January and February and a light winter crop in July and August. The summer crop normally contributes upwards of 70% of the total annual crop and the winter 30%, a feature relating mainly to more favourable growing conditions in the spring and early summer.

A factor of extreme importance in the ripening seasons, is the farmer's experience and judgment in determining when the bulk of the fruit is ready for picking. Fruit sold locally in e.g. Grahamstown, Port Alfred or Port Elizabeth, is picked when ripe or 75-100% yellow rather than green, while fruit sold further afield e.g. in Cape Town or Johannesburg or for export, is usually picked slightly green so that it may ripen in transit.

In the summer season especially, fruit ripens rapidly and irregularly and several peak periods, each of several day's duration, are experienced during which the picking operations are intensified.

LABOUR:

In the picking seasons a large labour force is essential to manage the rapidly ripening fruit and all available farm labour is drafted into the pineries at these seasons. In addition a large labour force of Native women pieceworkers (the wives and daughters of the permanent labourers) is hired for this work and usually over 30 workers are employed in picking and handling the fruit crops. A labour shortage at these seasons is a serious limiting factor. The farmer rarely experiences such shortages, however, since the large force of Native women living on the farm are a readily available labour source at all times.

PICKING/.....

PICKING THE FRUIT:

The pineapples are picked by experienced Native women pickers dressed in stout canvas aprons or more typically in their red-ochre blankets which protect them against the spiny plants.

It is interesting to note that the women pickers are preferred since they carry their picking baskets on their heads leaving both hands free for picking. Male workers, on the other hand, for traditional reasons will not carry baskets on their heads and with the baskets slung and held across their backs on sticks picking is less efficient. As Metrowich (1953 p. 83) observes "it is a picturesque sight to see these women, often with babies on their backs, passing down the long ranks of pines. Swaying from the hips, they stoop and with rhythmic action, insert their forked stick beneath a pine". A quick twist, an accurate cast and the pineapple wrenched neatly from the plant, sails deftly through the air and lands in the basket poised on the picker's head." This procedure is followed mainly in the case of fruit destined for canning since it need not be as carefully handled as that for export or for the South African fresh fruit market. It is picked into unlined baskets, but as far as possible bruising of the fruit is guarded against especially with respect to the Cayennes which are readily damaged.

The export fruit and that for the Union produce markets is very carefully handled to prevent bruising. This fruit is picked into wood-wool-lined baskets. It is not picked roughly but is carefully cut from the stalks. In addition about an inch of the stem is retained on the fruit for export, which stem later acts as a cushion when packed in export cases.

The pineapples are bulky and heavy and are easily damaged with much handling. To facilitate short portages and to minimise handling, therefore, a central collecting centre, where the fruit is weighed, graded and packed is set up in the pineries and moves from point to point as the picking advances.

To/.....

To this collecting centre come the women carrying comfortably filled baskets of fruit weighing anything up to 60 lbs and carefully lay the export and home market fresh fruit on the ground while piling the canning fruit in small heaps.

In the picking seasons work commences immediately after the fruit is free of dew and continues throughout the day until sunset with an hours break for lunch at mid-day.

The fruit destined for sale as fresh fruit is carefully examined for quality and freedom from disease, sunburn or bruises, after which it is weighed and graded into weight and size groups ready for packing. The export fruit is packed into wooden cases with wood-wool padding to prevent damage to fruit in transit. The numbers of pineapples per export case varies from 26-16 for the Queen and from 6-10 for the Cayennes. Fresh fruit for the home market on the other hand is packed without padding in cardboard cartons or wooden cases since this fruit is handled to a lesser degree in its passage to the consumer.

Canning fruit on the other hand is handled in bulk. The readily damaged Cayennes, however, are transported in special lug-boxes while the Queens are carefully stacked directly on to the lorry for transporting to the railway station where they are transferred and packed loosely into fruit trucks for transport to the factory.

#### MARKETING THE FRUIT:

Fifteen percent of the annual crop from Mayfair is normally sold as fresh fruit 5% being sold on home markets while 10% is exported to the U.K. The remaining 85% is sold under contract to a canning factory in Port Elizabeth.

Fruit sold on the home markets is administered through the Bathurst Farmer's Union and is sold chiefly in Cape Town, Johannesburg, Grahamstown and Port Elizabeth.

The export fruit is also sold through the Bathurst Farmers' Union, which handles the bulk of fruit exported from this area, by conducting an annual pool. In Britain the fruit is sold through an agent - the Francis Nicholls Organisation.

This/.....

This organisation has administratively divided the U.K. into several sale zones each centred on a convenient population centre where a primary salesman administers the sale of the fruit in his zone. This system ensures complete coverage of the major marketing centres in Britain and avoids over or under supply and fluctuating prices. The farmer observes that the major marketing centres are in London, Birmingham, Bristol, Cardiff, Glasgow, Hull, Leeds, Liverpool, Manchester, Newcastle, Sheffield and Southampton, each of which is supplied direct by road or rail from the port of entry at Southampton.

At present the quantity of fruit sold from this farm on the home markets, for export and for canning, in a normal year may be expected to be approximately 600 tons of fruit of both varieties, of which 30 tons are sold on the home market, 60 tons for export and 510 tons to the canning factory. In the future, however, as noted above, it is likely that fresh fruit sales are likely to decline with greater concentration on production for canning. The present factory contract for Mayfair guarantees the sale of approximately 900 tons of fruit/<sup>p.a.</sup>to the end of 1964 and it is likely therefore that production will expand to that figure over the next 10 years.

#### YIELDS:

As noted earlier, the yields expected from the two varieties are 3 tons per morgen for the queen and 7.5 tons per morgen for the Cayenne. These yields compare favourably with the average yields obtained in the region as a whole. The yields contrast sharply with those obtained in 1929 for example. In that year an average of 1 ton per acre was obtained from the Queens and 4 tons from the Cayennes. This remarkable increase in yields is attributed by the farmer to better planting and cultural methods. Furthermore he believes that these yields may be further increased as research reveals further improvements in cultivation methods.

#### TRANSPORTATION AND COMMUNICATIONS:

From Map 7 it may be observed that Mayfair is well served/....

served by both rail and road transport routes. The farm is situated some 2 miles from the railway station at Martindale while in addition a twice weekly Road Motor Bus service passes it.

The pineapple fruit is perishable and the farmer naturally desires to have the fruit off his own hands as soon as possible. Efficient transport facilities are thus an essential factor in the growing of the crop.

The Mayfair pineapples are normally despatched on the same day as they are picked. They are transported from the pinery collecting centre by lorry to the railway station at Martindale where special storage sheds have been erected to shelter the fruit that is despatched here from the surrounding farms. From this point it travels in cooled, but not refrigerated, fruit trucks to the home markets or to Port Elizabeth in the case of export and canning fruit. In Port Elizabeth the canning fruit is delivered direct to the factory in the trucks while the export fruit travels direct to the pre-cooling chambers in Port Elizabeth harbour. There it is received by a Bathurst Farmers' Union agent and is rigidly inspected for disease or blemish by a Government Fruit Inspector.

The export fruit is transported from Port Elizabeth in fast refrigerated Mail vessels which leave the Port once weekly. On its arrival in the U.K. 19 days later the fruit is offloaded within 12 hours, into lorries or railtrucks waiting on the quayside which carry it direct to the major marketing centres already noted above.

#### INCOME FROM PINEAPPLES:

In most years the income derived from the sale of fruit represents at least  $\frac{2}{3}$  of the total farm income.

Under the present prevailing prices for pineapples the income obtained is decidedly satisfactory the gross amount received varying between £6,000 and £7,000 annually.

Farm expenses are heavy, however, and in 1951-52 for example they were as follows:-

Labour/.....

Labour wages .....	£ 900
Repairs to machines .....	738
Packing materials .....	700
Fertilizers .....	540
Fuels .....	600
Rates and Taxes .....	290
Sundries .....	540
	<hr/>
	£4,308
	<hr/>

From these it may be observed that farm expenses are mainly concerned with pineapple cultivation, the costs for ranching cattle being negligible in comparison.

CATTLE RANCHING AND DAIRYING ON MAYFAIR.

INTRODUCTION:

In the case of the mixed farming system of Mosslands some important features emerged regarding the grazing of cattle as a satisfactory complementary occupation to Citri-culture. These features are paralleled on Mayfair with its cattle grazing complementary to pineapple growing. To avoid unnecessary repetition of details, however, these important features are merely summarised below:-

- (a) The economic use of land not devoted to the cultivation of pineapples.
- (b) The obtaining of a complementary farm income not concentrated in a single annual cheque as is the payment for pineapples.
- (c) Insurance of a steady monthly income from the cattle should the pineapple crops fail or a slump on the pineapple markets occur.
- (d) The production of quantities of skimmed milk as an attraction to farm labour without whom the farm could not be managed.
- (e) The provision of supplies of manure for use on agricultural land.

SIZE OF HERDS:

The ranching herd of Mayfair numbers approximately 100

breeding/.....

breeding cows, 80 heifers, 1 registered Shorthorn and 3 Afrikander bulls and over 200 steers of varying age from a few weeks to 2 years old.

The dairy herd on the other hand numbers 35 Friesland milk cows, 1 Registered Friesland Bull and 20 calves.

These numbers exclude approximately 50 Native cattle grazed on the farm by the permanent farm labourers for their own use.

FEATURES OF THE FARMING SYSTEM CONCERNING CATTLE GRAZING:

GRAZING:

THE VEGETATION AND GRAZING:

The grassland forms the chief natural grazing source on the farm, the most important grasses grazed being the Themeda, Digitaria, Tritachya, Eragrostis and Panicum.

The valley bushland is important as a complementary natural feeding source especially for the ranch cattle during the winter poor grass season and during drought. The dairy cattle on the other hand are grazed almost entirely on grass-dominated grazing since certain bush elements taint the milk. These cows receive supplementary feedstuffs and hay in the winter season when the natural grazing is poor.

PALATABILITY:

As in the case of Mosslands, Mayfair possesses sour, sweet and mixed grazing determined largely by unequal distribution of rainfalls due to relief. According to the farmer the sour and mixed grazing types occupy almost 2/3rds. of the farm area and comprise the open gently rolling grassland on the high flats across the southern reaches of the farm and extending along the crests of the grass-covered ridges in the broken country in the northern portion of the farm. These elevated areas presumably receive slightly higher rainfalls than the valley floors over which the sweeter bushland grazing is encountered making up the remaining 1/3 of the farm area.

NOURISHING/.....

NUTRITIONAL VALUE OF THE GRAZING:

Typical of the higher rainfall region of Albany and Bathurst, the grazing, the grassland especially, is deficient in essential minerals of which the phosphates are the chief.

These mineral deficiencies are made good by the feeding of balanced medicated licks, the chief ingredient of which is calcium and phosphate-rich bonemeal. Unlike Mosslands and Tharfield, the licks are here fed in brick troughs which are kept constantly supplied, in each camp division.

