

**The place of animal production in the agricultural economy of South Africa:
Results and formulae for the future**

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The place of animal production in the agricultural economy of south africa : Results and formulae for the future

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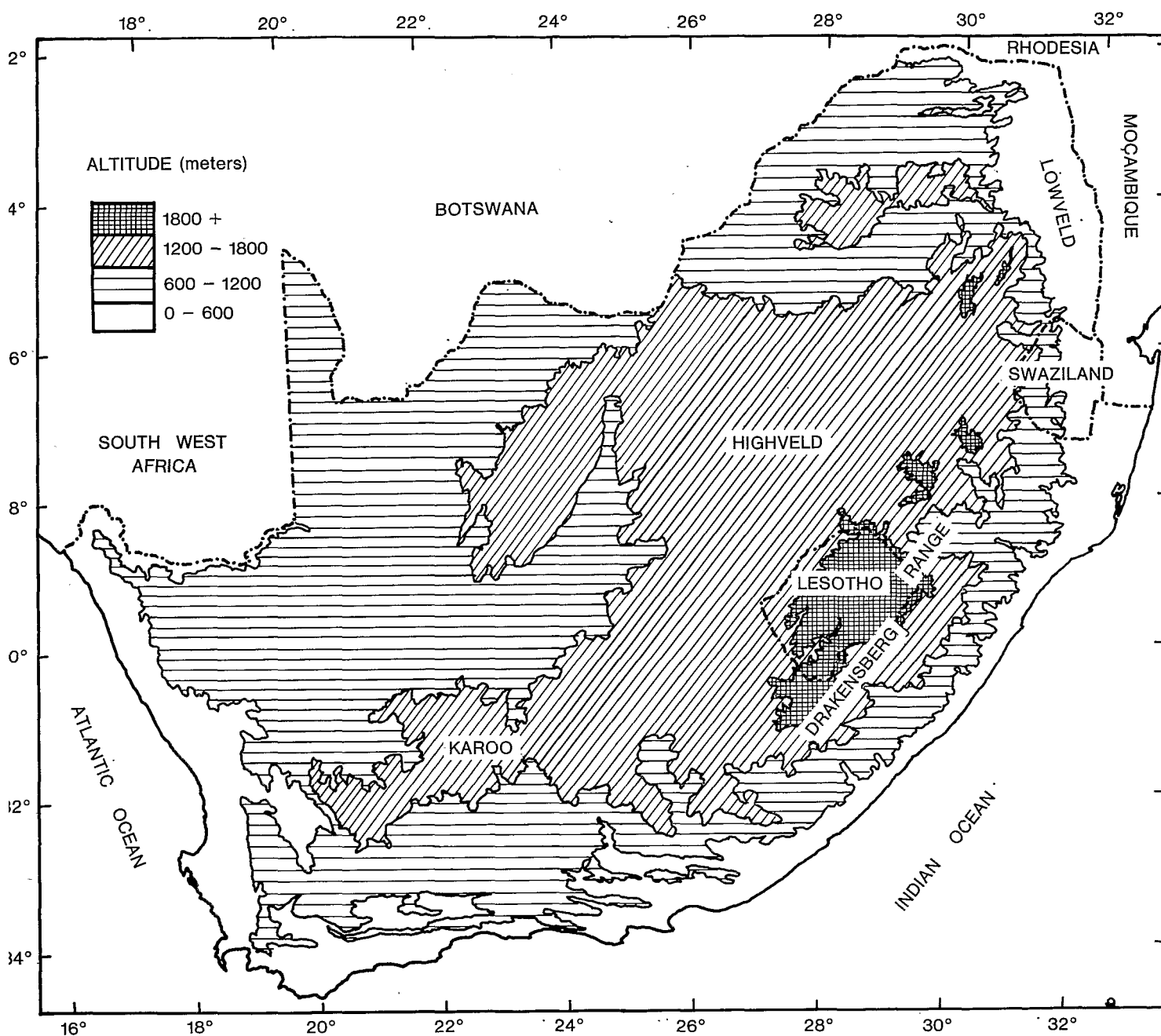


FIG. 1 - The altitudinal Zones of South Africa.