The sour grasslands are deficient in protein content, according to the farmer, to a greater or lesser degree throughout the year except during the Spring season, and the dairy cattle respond well to supplementary feedstuffs containing protein concentrates such as peanut meal when grazing on grass. The Bushland on the other hand has been found to contain many leguminous elements which normally supply the ranch cattle with sufficient protein to make supplementary feeding unnecessary.

As with the grazing on the other farms considered, an annual nourishment cycle is evident here, with the grazing at its best during the Spring and early Summer and to a lesser degree in Autumn, with the greatest incidence of effective rainfall in these seasons, and declines through the period from April to August to reach its lowest ebb during the latter month.

CARRYING CAPACITY:

No part of this portion of the Bathurst Division has as yet been declared a Soil Conservation District and thus no official mean stocking rate is available. According to the farmer, however, the carrying capacity of Mayfair may be considered as 3-4 morgen / beast there being at present 500 cattle grazing off approximately 1,500 morgen. (The crown-land outspan of Round Hill covering approximately 350 morgen, adjacent to the Southern boundaries of the farm, is hired by the farmer for the grazing native cattle chiefly.)

The stocking rate varies depending on the stock type grazed. In the case of ranching cattle for example, of

which/.....

which a fair proportion (50%) are young steers under 3 years old, the quantity of grazing required is lower than for the milch cows and the ranching breeding cows. The steers are grazed at the rate of 1 beast / 3 morgen while the milch cows and breeding cows are grazed at the rate of 1 beast / 5 morgen.

The farm is not understocked, but according to the farmer, is stocked to the capacity of its grazing and its water supplies in relation to the winter carrying capacity. With normal rainfalls, further, it is wise to keep the farm fully stocked or otherwise the rapidly growing grasses tend to become rank and unpalatable if not sufficiently grazed; while since no veld burning is carried on, the rank grazing, especially in the Spring and Summer, would smother the new growth of grasses in these seasons.

The carrying capacity of the two grazing types varies also. The grassland area normally carries more stock, whereas in drought the bushland has the greater capacity. This feature indicates the importance of the valley bushland grazing in this region where intermittent droughts may be expected.

#### FENCING SYSTEM:

With stock grazing an important aspect in the farm system, the fencing and sub-division of the grazing plays a major role, once more, in farm organisation and management.

The Mayfair fences are all stock proof and constructed of stout strand and barbed wire using locally obtained sneezewood poles as fencing posts. The total length of fences on the farm is approximately 20 miles.

The farm has been subdivided into 11 large grazing camps varying in size from 50 morgen to over 200 morgen. Some of these camps in turn contain enclosures occupied by fenced agricultural lands the location of which is governed by their suitability for cultivation. In addition there are several small paddocks clustered around the milking shed S<sub>1</sub> on Fernrock conveniently situated for the handling of animals. Further the two homesteads F and F<sub>1</sub> also occupy fenced enclosures as

illustrated/.....

illustrated on Map 19.

All the camps have interleading gates of tubular metal construction mainly, which facilitates the movement of stock across the farm.

The fencing system follows a more or less regular pattern of fences aligned mainly on the farm boundaries with camp shapes varying from roughly rectangular to square. For approximately two-thirds of their length the outer boundaries of the farm may be considered as natural boundaries following major drainage lines in the North and East and the main roadway in the South. These fences when they are aligned on drainage lines follow a zig-zag pattern (not shown on Maps 18 and 19) hopping from one bank to the other to allow for a fair division of watering facilities among the bounding farms.

The fencing pattern is not entirely arbitrary, however, and certain environmental factors have been considered among which the following may be noted.

As far as possible the grassland dominated areas have been separated from the bushland to allow for easy grazing management. The land is subdivided also with special reference to watering facilities, with the camps, as illustrated on Maps 18 and 19, aligned severally along the semi-permanently flowing Kap River, or lying astride the major drainage lines on which small storage dams have been constructed, while others are served artificially by windmill operated boreholes. In addition, over the broken country of the Kap River tributaries in the North of the farm, each camp contains both a stretch of valley and highground grazing to enable the livestock to move out of the valley floors with high temperatures during the day in summer and low temperatures during the winter nights.

#### GRAZING MANAGEMENT:

A comprehensive farm plan involving a rotational grazing plan has as yet not been drawn up, the farm falling without the established Soil Conservation Districts of the region. The system on Mayfair relies, therefore, entirely on  
the/.....

the farmer's judgment and knowledge of the grazing conditions. The present subdivision of the farm is considered ample for present needs, but it is not unlikely that reorganisation of camps, especially as regards their varying sizes, will take place in the future when a plan is drawn up for the farm.

The major feature of the grazing system as regards the ranching cattle, is the rotational grazing of the grassland with the bushland areas so as to allow all the cattle a fair share of the sweeter grazing of the bushland, as a change in diet which the farmer has found beneficial to their condition. As far as possible the bushland areas are grazed during the winter and the grassland in Summer, a procedure depending chiefly upon the relative unpalatability and lower nutritional value of the sour grasses in Winter.

The milch cows on the other hand are grazed in grass camps, since although bushland grazing is sweeter, the milk product is tainted by elements in the bush. It is also more difficult to collect the animals at the milking times in the obscuring bush cover.

To overcome the lack of suitable sweet natural grazing, however, the cows are allowed to forage in the oats and artificial pasture lands and in the maize lands (after reaping) where in addition a leguminous crop of cowpeas has normally been sown intercropped with the maize for grazing purposes.

Each year at least one camp (especially the milch cow camps) is allowed a resting spell, if possible in the Spring, to allow for seeding of the grasses. These rest spells normally do not extend beyond a season (3 months) because of the rapid growth of the grasses which become rank and dense over longer periods ( c f, Mosslands).

The management of the different animal categories is essentially similar to conditions observed in the case of Mosslands and Tharfield and they are distributed as follows:-

(a) Milch Cows and Calves:

Grass camps G and K are devoted to these animals since they have suitable grazing and abut conveniently on the milking

shed. The Friesland calves are separated from the cows, and are grazed in grass camp J which is convenient to the Shed S, and paddocks for collecting.

(b) Ranching Cows and Calves:

These animals are grazed in the bush and grass camps F with the heifers in grass camp H.

(c) Ranching Steers:

These animals are grazed in grass and bush camps D and I.

(d) Dry Cows:

These animals are grazed in any available Kap River bushland Camp - A,B,C or E.

The categories are rotated as noted above from the grass camps to the bushland camps at suitable intervals. (This excludes the dairy cattle).

The Native cattle are grazed throughout the year on the Round Hill Outspan as noted above.

STOCK WATERING:

Except in the case of Camps D and H where boreholes (some 60-80 feet deep) with windmills have been established all other camps on the farm rely on run-off water impounded behind small storage dams across the drainage lines; on permanent water holes in such drainage lines supplied by permanent springs - (Camps E and K); or on the permanent water holes in the Kap River (Camps A,B,C and F).

During droughts the farm experiences water shortages in most camps which rely on the small storage dams, at which time water is usually transported into those camps in a mobile water tank or otherwise all gates are opened to allow stock to reach the water sources at the boreholes, Springs or the Kap River which has only once since 1928 been known to be reduced to a series of interrupted water holes (1949 drought).

Under normal conditions, therefore, water supplies are not a limiting factor in cattle grazing on Mayfair.

THE DISEASE FACTOR IN THE ENVIRONMENT:

The prevalent diseases and preventive methods are essentially similar to e.g. Tharfield. Modern control measures adopted on the farm such as dipping regularly against the ticks in DDT dips, inoculation against Blackwater, Anthrax and Lam-siekte (caused by deficiencies in  $PO_4$ ) in addition to regular dosing and feeding of medicated licks have reduced stock losses from diseases which are thus not considered a serious limiting factor to cattle farming here.

BREEDING ON MAYFAIR:

BREEDING STOCK:

The ranch cattle are an Afrikander-Shorthorn crossbreeds which, according to the farmer, produce a steer which has many of the good qualities of the Shorthorn beef breed in addition to much of the hardiness of the indigenous Afrikander breed.

The dairy cows on the other hand are all pure bred Friesland cows.

BREEDING SYSTEM AND SEASON:

With little time and labour to spare from the growing and cultivation of pineapples, the ranching system is best adapted to the conditions on the farm. Breeding is not as controlled as on the other farms considered, since here the bulls and cows graze together at all times with the result that there is no definite calving season for either the ranch-cattle or the dairy cattle except perhaps for a natural tendency for calving in the Spring season.

Under the ranching system, the ranch cow calves are allowed to graze with their mothers until weaned (ensuring rapid growth) while the Friesland calves are separated for most of the day and night from the cows except after the milking times which ensures a longer and more constant milk yield from these cows.

Regular culling of unsuitable breeding stock is, however, undertaken in order to breed young steers of good conformation for sale to beef farmers and high grade dairy cows for use on the

farm/.....

farm.

CALF CROPS:

Under normal conditions the farmer expects up to 90% calving each year and about 90 and 30 calves are usually obtained annually from the ranch and dairy cows respectively.

In drought years calving is less successful with greater mortality and with possible lowering of the next year's calf crop due to lower fertility of the breeding stock under severe conditions.

ANIMAL PRODUCTS:

BEEF STEERS:

The beef steers are sold at an average age of 18-24 months to beef farmers. No steers are fattened on the farm for sale as mature slaughter stock, since, according to the farmer, the grazing could not support the fattening of a herd of mature oxen of any size. Furthermore he finds that with a rapid, if smaller, turnover from the sale of young steers fair remuneration is obtained while the system is more adapted to the conditions prevailing on the farm.

The steers are normally sold out of hand to buyers who visit the farm and not on stock fairs, an average of 50 being sold each year. In addition up to 50 other cattle - aged cows and culled breeding stock, are also sold each year.

The farm income derived from stock sales is largely speculative and varies from year to year depending primarily on the prices offered for cattle and variations which have taken place in preceding calving seasons or on the stocking rate of the farm, which during the serious drought is necessarily lowered. In 1951-52 for example stock sales realised up to £2,000 gross while in 1952-53 the sales plummeted to less than £200. It is thus difficult to estimate the average percentage of the annual income derived from this source.

CREAM:

A small surplus of cream is sold and although income

from/.....

from this source is relatively small, it is nevertheless more constant than that obtained from irregular cattle sales, and provides a regular monthly income from which small immediate farming expenses may be met.

The cream is transported in 10 gallon cans and despatched twice a week by rail to a creamery in King William's Town of which the farmer is a shareholder. The income from cream is normally of the order of £200 - £400 per year.

SUPPLEMENTARY CROP PRODUCTIONS:

Out of the total of a possible 140 morgen of cultivable land on Mayfair including pineapple lands, 10-15 morgen are given over each year to the cultivation of fodder crops of oats, cowpeas and sweet potatoes. Approximately 15 morgen of land (old pineries) have been put down to artificial pasture grasses. In addition from 15-20 morgen of land are used each year for maize grown both for the grain and for animal grazing (Map 19).

Environmental conditions for crop cultivation are essentially similar to those of Mosslands and need not be repeated here.

CROPS CULTIVATED.

OATS:

Oats is grown as a winter greenfeed crop sown normally in March, depending on the Autumn rains, and is grazed on the lands chiefly by the dairy cows, at suitable intervals during the winter season.

The crop is normally sown on those lands adjacent to the dairy cow camps within easy walking distance for the cows. Normally from 4-6 grazings are obtained each year, the surplus being cut for hay in the Spring.

COWPEAS:

On Mayfair cowpeas are grown as a winter feed. The crop is usually intercropped with maize and is sown just after the maize begins to fruit in the Summer, this preventing

undue/.....

undue competition for plant nutrients prior to the fruiting of the maize. The cowpeas here intercropped with the maize serve the dual purpose of providing greenfeed for cattle while at the same time adding nitrogenous material to the soils of the maize-lands.

SWEET POTATOES:

Usually one land of approximately 3 morgen is devoted each year to sweet potatoes the foliage of which is grazed as a greenfeed while the tubers when cut up provide excellent succulent feed for the dairy cows as stall feed at milking times.

ARTIFICIAL PASTURES:

Three old pineries have been planted to artificial pastures chiefly of Rhodes grass on which the cattle in the surrounding camps are allowed to graze at intervals depending on the condition of the grass. These pastures materially increase the grazing capacity of the surrounding camps especially in the winter poor-grass period (Map 19).

MAIZE:

The area sown to maize varies from year to year but normally about 10 morgen are devoted to the crop annually. The stalks and chaff are utilized as a dairy cow feed while the grain is produced for Native rations. The farmer observes that owing to low yields here, maize would not pay as a cash crop and it is grown merely because of the high prices of purchased grain.

FARM LABOUR:

The farm labour complement on Mayfair comprises the farmer and 30 male Native workers who together with their families total about 250 persons.

Each of the permanent male workers is allowed to cultivate 2 acres of land for his own use. On these lands subsistence crops of maize, Kaffircorn, melons and sweet potatoes are/.....

are cultivated. The Native lands are situated adjacent to the pinery in Camp P on Mayfair and include also the two small lands situated on the Eastern boundary of the farm in Camp F. The workers draw in addition a weekly ration of maize and mealie-meal from the farmer and daily receive the excess skimmed milk from the dairy. Each Native family is furthermore allowed to graze 2 head of cattle on the farm for their own use. The permanent workers are given an annual gift of clothes at Christmas time a gift which often costs the farmer a total of over £100 each year.

Of the 30 permanent workers at least 20 are constantly engaged in the cultivation of the pineries illustrating the importance of a large and stable labour force in this farming occupation.

The remaining workers are employed in ranching and dairying or in the many routine tasks encountered on any farm.

The women are regularly employed on a piecework basis, either in the hoeing and cultivating of the pineries or in picking the fruit, as also in reaping maize and fodder crops. Young native boys are engaged as herders of the ranch cattle.

The wages received by the labourers, although exceptionally low compared to European standards, nevertheless constitute the main channel of farm expenditure as already noted above. The permanent workers receive monthly about £1. 10. 0. in addition to their rations. Furthermore, the farmer pays their poll-tax for them. The women pieceworkers normally receive a wage of about 1/6 per day of work, plus a small ration of maize.

#### FARM POWER:

Except for horse-drawn cultivators in pinery culture haulage power is exclusively mechanised. Two tractors are kept on the farm for this purpose. One of the vehicles is a heavy caterpillar type machine used for heavy work such as subsoiling, ploughing and land clearance, while the light tractor is used for less arduous tasks such as harrowing and

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discing.

Borehole pumps are operated by windmills while two small internal-combustion engines supply the homesteads on Mayfair, F, and Fernrock, F<sub>1</sub>, with electricity for domestic lighting.

The greenfeed shredding machine and a maize grinder mill housed in a small shed on Fernrock, are operated by another internal-combustion engine.

For farm haulage a heavy lorry, a light motor truck and an ox-waggon are available and are normally ample for present needs of the farmer.

#### HOUSING:

The native families are housed in typical round thatched wattle and daub huts built by themselves. These huts are situated in scattered kraals to the East of the Mayfair homestead F as illustrated on Map 19. They are located out of sight of the homestead and yet close enough for convenient centralized readily available labour. The huts in Camp F house a single family which tends mainly to the needs of the ranching cows and calves who graze this camp.

The Mayfair homestead F is the major control centre of the farm. It is a large rambling building of 7 rooms with a view to the West of the prominent Round Hill situated just South of the farm and interrupting the smooth rolling surface of the peneplane.

The Fernrock homestead, F<sub>1</sub>, is a smaller and more recent bungalow-type house. Its purpose is to house a manager for the farm but is at present rented by a family who do not have any connection with the farm.

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WATERSMEET.

INTRODUCTION:

The farm Watersmeet, devoted to chicory cultivation and dairying, covers approximately 480 morgen of land and is the property of Mr. A. Rudolf. It is situated in the S.W. portion of the Bathurst Division flanking the west bank of the Kariega River approximately 14 miles East of Alexandria, on the coast road linking Alexandria and Port Alfred. (Map 7).

In its Title Deeds the farm is described as "certain lands in the Division of Bathurst, being portion of the farm North Gorah, originally granted to S. Smith in 1910." According to the farmer, however, little evidence of settled farming became apparent in the area lying between the lower reaches of the Kariega and Bushmans rivers, of which the farm is part, until some 15 years ago (1937). Before that time the area was largely occupied by dense scrub and low forest and was not readily accessible except over poor roads and after fording the two flanking rivers. Since then the Bushmans River has been bridged and reasonable road communications established with the chief marketing centre of the area at Alexandria. The Kariega River is yet to be spanned and is at present crossed by a low causeway which is periodically impassable due to flooding of the river.

The land between the two rivers was utilized largely by Native people for cattle herding and the growing of small subsistence crops of maize. These Natives were, according to the farmer, responsible for clearing quite large tracts of the low forests, which have now become grassland.

The recency of European settlement and farming in the area occupied by the Gorah Grants is clearly revealed for example in the type of farm dwellings found there. They are generally small unpretentious buildings which await replacement by the more substantial homesteads which characterise earlier settled farming areas beyond the bounding rivers.

When the farmer arrived at Watersmeet in 1947 the

surrounding/.....

surrounding areas had been somewhat developed for farming. On Watersmeet, however, the aspect was one of almost continuous dense low forest and bush with only a small tract of 5 morgen of cleared cultivable land. No dwelling existed and, reminiscent of the 1820 settlers, the farmer and his family resorted to life under canvas for the first few months after their arrival on the farm, while a temporary house, constructed of wood, was erected. This house is still in use although a brick house is planned for the near future.

At this stage the farm was owned and financed by Mr. Rudolf senior, the object being to cultivate chicory as a cash crop and to develop a dairy herd for an all year round income. Mr. Rudolf senior died in 1947, however, leaving the farmer without sufficient financial support, while the farm had also to be bought out of the estate. In consequence it was found impossible to carry the chicory-cum-dairying farm system into effect and it was decided to concentrate mainly on the chicory cash crop although a small dairy herd and the necessary cow sheds and water supplies were also established.

Through 1947 and 1948 land clearing progressed very slowly using Native labour, and in 1949 it was decided to speed up the process so as to enable the planting of sufficient chicory for the farm to shew a satisfactory profit. Two thousand pounds were forthwith borrowed and a firm from Johannesburg contracted to clear the ground. Thus by mid-1949 over 60 morgen of land had been cleared by "bulldoze" methods. In 1950 all available ground was sown to chicory, and with climatic conditions exceptionally favourable throughout the chicory growing region, a record crop of 3,400 bags of dried root was produced, on the farm, which realised over £10,000 (c.f. 450 bags at £1,100 off 10 morgen in 1947).

Two succeeding crop failures, through diseases and poor seed in 1951 and 1952, however, brought the realization that the monoculture system was undesirable and resulted in the establishment of the present mixed farming system with chicory

as/.....

as a cash crop and dairying as a stabilizer of annual farm income. Much of the land, as shewn in Map 21 has since been devoted to fodder crops chiefly, and chicory is grown on a more moderate scale, normally occupying from 10-20 morgen of land.

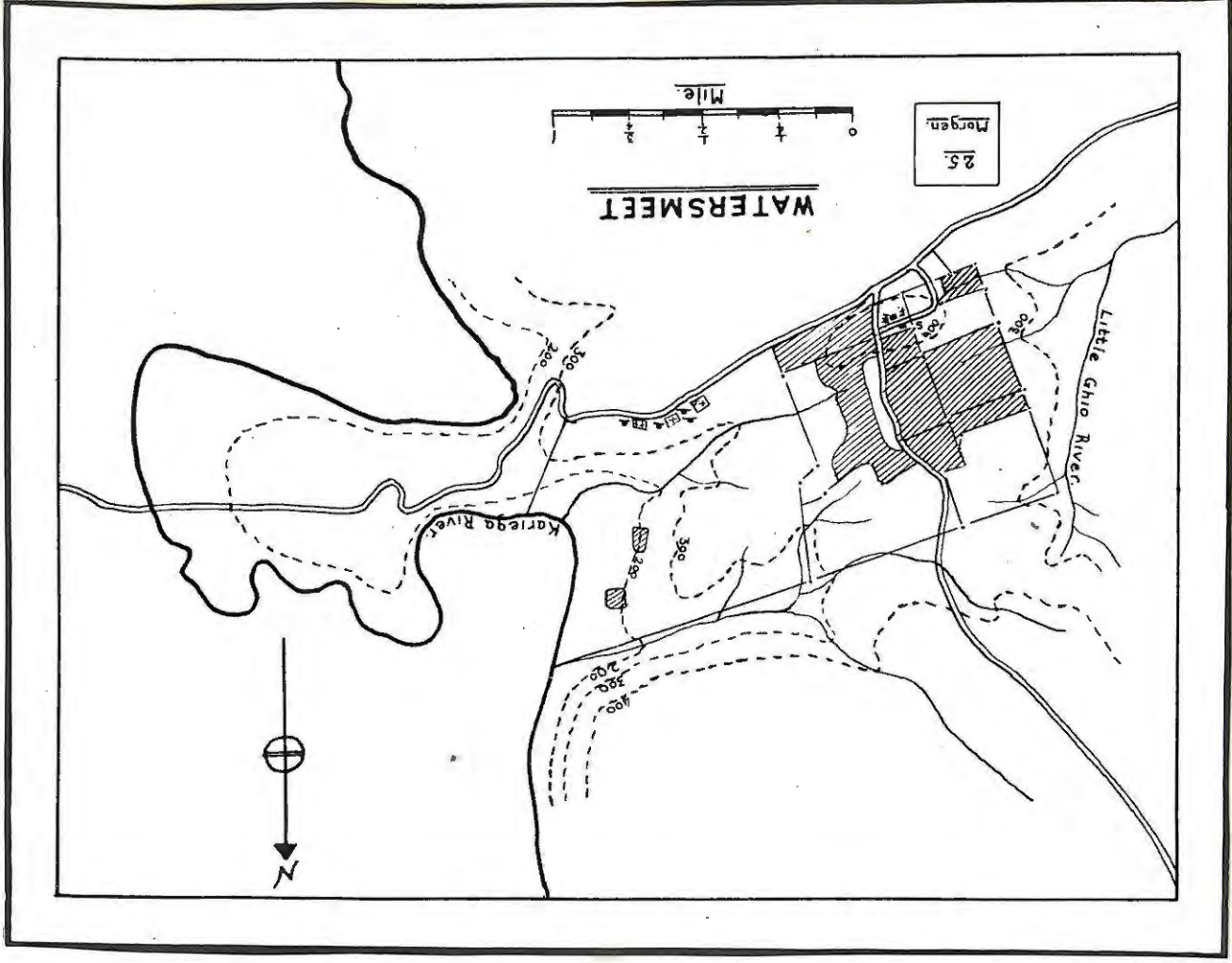
GEOLOGY AND RELIEF:

Geologically, Watersmeet, falls within the coastward areas of the truncated and peneplaned folded formations of the Cape System which occupy the large tract of country extending from the coast inland to the foothills of the central Albany highlands.

The area covered by the farm forms part of the Bokkeveld Shales, Sandstones and Quartzites which occupy the extreme S.W. corner of the Bathurst Division. (Map 3). Formations of Witteberg Quartzite occur immediately North of the farm where they are exposed in kranzes and outcrops in the deeply entrenched Kariega River Valley. Overlying the Bokkeveld Series unconformably over large tracts of the Western portions of the farm, are marine limestones and gravels of the Post Cretaceous System, forming part of a tongue of these formations which extends Northwards between the Kariega and Bushmans Rivers from the coast.

The farm is situated astride the interfluve which divides drainage towards the upper reaches of the Little Ghio River, a tributary of the Bushmans River, from that towards the meandering Kariega River on the eastern boundary of the farm. The interfluve trends roughly North-South and has a mean altitude of 300-400 feet above sea level lying some 200-300 feet above the Kariega valley floor and 100 feet above that of the Little Ghio.

In the North-East corner of the farm the Kariega River emerges from a steep-sided, narrow gorge cut in the Witteberg formations, into a considerably wider stretch of its valley. This has been produced by the lateral corrasion of the river and the erosion of two Eastward flowing tributaries which here have cut back into the less resistant Bokkeveld formations. This portion of the Kariega valley has a flat to gently rolling character and covers some 90 morgen of land. From the valley/.....



MAP 20.

valley floor the land slopes up steeply to the West, North and South on to the rolling interfluvial surface discussed above.

CLIMATE:

The climate of Watersmeet is characteristic of the coastal belt of Bathurst with moderate summer and winter temperatures a frostless period which extends throughout the year and a mean annual rainfall of some 25 inches.

TEMPERATURE:

Accurate temperature values are not available for the farm but statistics for Bathurst at approximately the same altitude and distance from the sea may be presented here as a general guide to the prevailing temperature conditions.

From temperature tables (Schuman 1941) the following features emerge for Bathurst, for the period 1929 to 1940.

(a) Mean Annual Temperature 64.6°F.

(b) Mean Seasonal Temperature.

Spring (S.O.N.)	63.0°F.
Summer (D.J.F.)	69.7°F.
Autumn (M.A.M.)	65.9°F.
Winter (J.J.A.)	59.7°F.

(c) Mean Seasonal Maxima and Minima.

	<u>Maxima.</u>	<u>Minima.</u>
Spring (S.O.N.)	72.0°F.	53.0°F.
Summer (D.J.F.)	78.5°F.	61.0°F.
Autumn (M.A.M.)	75.0°F.	57.0°F.
Winter (J.J.A.)	68.5°F.	50.5°F.

(d) Mean Season Absolute Temperature.

	<u>Mean Maxima.</u>	<u>Mean Minima.</u>
Spring	91.5°F.	46.0°F.
Summer	94.2°F.	52.2°F.
Autumn	91.8°F.	48.7°F.
Winter	83.8°F.	42.9°F.

(e) Some Absolute Temperatures.

<u>Absolute Maximum.</u>	<u>Absolute Minimum.</u>
104.0°F. (March 1936)	37.0°F. (September 1931) (fx.....)

(f) Mean Annual Range 11.9°F.

(g) Mean Daily Range. 17.8°F.

It may be observed therefore that Watersmeet may be expected to experience mean annual temperatures of 64°F. Summer temperatures are warm to hot (70°F.) and winters are mild to warm (59°F.). The farm thus enjoys an equable temperature regime with a mean annual range of approximately 11-12°F.

High temperatures of over 90°F. may be expected during Summer (especially February) and the temperature may ascend to as much as 100°F. on occasions. In winter the mean absolute temperature may descend to the order of 40°F., but only rarely below that figure, revealing the absence of frosts and a growing season which extends throughout the year.

The mean daily range is moderate and of the order of 17°F.

RAINFALL:

Since rainfall records have been kept on Watersmeet for only 4 or 5 years, statistics for Alexandria some 14 miles to the West at the same altitude and distance from the sea must suffice to gain a general impression of the rainfall conditions. (Alexandria is used for rainfall figures because of the longer period in which records have been taken there).

TABLE 26 : ALEXANDRIA. (Period: 50 years up to end of 1935).

J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.	YEAR.
1.78	1.65	2.17	2.10	2.29	1.82	1.66	2.26	2.52	2.53	2.77	2.32	25.5

From table 26 it may be observed that the rainfall is typically fairly evenly distributed throughout the year. There are two slight maxima occurring in Autumn (M.A.M.) and Spring (S.O.N.) with peaks in March and November respectively. The Summer (D.J.F.) and Winter (J.J.A.) seasons are normally

slightly/.....

slightly drier and it may be assumed that owing to higher temperatures in Summer the Winter rains are more effective to plant growth.

The rainfall is distributed in the proportion of 49% in the Winter-half year to 51% in the Summer-half year.

The variation, reliability and intensity of the rainfall may be expected to follow the general pattern already discussed for Albany and Bathurst and need not be repeated here.

VEGETATION:

The natural vegetation of Watermeet belongs to the Coastal Low Forest and Valley Bushveld vegetation types which in this area are merged in a broad transition zone with no definite bounding line between them.

Since 1947, considerable tracts of the natural bush and low forest have been cleared for agricultural and open grazing land, but it nevertheless remains the dominant vegetation type of the farm, occupying roughly 60% of the farm area (Map 21) and contains such typical elements as have been noted earlier.

Due to the grazing of cattle and much chopping out, however, the originally dense bush and forest has been considerably opened up, and today really dense stands are to be found only in the deep kloofs and ravines and on the steep slopes descending to the Kariega valley floor.

Over the small cleared areas not occupied by agricultural land, the dense bush has been largely replaced by open acacia-grassland, which, owing to the recency of the bush clearance, is still characterized by *Panicum* grass whilst *Eragrostis*, *Themeda*, *Cynodon* etc. are as yet of relatively minor importance in the plant succession. In addition the *Panicum* are common also as a broken layer in the areas dominated by bush and low forest, which areas are further characterised by many low growing shrubs.

LAND/.....

LAND USE AND THE FARMING SYSTEM.

INTRODUCTION:

The farming system of Watersmeet, is essentially a mixed system of agriculture and dairy farming. Agriculture here concerns the cultivation of chicory root as a cash crop, grown in rotation with soil-building fodder crops for use as supplementary feeds for dairying, which in turn is concerned primarily with the production of cream for sale.

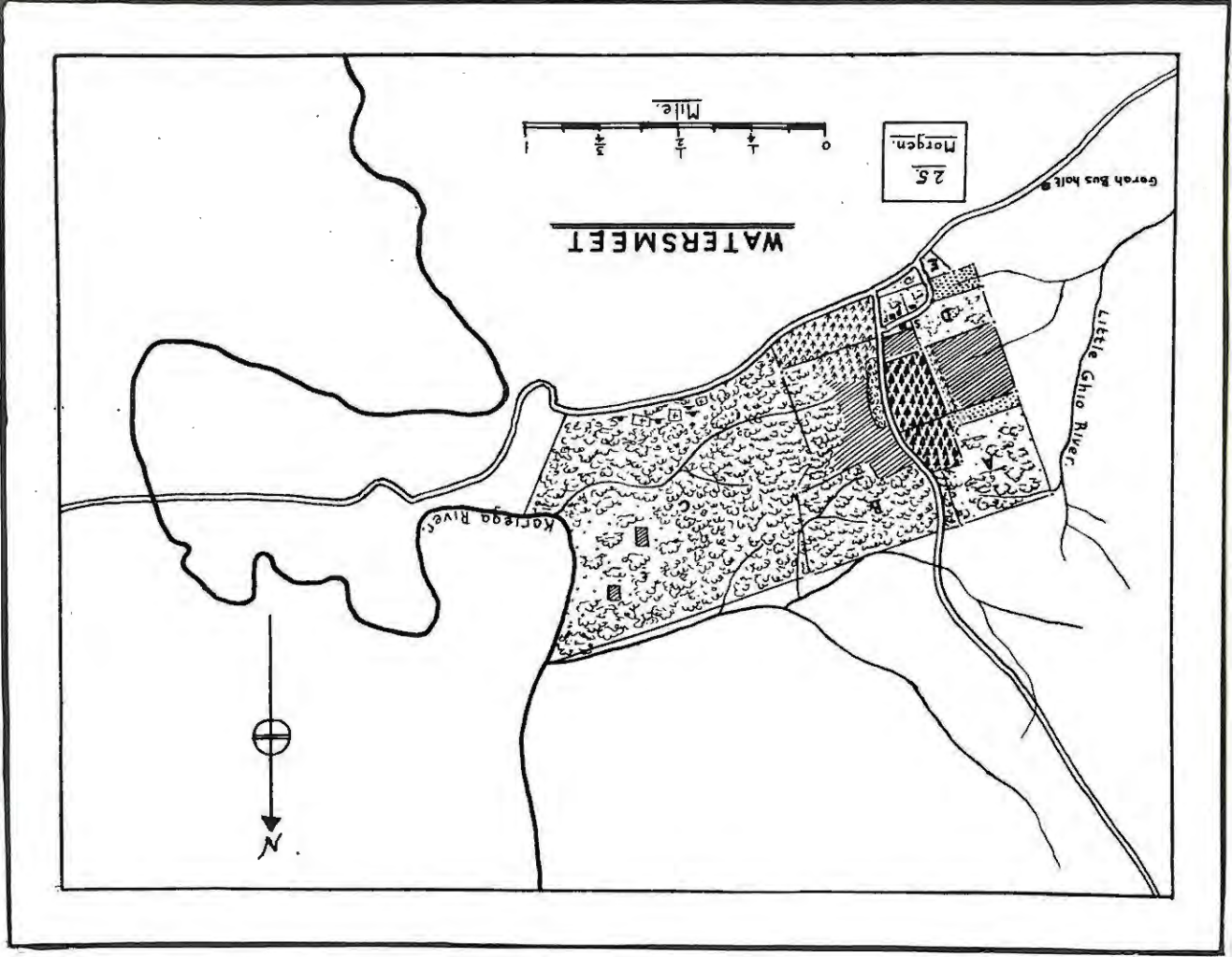
At present, in a normal year, the chicory crop and dairy-produce each contribute about 50% to the annual farm income. This state of affairs, however, is a recent development as has already been intimated. Since as recently as 1951 for example chicory sales represented up to as much as 90% of the annual income. We shall enquire here, therefore, as to the reasons for the decline of chicory as the predominant source of income and for the establishment of a mixed system as the most favourable adaption to the environment. It may be noted here, that the mixed chicory and dairy farming system encountered on Watersmeet is, according to the farmer, by no means an isolated occurrence. He observes that in recent years it has in fact become an increasing tendency in the chicory growing region as a whole.