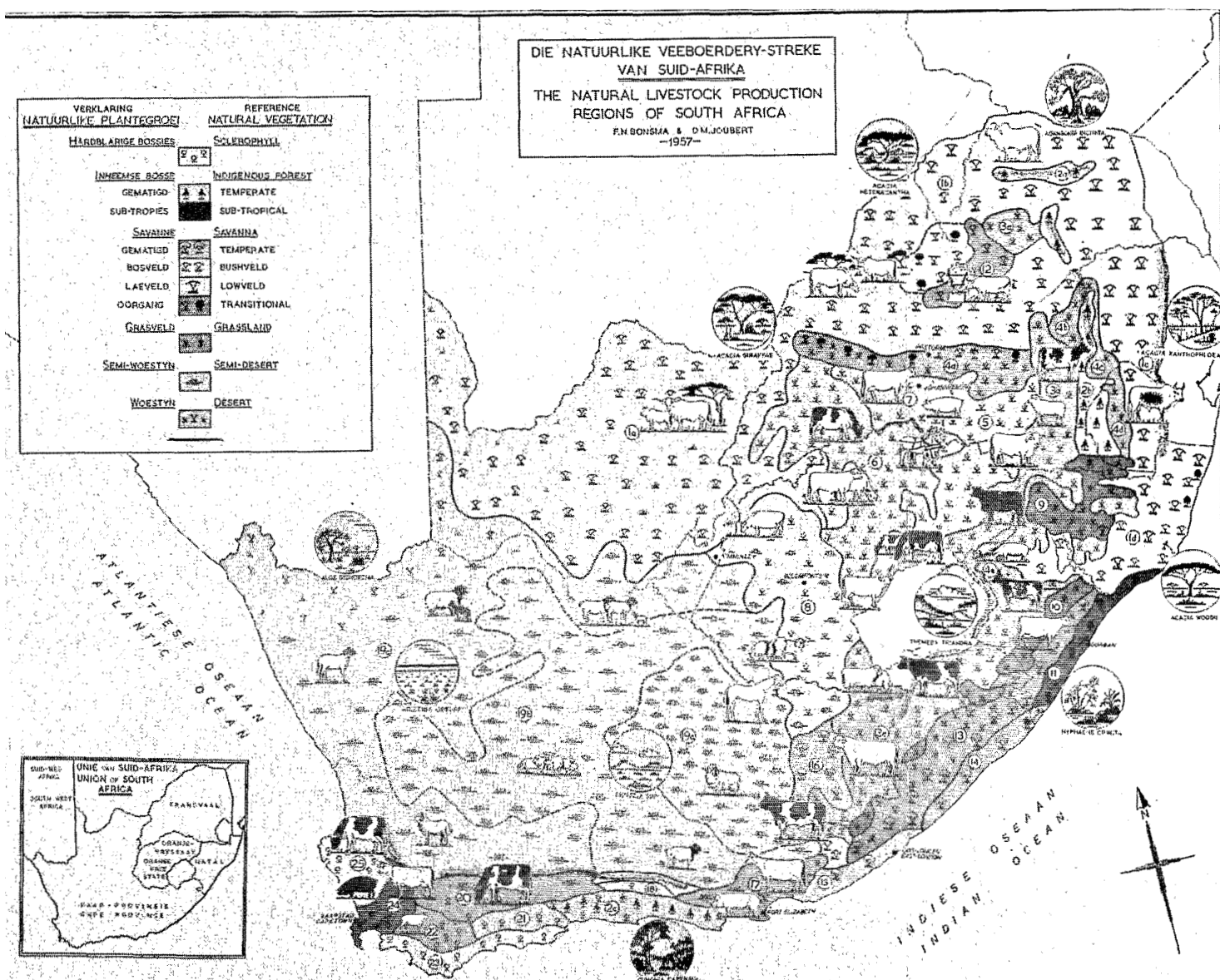


Fig. 2

THE COUNTRY

The Republic of South Africa forms the southern tip of the African continent and lies between the 22° and 35° southern latitudes. Its four provinces — Cape, Natal, Orange Free State and Transvaal — occupy an area of 122, 111, 000 ha; this figure excludes the independent Lesotho and Swaziland kingdoms which form part of the natural geographical complex.

Though only a relatively small portion of the northern Transvaal lies within the tropics, part of the country is subtropical: either semi-arid subtropical such as most of the northern territories, or the humid subtropical belt along the eastern Natal coast. A diversity of other climatic patterns is, however, characteristic of South Africa and this must be understood before comprehension of the livestock industry is attempted.