From a discussion of the problem with the farmer and others the following main features, emerge:-

- (a) Income from chicory takes the form of a single annual cheque, while, dairying provides a regular monthly income from which the running expenses of the farm may be met with no accumulation of unsatisfactory debt thus making for a stable farm economy.
- (b) Grown on a large scale, chicory is found to be an expensive crop to produce, while income from the crop may not always be sufficient to cover such expenses and leave any satisfactory margin of profit.

On Watersmeet, for example, when all available

agricultural/....



MAP 21.

agricultural land (about 60 morgen) was devoted to chicory, estimates of the major expenses were:-

(i)	Labour .....	£ 2,000.
(ii)	Machinery depreciation and repair .....	1,000
(iii)	Land depreciation .....	1,000
(iv)	Fuels .....	500
	TOTAL -	<u>£4,500</u>

This large expense bill would normally remain fairly constant from year to year and would have to be met by each successive crop. If conditions for production remained consistently favourable, the incomes received would cover expenditure and yield a satisfactory profit. Through experience, however, the farmer has discovered that such factors as poor seed, drought or disease may cause serious crop declines which result in an insufficiency of income to cover expenses let alone to yield a profit. These losses may later be redeemed tax-free from the income of a favourable year, but in the interim the farm has to be run on borrowed money on which heavy interest is normally due.

When the crop is grown on a more moderate scale in conjunction with dairying, expenditure on the one hand is considerably reduced while on the other the smaller income derived from chicory is largely made up by that obtained from dairy produce. Moreover the unsatisfactory dependency on a single cash crop with its resulting fluctuating farm economy is replaced by a stable economy.

(c) LABOUR:

Chicory growing on a large scale requires a large labour force throughout its growing and reaping seasons. The labour force would consist both of Native male, manual workers contracted for the period of the chicory season, and Native women pieceworkers for hoeing, cultivating and reaping.

In recent years labour shortages especially of manual workers, engendered by the drift to the towns in search of/.....

of higher wages, have been a major deterrent against the crop being cultivated on a large scale. Furthermore in poor seasons, which are difficult to predict ~~ahead~~, the volume of work available may not be sufficient to employ the labour gainfully at all times. It then becomes a definite uneconomic drain on the financial resources of the farm. Moreover, women pieceworkers often present labour problems since they are recruited from the surrounding area, where the demand is large. Furthermore, they will only work when their food supplies are low.

In the mixed system, however, labour problems are less frequently experienced. This is because a smaller force is necessary and it can be more economically utilized since, when not employed in chicory cultivation, the workers are gainfully employed in dairying and in cultivating fodder crops. The labour force is moreover more settled and stable when permanent workers and their families live on the farm. The women of these families are then also always readily at hand for piecework tasks.

(d) LAND DEPRECIATION:

According to results obtained by Orchard and van Rooyen (1951), chicory cultivated successively on the same soils is an exhausting crop depriving the soils of essential organic and mineral matter and destroying their structure. This process carried to extremes results in alarming soil erosion not only by water but also by wind.

As noted above it is estimated that under the old system the agricultural land on Watersmeet was depreciating at the rate of £1,000 in value each year. The farmer observes that once the initial fertility of the virgin soils had been reduced, extensive fertilisation would have had to be undertaken. Such a programme at prevailing prices would have cost over £30 per morgen annually to maintain soil fertility completely. Such an expense would have seriously affected an already fluctuating economy.

With dairying included in the system, however, soil

depreciation/.....

depreciation is halted, since chicory is now grown successfully in rotation with soil building fodder crops for use by the dairy stock. Furthermore, since chicory cultivation requires only a small portion of the farm, dairying allows for the profitable use of the remaining area; while in addition, the manure obtained from the cattle is an important source of organic fertilizer.

(B) CHICORY CULTIVATION ON WATERSMEET.

INTRODUCTION:

Chicory is best known in its roasted and ground form when blended with coffee, the taste, aroma and appearance of which is considerably enhanced in the opinion of some by the addition of the adulterant. After roasting and grinding, chicory is a red-brown powder which is the ultimate product of the white fleshy root of the plant Chinchorum intybu. The root bears a strong resemblance to that of a parsnip while the leaves have the appearance of spinach plants. The root is exceptionally bitter in taste and is on the average from 8-14 inches long and from 1½-3 inches thick at the head of the root.

AREA DEVOTED TO CHICORY:

The chicory lands of Watersmeet today occupy from 10-20 morgen representing roughly 3-4% of the total area from which ± 50% of the annual farm income is derived each year. Chicory cultivation may therefore be considered as an intensive farming activity to be compared to other products of the area such as pineapples and citrus. Unlike these products, however, the chicory lands are not static but are involved in the annual rotation plan of crops on the farm. The area shown on Map 21 represents the location of chicory in 1953.

SOME ENVIRONMENTAL FACTORS IN CHICORY CULTIVATION:

CLIMATIC FACTORS:

In the coastal chicory growing areas of Alexandria and Bathurst, as on Watersmeet, chicory is grown as a winter

crop/.....

crop with a growing season extending from March and early April to late October or November.

During this period approximately 80% of the annual rainfall is received. In addition the crop has the advantage of the autumnal maximum of rainfall in March for sowing and germination, a smaller but nevertheless effective rainfall in the Winter growing season and the Spring maximum of rain in October and November when after 4-5 months the root begins to put on weight and experiences its maximum growth.

An alternative practice would be to sow with the Spring rains and to reap after the Autumn maximum of rainfall. In this case, however, the mid Summer rainfalls are less effective, with higher temperatures prevailing, so that the growth may be arrested and the roots become stunted and apt to develop a higher percentage of undesirable fibre content under the drier conditions. The winter season thus appears to offer the most efficient use of effective moisture, an important feature since the crop is not grown under irrigation.

The farmer estimates that from 10 to 15 inches of effective rainfall are normally sufficient for successful cultivation of chicory, a figure usually satisfied by the rainfall of Watersmeet. An effective rainfall here is estimated to be about  $\frac{1}{2}$  inch in Summer and  $< \frac{1}{2}$  inch in Winter per rainfall.

Occasional weather vagaries, however, may result in small crops or crops of poor quality. The failure of the Autumnal rains for example may result in late sowings and poor germination due to low Winter soil temperatures. Or again, the failure of the Spring rains may retard the growth of the roots at that season and result in small fibrous roots of poor quality.

TEMPERATURE:

Situated in close proximity to the sea, the farm rarely experiences frosts, and while the mean absolute minimum of temperature may be expected to be of the order of 42° F,

the/.....

the mean Winter temperature is  $\pm 58^{\circ}\text{F}$ . making for mild conditions and allowing for the successful growth of the chicory crop in Winter. In the Autumn sowing seasons the mean temperature is of the order of  $65^{\circ}\text{F}$ . which allows for successful germination of the crop in the moist conditions experienced at that season. In the Spring temperatures rise to the order of  $63^{\circ}\text{F}$ . which combined with the Spring rains makes for successful gains by the roots at this season.

The effects of low soil temperatures on a late sown crop in Winter have already been given above.

It should be noted here that where the crop is grown further inland, the Summer growing season is preferred due to the frost incidence in Winter. Plantings there thus have the disadvantage of the less effective and often less reliable Summer rainfall which, it may be suggested, may be an additive factor in explaining the concentration of chicory growing in the coastal regions.

#### SOILS:

The soils of Watersmeet may be described as light sandy to sandy loams which, from results obtained thus far in the chicory growing areas, are considered to give rise to successful chicory production.

Chemical analyses of soil samples from Watersmeet show that the soils contain satisfactory fractions of organic nitrogen, and of most of the essential mineral plant nutrients. The soils are more or less alkaline with a pH value approaching 8, relating to the limestone formations which underlie most of the farm. The soils, however, show a distinct deficiency in phosphate, which will probably have to be made good in the future by the use of phosphatic fertilizers.

The results obtained from a soil sample taken from an old land used consistently for chicory cultivation for the relatively short period from 1947 to 1951, however, reveal the definite necessity for the establishment of <sup>a</sup> sound crop

rotation/.....

rotation to maintain the soil fertility. On that land nitrogen, potash, phosphates, calcium, and other alkaline matter were seriously reduced, with consequent lower crop yields. The land has since been occupied by artificial pasture (Map 21) in an attempt to restore its former fertility.

SOIL AND WIND EROSION:

With level to slightly sloping land (Map 20) ploughed on the contour, water erosion has very little effect on the soils of Watersmeet.

Wind erosion, however, according to the farmer, may assume alarming proportions on old lands used consistently for chicory growing when the structure of the initially loose-textured sandy soils has deteriorated. Under such conditions wind erosion may become a limiting factor in chicory cultivation. On Watersmeet, however, owing to the recency of cultivation and the establishment of crop rotation, wind erosion is not considered a limiting factor and the soils are normally stable except in rare severe wind storms.

THE CULTIVATION OF THE CROP.

LAND PREPARATION:

After the first soaking rains of the Autumn, normally in March, the prospective chicory lands are deeply ploughed and harrowed to smooth out the soil and improve the seed bed.

On Watersmeet it is the practice to plough, harrow and sow in one day, immediately following the rains, if the soils are not too moist. In this way there is normally enough moisture in the soils to allow for both germination and to carry the young plants through the initial stages of growth, without any further rain. An alternate method employed by some growers is to plough and harrow after the rains and to leave the soil to dry before sowing the seed. The chicory then germinates when the next rains fall. The farmer notes, however, that the method is risky since a small rainfall/<sup>is</sup>sufficient only to germinate the seed may leave the young plants without  
enough/.....

enough moisture in their initial growth stages which may result in considerable losses.

CHICORY SEED AND SOWING:

The chicory crop is sown from quality imported seed purchased in bulk by the Chicory Control Board from Holland, Belgium, Germany and Luxembourg, the Magdeburg and Brunswick varieties being especially favoured. The quality of seed is of vital importance to the farmer, who may suffer complete crop failures through poor seed. On Watermeet in 1951 for example 1,600 bags of chicory out of an expected 2,400 were lost through sowing poor seed. In spite of encouragement from the Control Board, however, little quality seed is yet produced in the Union, primarily due to the lack of experience in seed production. In times of seed shortages, therefore, poor South African seed may become a prime limiting factor to the chicory producer the seed shortage years of the Second World War being especially prominent examples of this feature.

The seed is normally sown at the rate of 3 lbs per morgen on Watermeet, in rows some 12-15 inches apart and 1 inch deep, using a tractor drawn vegetable seed planter. The plants are later thinned out to leave approximately 6" between them to prevent excessive competition for plant nutrients.

CULTIVATION:

The seed germinates approximately 5 days after sowing in favourable weather and longer if temperatures are low.

Throughout the growing season the lands are constantly hoed to remove weeds which compete for plant foods and moisture. Ten to fifteen women pieceworkers are employed from time to time through the season to hoe the lands. In addition a constant and rigid check is kept on the appearance of diseases or insect pests which have been known to ruin the entire chicory crop if not caught and eradicated in good time.

LIFTING:

The chicory normally reaches maturity some 5½ to 6 months/.....

months after sowing, usually from late September onwards, and at this stage the ability of the farmer to recognise the maturity of the crop is of great importance. According to Orchard and van Rooyen (1951) the root, if left too long in the ground after maturing, deteriorates rapidly in quality, especially as regards undesirable fibre content.

The mature roots are lifted using a heavy single furrow plough, drawn between the rows by a tractor. The heavy plough is used so as to plough as deep as possible and to prevent the slicing off of root tips. A light rain before lifting is desirable since the breaking up of hard dry soils often results in damage to the roots.

The roots are picked from the broken soil by hand, about 10 workers normally doing the lifting on the present scale of production, and gathered into small heaps on the side of the land. Here about 20 women pieceworkers slice off the leaf tops and load the topped roots into bags ready for transport to the shredding machine. It is important to have the topped roots shredded and dried as soon as possible after topping, since in the warm moist conditions sometimes experienced in the lifting season, fermentation sets in rapidly, reducing root quality. On the other hand, a hot dry spell results in wilting of the root-skin which is also considered undesirable.

Further, since the drying kiln has a limited capacity, root lifting is carefully controlled so as to make available only sufficient for each successive drying and to prevent deterioration of root through a time lag.

#### CUTTING:

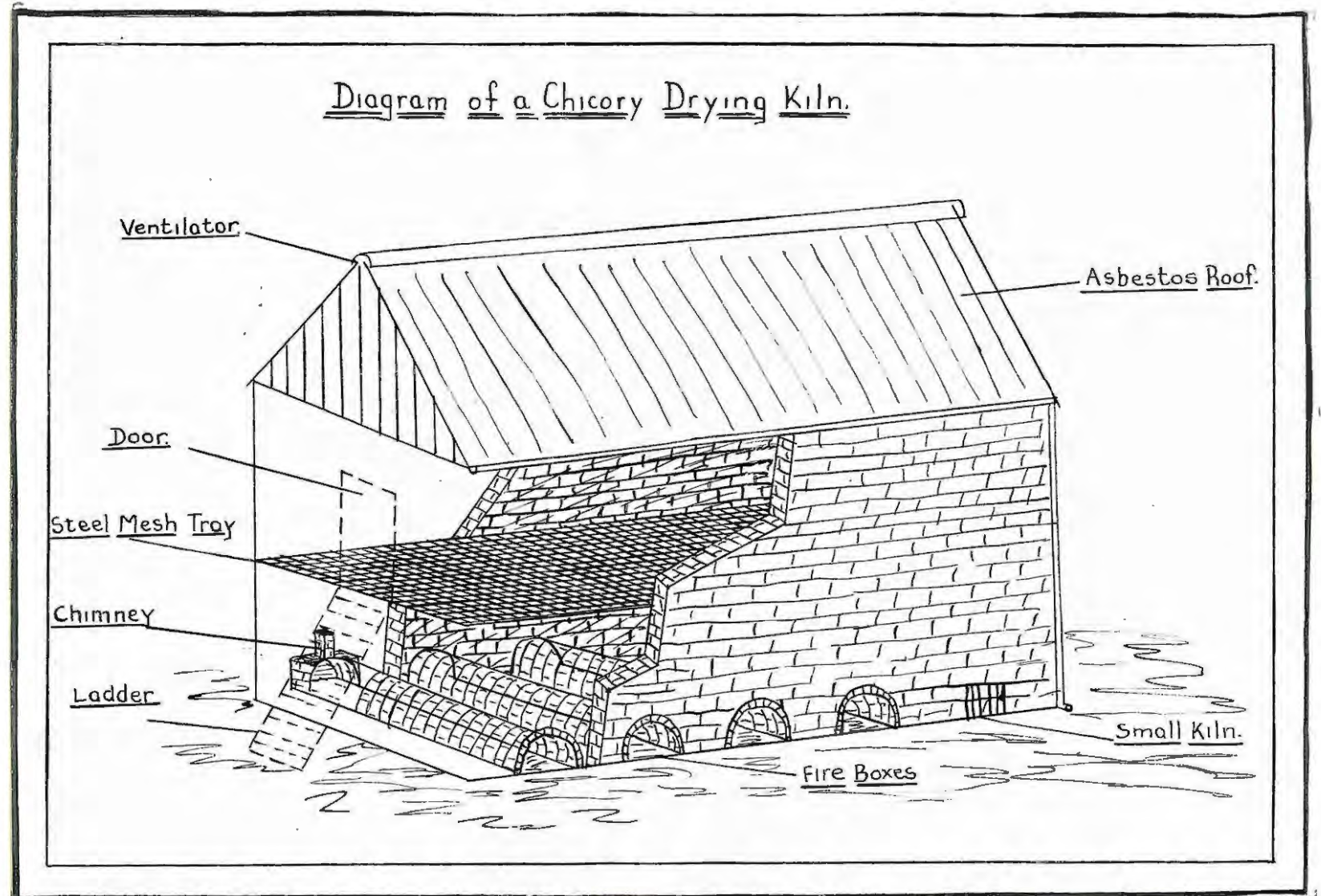
A special shredding machine operated by tractor power reduces the roots to small cubes roughly  $\frac{1}{2}$  -  $\frac{3}{4}$  inch thick in readiness for drying.

#### DRYING:

Once cut the root is roughly graded, by sifting through a coarse wire mesh, into small and large cube sizes to facilitate

even/.....

DIAG. 5.



even drying. This is important since, if ungraded, the smaller cubes would roast and char before the larger ones had fully dried.

The chicory is entirely kiln dried since the coffee manufacturers will not accept either sun or wind-dried root.

The watersmeet kiln is of simple design as illustrated in the diagram 5.

From the diagram it may be observed that the kiln consists of a rectangular brick building with dimensions of 25 x 10 x 12 feet. It is roofed with rust resisting, heat insulating, corrugated asbestos. A ventilator, to allow moist air to escape from the kiln, runs along the length of the apex of the roof. Four brick fire boxes span the breadth of the building some 6 feet below a heavy steel mesh wire tray on which the chicory is laid out to dry.

On Watersmeet, as on many other chicory farms in this region, an ample supply of firewood, for the firing of the kiln, is available from the natural bush and low forest vegetation. The farmer observes that in order to conserve this valuable natural resource only old or dead wood is chopped out for this purpose. It is apparent, however, from discussions with the farmer and others that the supply of firewood for chicory drying in the growing region is not unlimited while furthermore the danger exists of denuding the region of its natural vegetal cover by excessive chopping out of the low forest. It is obvious therefore that wood shortages may become a potent limiting factor to production on farms where much of the forest and bush has already been removed. It is with this factor in view that the Chicory Control Board is at present investigating the possibilities of erecting a number of centralized driers at various strategic points in the chicory growing areas. It is hoped that in the near future a Belgian three-floor coal burning, drier (Chicory Control Board 1951) will be erected in Alexandria which would serve as a prototype along which lines farmers or groups of farmers could then build their own driers.

It/.....

It is reported that the coal burning drier is the most suitable at present owing to the shortage of electrical power in the growing regions.

DRYING PROCESS:

The chicory is spread out on the tray in a layer some 3 to 4 inches deep (the smaller pieces are dried in a special small kiln at the base of the building as illustrated on the diagram). The hot air rising from the fireboxes below brings about the drying of the root. The thickness of the layer is controlled to prevent excessive moist air, in the kiln, which retards the drying process.

The temperatures in the drying process vary from about 120°F. at commencement to prevent rapid drying out and hardening of the root skin, to 185-190°F. towards the closing stages. The chicory is stirred constantly using spades, to prevent charring and roasting. This work is performed by two trained Native workers under the farmers supervision. The drying process is normally completed within 24 hours.

The capacity of the Watermeet kiln is approximately 80 bags of wet shredded root per drying. From this load of wet root about 30 bags (180 lbs.) of dried root are normally obtained. After drying the crop is bagged and stored ready for transport to the warehouses of the Chicory Control Board in Alexandria where it awaits sale.

MARKETING THE CHICORY CROP:

The crop is marketed through the Chicory Control Board with its headquarters some 14 miles away, from the farm, in Alexandria.

Here the crop is screened weighed and graded for particle size and quality into 4 grades namely Super, 1st, 2nd and 3rd grades. Thereafter the various grades are pooled with the chicory crop from the entire producing area, the sale of which is administered by the Control Board.

After grading the crop the Board pays the farmer 60%

of/.....

of the total value of his crop, the actual amount depending on the prevailing fixed prices at the time, the remaining 40% being paid out after the sale of the entire pooled chicory crop and after deductions have been made to defray the expenses of the Board.

Among the main features of the co-operative system adopted by the Control Board the following may be noted:-

- (a) The Board prohibits any chicory farmer in Alexandria, Albany or Bathurst and other districts from selling his crop through any other channel, by conducting an annual pool of the crop.
- (b) The controlled selling of chicory has its main object in the maintenance of a balance between supply and demand, with a view to stabilising prices.
- (c) Both buying and selling prices are fixed in order to preserve the local demand and simultaneously to restrict the output of chicory to the country's requirements.
- (d) The local industry is protected from the uncontrolled importation of root from overseas, and the policy is to maintain import tariffs which encourage the local industry.
- (e) Efforts are made to encourage the improvement of quality of locally produced root to equal the best imported article.