In broad terms the country may be likened with an inverted saucer, the rim being a low-lying belt extending along the

entire South African coast. (See Figure 2). The inland consists of a vast central plateau which is either approached gradually from the west; via several successive plateaux at increasing altitudes from the south, or at a fairly steep incline from the east. The central inland plateau is, however, bordered along its eastern edge by a long mountain chain (Drakensberg) which runs in a north-south direction, and over 3,300 m at its highest elevation. The plateau moreover rises to a height of 2,000 m along the Witwatersrand close to its northern boundary, and then drops gradually via the savannah country of the northern Transvaal to an altitude of some 400 m in the tropical Limpopo basin where the Republic borders on Rhodesia. Also to the north-east, the so-called 'Lowveld' once again simulates the edge of the inverted saucer and includes the relatively humid subtropical boundary with Mozambique.

In terms of rainfall the above physiography along with prevailing winds and ocean currents give rise to a clear, broad

pattern: Firstly the rainfall intensity unmistakably increases from west to east, from below 100 mm per annum along the Atlantic coastline to anything up to a yearly average of 1,500 mm along the eastern Indian ocean seaboard. The 500 mm isohyet in fact halves the country from north to south practically midway between the latter two extremes. In terms of acreage, however, it is estimated (see Table 1) that only 35.3 % of the country receives a total annual precipitation exceeding 500 mm. It will be appreciated, therefore, that South Africa is very largely a semi-arid country, and its water resources require constant and serious attention. Moreover, the distribution of its rainfall is important. Apart from a limited coastal area in the extreme south which receives rain throughout the year (Region 2c) (*), the distribution elsewhere is strictly seasonal. In the south-western Cape the climate is typically mediterranean with most of its

(*) Regions refer to Figure 1.

rain concentrated in the winter months (Regions 18, 19c and 20-25). The remainder of the country has a summer rainfall, one which is dominated by swift thunder showers. Except for isolated areas of high altitude, summer temperatures tend to be high throughout the country, but only restricted low-lying coastal and tropical regions are completely frost-free. Winter snow falls too are uncommon, barring, of course, the higher mountain peaks.

TABLE I

Mean total annual rainfall distribution in the Republic of south Africa
(Joubert, 1970)

Rainfall (mm)	Area (%)
Below 250	30,3
250-500	34,4
501-750	25,1
751-1 000	7,4
Above 1 000	2,8

The natural vegetation reflects closely the rainfall pattern. Along the western coast desert, succulents predominate which gradually change to a somewhat unique macchia (Cape flora) as one approaches the western Cape peninsula. Evergreen forest dominates the southern coastline, which in turn gives way to a luxurious, distinctly more tropical type of vegetation as one ascends along the eastern coast towards Mozambique. Moving inland once more from the west, the semi-desert flora changes from annual grass to a mixture of both low scrub and perennial grass. The highest rainfall of this vast region - collectively known as Karoo which means dessicated (Region 19a, b and c) - occurs along its eastern border where it approaches 500 mm per annum. Further north the plateau levels out to form a large triangular treeless grassland (Highveld) (Regions 5-7) with merges into the savannahs of the northern regions. Of the latter various gradations are identifiable depending upon soil types and winter temperatures. Generally, though, the closer to the tropics the taller the tree species. All along the Drakensberg escarpment (Region 3b and c) grassland is the most permanent feature, much of the country being above the natural tree-line; only in the protected ravines do patches of natural forest in fact occur. But the grasses tend to be shorter, and the more prolonged and severe winters also reduce their period of active growth.

It is important before one attempts to assess the agricultural industry and its livestock branch, to take note of terms commonly used in South Africa to describe the grazing value of natural pastures: The term 'sweet veld' refers to a pasture which grows on fertile soil and matures slowly during a fairly extended

growing season. Such pastures will, even when frosted down in winter, retain their feed value and in the areas concerned feed provision centres around the quantitative or supply aspect. 'Sour veld' on the contrary refers to pasture which responds very rapidly to spring rains and concomitant rising summer temperatures, but which rapidly seed and thereafter relapses into a fibrous state of low feeding value. In winter the digestibility of the latter pasture drops to nil and the crude-protein content hardly exceeds 2.5 %. This gives rise, therefore, to pronounced qualitative problems. Of course, various intermediary types occur between these extremes.