THE CHICORY CROP:

The average yield of chicory on Watersmeet is from 30-40 bags of dried root (180 lbs.) per morgen which, according to the farmer, is considerably greater than the mean for the chicory growing region as a whole, for which he estimates a 20 bag / morgen yield. The greater yield of Watersmeet is attributed to the higher quality of the recently cleared bush soils.

The yield may vary between wide limits, however, depending on climatic and disease variations. In 1950 for example, with very favourable climatic conditions a yield of

120 bags/.....

120 bags of wet root / morgen was obtained while in 1951 due to an abnormal incidence of disease 1 bag / morgen was obtained from one land.

Considering the average yield, however, the annual chicory crop is of the order of 400-800 bags of dried root, depending on the area sown to chicory.

FARM COMMUNICATIONS AND TRANSPORT:

From Map 7 it may be observed that Watersmeet lies conveniently on the railway bus route from Grahamstown via Salem and, the Gorah halt to Alexandria. It lies some 14 miles from Alexandria and 28 miles from Grahamstown over fair gravel roads. A twice weekly bus service in both directions provides rapid and relatively cheap transport for both major farm products of Watersmeet. During the chicory drying season, however, the capacity of the normal buses may not be large enough to cope with successive loadings, when special buses are ordered through the Control Board to deal with the crop.

DAIRYING ON WATERSMEET.

SIZE OF DAIRY HERD:

The dairy herd of Watersmeet numbers 30 dairy cows chiefly of the Jersey breed, 24 heifers, 20 calves and 2 bulls. In addition a small number of oxen are also grazed.

GRAZING:

(1) THE VEGETATION AND GRAZING:

Grass, although not the major vegetation element on the farm, is nevertheless the chief source of grazing for the dairy cattle. Among the grasses the Panicum is perhaps the major species grazed, and in addition shows favourable results when artificially cultivated. On the other hand, the bush and low forest represents a valuable fodder bank, playing an important role in animal feeding in drought especially. Some of the bush elements, however, taint the milk product and in consequence the

milch/.....

milch cows are grazed as far as possible in camps where grass predominates (camps A, D, E. Map 21) or on the artificial pastures cultivated on the farm.

(2) PALATABILITY:

According to the farmer, the grazing may be considered as a mixture between sour and sweet grassland on the one hand to purely sweet grassland and bush on the other. The sweet grazing occurs mainly in the slightly drier valleys and remains palatable throughout the year.

NUTRITIONAL VALUE OF THE GRAZING:

The grasses of Watersmeet have thus far shown no obvious deficiency in phosphates which the farmer attributes to the recency of bush clearance. Soil analyses, however, have revealed a distinct phosphate deficiency which may become apparent in the grazing in the future. The grazing is calcium-rich due to the underlying limestone formations over the greater part of the farm.

The grazing normally supplies sufficient protein matter also, to maintain animal condition, but to ensure uniformly high milk and cream production, milch cows normally receive supplementary rations of greenfeed and concentrates throughout their lactation period.

(4) SEASONAL RHYTHM OF THE GRAZING:

The seasonal distribution of rainfall and the temperature regime are similar to those experienced on Tharfield, and with a frostless period extending throughout the year, the seasonal rhythm of grazing nourishment also conforms closely. On Watersmeet, however, owing to a general absence of obvious deficiencies in the grazing and, since the dairy herd receives supplementary greenfeed stuffs throughout the year, for efficient milk production, the cycle is even less pronounced than on Tharfield and the dairy cattle remain in good condition throughout the year.

CARRYING/.....

CARRYING CAPACITY:

The official estimate of the carrying capacity in the Salem Soil Conservation District, of which the farm forms a part (Map 8), is 1 beast per 3 morgen. Watersmeet is at present stocked at the rate of 1 beast per 3 morgen due primarily to the recency of dairying in the farm system. If more artificial pastures were cultivated, the farmer observes, and considering the absence of deficiencies in the natural grazing combined with the all year round growing season, a stocking rate of 1 beast per 2 morgen should be possible on Watersmeet in the future.

THE FENCING SYSTEM:

All fences on the farm have been erected since 1947, before which date the farm formed part of the wild unfenced bushlands which characterised the area. Today approximately 10 miles of stock proof fences, constructed of stout strand and barbed wire and sneezewood posts, bound and subdivide the farm into camps, paddocks and agricultural land.

The farm is subdivided into 5 grazing camps from 230 morgen to 10 morgen in size, 4 small paddocks surrounding the homestead, and 7 agricultural lands situated over the most suitable level areas. (Map 21).

The present fencing system, however, due to the large variations in the camp sizes and the small number of camps, is considered inadequate for successful grazing management.

The present camping pattern bears relation primarily to the available water supplies, and further subdivision will depend on the extension of these supplies. Camps A and B for example possess semi-permanent natural waterholes developed in the limestone formations, Camps D and E are served by a borehole in the homestead paddock while Camp C relies entirely on the Kariega River for water. No other supplies are available in Camp C which largely explains its extent in comparison to the others. Further subdivision will thus concern Camp C and water for these subdivisions will be provided by pumping water from the

Kariega/.....

Kariega into small storage reservoirs in each of the new camps. It is probable that much of the excessive bush will be cleared to make the new camps more suitable for milch cows.

GRAZING MANAGEMENT:

As noted above, the present camping does not allow for any comprehensive grazing rotation scheme. Therefore as on Mosslands for example, the grazing management relies to a great extent on the farmer's judgment of the condition of the grazing. At present it is possible only to have rotational grazing for the grass-predominant camps utilized by the dairy cows (Camps A, D and E), while the oxen, dry cows and heifers are grazed continuously in Camps B and C. In this way the smaller grass camps have at least one season of rest, if possible in the Spring and early Summer growth and seeding period; while Camp C because of its large size and quantity of grazing is never actually overgrazed.

The lack of camps, however, is again a feature in the grazing management as regards the separation of animal categories discussed in the case of Tharfield. Suitable provision on Watermeet is available only for the dairy cows which, as noted above, are grazed on the small grass camps A, D and E. These camps, in addition are situated in close proximity to the cow-byres and also to the artificial pasture land, while agricultural lands close by, when in fallow, may also be used for their grazing. The other categories, with the exception of the two bulls, are grazed together in Camps B and C. The bulls are grazed in one of the small paddocks which surround the homestead where they are conveniently at hand for proper care to be taken of them.

It should be stressed, however, that the problems engendered by the inadequate camping facilities are temporary, and are due primarily to lack of ready capital and the recency of dairy farming on a fair scale here and not to the failure of the farmer to recognise the necessity for further subdivision.

WATER/.....

WATER SUPPLIES:

The main sources of stock water have been noted above and need not be repeated here. For the present stage of development these supplies are considered adequate except in droughts when the natural waterholes have been known to dry up with resulting inconvenience. At such times water is carried into the camps in a mobile tank filled at the homestead borehole.

The water problems which at present constitute a limitation to successful grazing management will be overcome when the pumping plant on the Kariaga and suitable storage facilities have been constructed.

THE DISEASE FACTOR IN THE ENVIRONMENT:

The prevalent diseases and preventive methods are essentially similar to those encountered on Tharfield for example. Again modern measures of controlling diseases are in use and by regular dipping in DDT dips, inoculation and dosing against the common diseases they have been brought under control and are not considered a limiting factor to stock grazing on Watersmeet at the present day.

BREEDING:

BREEDING STOCK:

The predominant breed kept on the farm is the Jersey, but a few cows are crossbred Jersey-Friesland and will be gradually <sup>be</sup> replaced by purebred Jersey stock. The aim in breeding is to produce cows which by the nature of their constitution and production capacity will be both profitable and in adjustment to their natural environment, and to this end careful selection of the breeding stock is practised. The cows are all high grade stock, the majority of which are graded animals while a few are registered stud animals. One of the bulls at present in use is also a registered stud animal.

BREEDING SEASONS:

On Watersmeet, as on Mosslands for example, where the

production/.....

production of cream is the major consideration, calving in the Winter season, when cream is scarce and prices highest, is preferred. A fair proportion of the cows, however, calve outside of this season, making for a relatively uniform cream production throughout the year, but with a distinct peak in the Winter. Since the grazing remains in fair condition even in this season and supplementary feedstuffs are then available, winter calving is no hazard according to the farmer. Further, diseases and pests, ticks especially, are at their lowest ebb in Winter, making for a further advantage. Modern preventative methods, however, have made calving at other seasons as safe as the Winter as regards the disease factor.

Calves are separated from their mothers 3 days after birth and are thence forward hand-reared until they are weaned some 9 months afterwards, so as to allow for the highest possible cream yields from the cows.

Bull calves are kept for beef cattle and are cheaply reared off the natural grazing. They are sold normally, due to lack of sufficient grazing area, when they are approximately 2 years old (400-500 lbs), to beef cattle farmers for further fattening and eventual sale as baby beef.

The heifers are kept to replenish breeding stock but those found unsuitable are culled out of the herd and sold.

#### CALF CROPS:

With normal environmental conditions prevailing the farmer expects from 90-95% calving each year and from 25-30 calves are thus born each year. Occasional losses have been experienced but have thus far been of a minor nature even through the serious drought of 1949 for example.

#### DAIRY AND ANIMAL PRODUCTS:

Products obtained from the herd are milk, cream and beef, of which only cream and beef are produced for sale. The farm is not considered to be economically outside the milk zone of Port Elizabeth with fast motorised transport, but the farmer

prefers/.....

prefers to retain the skimmed milk on the farm chiefly for the labour to whom it is a marked attraction, while in the future with the extension of dairying the excess milk will be more profitably fed to pigs and poultry.

CREAM CROP:

The Watersmeet cows each yield a mean of about 6,000 lbs of milk / year from which approximately 600 lbs of cream is obtained, equivalent to roughly 300 lbs of butter fat each year from every cow. This yield is considered to be a good one according to the farmer.

The separated cream is collected in 10 gallon cans and despatched twice a week by Railway bus, to a Co-operative Butter Factory in Grahamstown where it is manufactured into butter.

CREAM:

Cream produced on the farm contributes approximately 50% to the annual income which is an admirable feature of the farming system with no monoculture of a single cash crop.

CREAM PRODUCTION:

The Watersmeet cows are milked twice a day, namely in the cool of the early mornings and evenings.

Milking takes place in a well constructed airy, brick and concrete cowbyre situated in the homestead paddock.