THE AGRICULTURAL PATTERN

Broadly speaking, the winter rainfall region (coastal mediterranean climate) has the most stabilised agricultural pattern in the country (Regions 20-25). This is composed of intensive fruit and vine culture in its central core of higher rainfall, along with wheat production on the outskirts wherever arable land occurs. The arid Karoo in its entirety is a livestock region, sheep and goats providing the major source of income (Regions 19a and b). The more eastern coastal regions may be justly described as mixed farming areas and they are dominated successively as one traverses the distance between the Cape peninsula and the northern Natal coast by forestry, chicory, pine-apples and sugar cane (Regions 2c, 15 and 11), with vegetable and fruit growing and small-scale dairying interspersed between. The Highveld of the inland plateau is the major dryland cropping area, with maize growing as the major enterprise, although other summer crops such as groundnuts, sunflower, sorghum, potatoes and beans also play a significant rôle. Lands lying fallow in summer may, however, also be put to wheat in winter. The savannah territories (Regions 1a, b, c and d) are once again largely reserved for livestock; sheep or cattle depending upon the locality. And finally, this brings us to the Drakensberg mountain range area which in itself supports a dense livestock industry, but which also merges gradually into a rich mixed farming area (Regions 9 and 10) as one descends eastward down towards the Natal coast.

In an outline of the South African agricultural picture one cannot, however, ignore the very significant part played by irrigation farming. Currently the total area watered either permanently or seasonally, mainly by dams and rivers but also by underground supplies, is in the region of one million ha, and this is bound to increase by another 40 % before the end of the century. Here much of the country's wheat is grown and practically all of its tobacco, apart from such crops as alfalfa, cotton and citrus. This no doubt has a clear bearing on the animal industry, particularly as a source of essential stock feeds.

TABLE II

Livestock numbers
(Department of Agricultural Economics and Marketing, 1970)

Cattle	12 600 000
a) Meat and Milk types	8 000 000
b) Indigenous (non-developed)	4 600 000
Sheep	39 900 000
a) Merino	30 533 000
b) Karakut	1 746 000
c) Other woolled breeds	3 026 000
d) Non-woolled (mainly meat breeds)	4 595 000
Goats	5 520 000
a) Angora	1 200 000
b) Boer goat (meat type)	1 500 000
c) Others	2 820 000
Pigs	1 500 000
Horses, Mules and Donkeys	800 000
Ostriches	40 000
Poultry	20 000 000

THE LIVESTOCK SECTOR

(a) Cattle

The cattle population of the Republic at present totals in the region of 12.6 million head. Statistics show that this figure has remained relatively constant over a period of several decades, but scrupulous analysis reveals significant changes in its composition. There has been a marked change-over from dairy to beef production, the current ratio probably being in the region of 20:80, compared with a 40:60 ratio some ten years previously. Moreover, due to both the disappearance of the draught-ox from the agricultural scene and an increased tendency to market steers, and lately bulls, at a younger age, often following intensive fattening, the turnover has been stepped up considerably. The relatively smaller dairy cow population on the other hand has, through raised levels of efficiency and more intensive methods of feeding, been able to supply the local dairy-product requirements in all but short-term periods of severe drought.

In the beef industry the indigenous Afrikaner breed continues to provide the foundation, but in contrast to earlier years there is an increasing tendency towards cross-breeding with a view to producing an earlier maturing calf, more suitable for fattening. In the latter connection it is significant to note that the breeds traditionally employed for this purpose, for example the Hereford, are rapidly being replaced by relatively new-

TABLE III

Production of main animal products

(Department of Agricultural Economics and Marketing, 1970)

Beef and Veal.	410 800 tons
Mutton, Lamb and Goat.	195 000 tons
Pig-meat.	72 000 tons
Poultry.	89 800 tons
Eggs.	159 400 000 dozens
Wool.	140 200 tons
Mohair.	5 000 tons
Hides et Skins :	
a) Cattle and Calf.	34 309 tons
b) Sheep and Goat.	22 195 tons
c) Kara Kul.	1 403 315 skins
Milk.	3 035 000 000 liters
a) Fresh used for consumption.	1 197 400 000 liters
b) Products (butter, cheese, etc.).	1 837 600 000 liters

er imports, such as Charolais, Simmental and Brahman. On the dairy front the Friesian has always been dominant, followed by Jersey, Dairy Shorthorn, Red Poll, Ayrshire, Brown Swiss and Guernsey, in that order. The indications are, however, that while the Friesian is further strengthening its position, some of the other dairy breeds are rapidly losing their popularity; in fact, to such a degree that they might disappear from the scene altogether.