To gain time and labour and to facilitate cleanliness in production the farmer has installed mechanical milking apparatus which operates on a vacuum system. The vacuum is supplied by an engine operating an exhaust pump from which a pipe system leads into the byre and serves each cow stall. It is planned eventually to instal more machines to provide completely mechanised milking.

At both milkings the cows receive shredded green fodder of maize stalks, oats or lucerne, depending on which is available, together with a generous ration of concentrated protein and carbohydrate feeds to ensure the highest possible production of milk and cream.

BEEF:

The proportion of the contribution of beef to the annual income fluctuates from year to year, but it is nevertheless not considered of any importance in comparison to the other main sources of income.

The beef cattle are cheaply grazed and sold directly off the natural grazing, when about 2 years old. They are sold normally in November or December after the gains derived from the Spring grazing, when they are in their best condition and when prices are normally highest. The cattle are sold usually at stock fairs held in Alexandria, the nearest marketing centre, to which they are driven, the short distance of 14 miles having little or no effect on their condition.

SUPPLEMENTARY CROP PRODUCTION:

Out of the total area of 80 morgen of agricultural land approximately 60 morgen or 75%, are normally given over to fodder crop production used in the preparation of hay, silage and greenfeed for dairy cattle. A small proportion of the maize crop is reaped, however, each year for grain for the Native labour food rations.

With rainfall distributed fairly evenly over the winter and summer half years, and a growing season extending throughout the year, both winter and summer crops can be cultivated under dry land conditions. Among the most important crops cultivated are oats and millets, legumes such as cowpeas and lucerne, maize and artificial pasture grasses. Occasionally small sowings of barley, wheat and linseed are also made. These crops are grown for use on the farm and only rarely as cash crops.

CROP ROTATION:

The ideal envisaged by the farmer is a 5 year rotation plan with each crop grown on any land once only in a 5 year period. This plan is not yet fully implemented and awaits official sanction from the Department of Agriculture, when a comprehensive farm plan is drawn up under the Master Plan of the Salem Soil Conservation District.

CROP/.....

CROP CULTIVATION:

Supplementary fodder crops are grown primarily for use during the Winter and Summer seasons (J.J.A. and D.J.P.) when rainfall is lowest and the natural grazing less plentiful.

OATS:

Oats is the chief crop grown for Winter feeding from May to October. It normally occupies  $\pm$  20 morgen of land and is sown at intervals in the Autumn from March to April, depending on the Autumn rains. The crop is grazed on the land, 3-5 grazings normally being obtained, with a grazing rate of 2 cows / morgen; and the farmer estimates that  $\pm$  40 tons of fodder / morgen are normally available for grazing each year.

Millets, Maize and Cowpeas are the chief fodder crops grown for the Summer season.

MILLET:

Millet is sown on approximately 10 morgen of land annually. It is sown at intervals from October to November, the staggered sowing making for an extended grazing season. Like oats the crop is grazed off the land, 3 good grazings normally being obtained at the rate of 2 cows / morgen; the amount of grazing normally available being estimated at approximately 40 tons / morgen.

COWPEAS:

Cowpeas normally occupy 10 morgen of land sown also in October - November depending on the Spring rains. The crop is not grazed on the land but is cut as silage for stall feeding at milking times. The annual yield is normally  $\pm$  20 tons / morgen, according to the farmer. The roots and stubble left after the cowpea season are ploughed into the soil adding valuable nitrogenous material to their organic content.

MAIZE:

Maize is utilized as a greenfeed chiefly in the late Summer (February) and Autumn seasons. It normally occupies  $\pm$  20 morgen/.....

morgen of land and is sown at intervals from September to October. This crop too is not grazed but is cut for soilage when the cobs are just beginning to form and before the stools become less succulent and too fibrous. The staggered sowings again provide an extended season for soilage preparation. A small proportion of the crop is allowed to mature for grain, the amount varying from year to year, but the farmer estimates that if the whole crop were reaped a yield of up to 8 or 9 bags / morgen could be expected. The mature stools, after the grain has been reaped, are turned into silage.

LUCERNE:

Lucerne at present occupies two small lands together covering some 6 morgen of land as illustrated on Map 21. The crop is not sown annually but is grown continuously for 4 or 5 years on any single land. It is used both for Summer and Winter greenfeed and for haymaking. The crop is never grazed off the land but is stall-fed, well mixed with other green fodder crops.

Unlike lucerne on Mosslands or Coniston for example, where 6 heavy cuttings are obtained each year, the crop is not irrigated on Watersmeet. Yields are consequently lower and only 2-3 heavy cuttings are obtained normally annually.

ARTIFICIAL PASTURES:

Approximately 16 morgen of land has been planted to artificial pastures containing such grasses as Setaria, Phalaris and Napier (Map 21). These pastures have considerably increased the carrying capacity of the farm for dairy cattle. They will eventually be included in the rotational grazing plan, but are at present used only at irregular intervals when the natural grazing is being rested in one of the grass camps. The Napier grass it should be noted is not grazed on the land but is cut for soilage for stall feeding at milking times.

NOTE:

The expansion of dairying on Watersmeet will require an extension of fodder-crop production. The farmer plans to

establish/.....

establish new lands on the large stretch of level river land noted above as bounding the Kariega River where it is planned to develop 30 morgen of crop-land, which will be devoted almost entirely to lucerne cultivation for greenfeed and hay. The importance of these level, largely alluvial lands is further enhanced by the fact that it will be possible to irrigate them from a dam which, it is planned to construct across the Kariega in the convenient gorge immediately above the reach which flows through the river lands.

FARM HAULAGE AND TRACTION:

For farm portage two large tractors are available which, according to the farmer, are ample for present needs. In addition he owns a modern car which is used for farm business and for pleasure.

Considering the bulk of ploughing, cultivation and portage involved in both chicory and fodder crop production, fast mechanized traction power is an essential feature in the farm organisation, according to the farmer. He owns two tractors which perform these duties. In addition the tractors are used for power for driving the chicory and fodder crop shredding machines. A sturdy jeep completes the transport facilities of the farm. It is used for moving about the rough farm roads and for haulage when the tractors are occupied in more urgent tasks.

FARM POWER:

Apart from the power supplied by the tractors for the shredding machines, two small internal combustion engines supply the homestead with electricity for lighting purposes and the power for the vacuum plant used in the milking process respectively.

FARM LABOUR:

The labour complement of Watersmeet comprises the farmer and 10 permanent Native male workers who together with their families number about 35 persons in all, excluding small children.

The permanent workers are clothed largely by the farmer

and/.....

and each family is allowed to cultivate  $\frac{1}{2}$ -1 morgen of land for cultivating subsistence crops such as maize, sweet potatoes, beans and Kaffircorn for their own use Map 21. Each permanent labourer is also allowed to graze 3 to 4 head of cattle and in addition they receive all the surplus skimmed milk from the dairy, which is again a significant attraction to labour. Any food shortages are in addition made good by the farmer from home-grown maize as noted above.

The 10 male workers are employed throughout the year in the various activities concerning chicory cultivation and dairying, while the women folk are employed from time to time in piecework upon chicory cultivation, and in housework. The wages earned by the permanent workers is about £1. 10. 0. per month while the women pieceworkers are paid 1/6 together with a 3 lb. ration of maize, per day of work.

#### HOUSING:

The farm labourers are housed here too in huts of typical design constructed of wattle and daub and have grass thatched roofs. The huts are situated in close proximity to the Native gardens (Map 21) and sufficiently close to the homestead F to make for readily available centralized labour.

The farm homestead F, as noted earlier, is an unimposing temporary structure of wood and is situated on a small rise in the S.W. extremity of the farm where it overlooks the agricultural lands immediately to the North and with the cowbyre S, calf pens and the chicory kiln clustered conveniently around it. In addition the house as the organising centre of the farm is situated conveniently close to the bus halt at Gorah for easy organization of the transport of both chicory and cream.

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CONCLUSION.

In concluding this work it is hoped that the sample survey of different farming types, presented above, will have served to project the reader directly into the rural landscape of the two Divisions of Albany and Bathurst and that he has thereby been able to gain an understanding of some of the details and complexities which collectively go to make up the agricultural geography of this area.

As far as possible the farm units have been selected to be fully representative of the different farming types studied. In every case, however, it is the writers opinion that the farm unit studied is probably representative of the better class of farm encountered in the area. Although a study of farms of a poorer quality would perhaps have, if included here, served to yield a more balanced picture of farming conditions, the limits set by time and opportunity have not made this possible. In each case an attempt has been made to view land use and farm practices in a truly geographical setting although on many occasions the resources of agriculture have been drawn upon to clarify and explain certain aspects not evident from direct study of the landscape.

No attempt has been made to link the field studies, presented above, into a single continuous narrative nor is it presumed that a complete picture of the geography of the several farming types considered, may be drawn from the study of individual farms of each type. The field studies are a series of separate basic analyses and descriptions of the anatomy and morphology of rural units of human occupance and endeavour. Although, as noted above, such separate studies cannot provide us with a complete picture of the agricultural geography of the area they do reveal much of the detail upon which such a generalised picture must ultimately depend. The true value of these studies, therefore, rests in the fact that they provide a key to the broader study of the

landscape/.....

landscape in this area. Here then are some of the details, may they serve as pointers to the broader study of farming activities in this portion of the eastern Cape - a region thus far very much neglected by the geographer.

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ABBREVIATIONS.

Where a study of the elements of climate has been made months are designated thus:-

- J = January.
- F = February.
- M = March.
- A = April.
- M = May.
- J = June.
- J = July.
- A = August.
- S = September.
- O = October.
- N = November.
- D = December.

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



























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### CHARACTERISTIC SHEET.

 <u>Grassland</u>	 <u>Donga Development and Contour Bank.</u>
 <u>Bushland and Low Forest.</u>	 <u>Marshland.</u>
 <u>Karroid Scrub.</u>	 <u>Vlei or Natural Water-hole.</u>
 <u>Pineapple Land.</u>	 <u>Stream with Dam.</u>
 <u>Chicory Land</u>	 <u>Wind-mill Operated Bore-hole with Pipeline Extension.</u>
 <u>Citrus Orchards.</u>	 <u>Contour Lines.</u>
 <u>Lucerne Land</u>	 <u>Trigonometrical Beacon.</u>
 <u>Artificial Pastures.</u>	 <u>Fences.</u>
 <u>Native Kroal Gardens.</u>	 <u>Stone Walls.</u>
 <u>Undifferentiated Crop Land.</u>	 <u>Farm Homestead.</u>
 <u>Deciduous Plantation Trees.</u>	 <u>Farm Shed.</u>
 <u>Coniferous Plantation Trees.</u>	 <u>Native Huts.</u>
 <u>American Aloe Hedges.</u>	 <u>Subdivisions of Farm Units.</u>
 <u>Spineless Cactus Land.</u>	 <u>Roads and Bridges.</u>
 <u>Terraced Land.</u>	 <u>Railways.</u>