(b) Sheep

Of the close on 40 million sheep in the Republic, at least 35 million are woolled sheep, predominantly fine-woolled Merino of a distinctly South African fine-wool type. Other woolled breeds include German Merino (Merino Fleischschaf), Corriedale, Dohne Merino and Dormer (the latter two, namely, locally developed). The non-woolled breeds include an expanding Karakul population (1.8 million), the popular locally developed Dorper mutton sheep, and several indigenous fattailed breeds and types, though rapidly declining in numbers. However, wool production being one of South Africa's primary industries with the total clip in the region of 140,000 metric tons, a large amount of mutton obviously reaches the market virtually as an inevitable by-product. The most recent trends in this industry reflect the decline in wool prices on the international market, causing a drastic change-over from wool to mutton and pelt production in the more arid regions, and to beef and lamb production in areas of higher rainfall.

(c) Goats

The country's goat population is composed of some 1.5 million highly bred Angoras which support a reasonably prosperous mohair industry, along with 4 million meat-type goats of an indigenous type. Though the majority of the latter are found in African tribal areas,

attempts by European farmers to improve their meat qualities have been particularly successful and led to what is known as the 'Improved Boer Goat'. These animals are becoming increasingly popular in many parts of Southern Africa as browsers of severely encroached bush, alongside beef cattle. Although most of the popular European breeds of milch goat (Saanen, Alpine) are encountered, numbers are comparatively small, their enthusiastic breed society rarely exceeding 35 members.

(d) Pigs

Compared with most countries of Europe the supply of pig meat remains low at about 8 % of the total meat production. Nevertheless a pig population of slightly over 1 million has always figured prominently in the livestock industry, half of which consists of improved Landrace types along with a small number of Large Whites (Yorkshire). The latter are in the main raised intensively, the best of bacon sides and hams, however, being exported. Through the years the pig industry has had to adapt to shortages and surpluses as caused by changes in supply and demand of other forms of meat. But with an increase in human population and changes in its consumer pattern the pig is undoubtedly steadily coming to the fore, also in its own right.

(e) Poultry

The poultry population is estimated at 20 million plus. No other branch of the livestock industry has, however, undergone such drastic change in recent years. In the first place the small producer has virtually disappeared. Broiler production is now controlled by less than a dozen large concerns and the annual consumption currently exceeds 50 million chickens which are marketed countrywide through supermarket chain stores. This has had an obvious effect

on meat purchasing trends of the consumer public. Secondly, egg production is rapidly following the same pattern, but in an effort to protect the smaller producer at least for the time being, though also to check severe overproduction, units exceeding 10,000 layers are permitted only on formal approval. The fact of the matter, however, is a complete change-over from predominantly outdoor production systems to controlled environment battery units which operate at an extremely high level of efficiency. There is no place, hence, in the present set-up for the inefficient producer.

(f) Equines

The total equine population numbers less than 1 million. Horses are rarely used nowadays for heavy draught purposes, although in the western Cape they continue to do light work in the vineyards. Otherwise horse breeding is confined to the raising of Thoroughbreds and rising stock, the latter, however, increasingly for purposes of recreation in and around the bigger towns and cities. The State supports but two equine breeding project : the one for Percherons which is still considered the most useful draught breed, and the other for the Nootgedacht pony, a riding horse admirably suited to routine work on large sheep farms or cattle ranches. The mule and donkey on the other hand, play a role essentially in areas afflicted by horse sickness, a severe viral endemic of Southern Africa.

(g) Ostriches

In recent years there has been a significant revival of the ostrich industry, the total number under domestication being in the region of 40,000 adult birds. Yet whereas plumes provided the major source of income in earlier times, at present the tanned skins are the most prized product. Much of the meat is sold in a salted, dried form, the remainder of the carcass being turned into meat and bone meal.





REGIONALISATION OF THE LIVESTOCK INDUSTRY

(a) Cattle

Traditionally dairy cattle were concentrated round the urban centres, but as transport and refrigeration facilities improved, the tendency has been for producers to move farther away into regions where feed can be grown at lower cost, thereby improving the economics of the industry. With regard to fresh milk, most is in fact presently produced in the more temperate areas of high rainfall on both sides of the Drakensberg range (Region 3b, c, 4e and 5) and in the semi-intensive mediterranean climate cropping areas of the western Cape (Regions 22-25). Rather than the completely specialised dairy units of earlier times in which case most feed was purchased, the tendency hence is to integrate with other forms of farming, mainly arable. Yet there still exists a decided tendency to produce cream for butter and cheese manufacture in the drier parts of the country, even to the extent that the cow is partially milked and the remainder left for the calf to suckle, a system known as dairy ranching (Region 1a). Although the long-term economics of this type of enterprise are often questioned, the argument in favour is that

it provides the farmer with a reasonably steady monthly income which neither cropping or beef cattle farming can ensure.

The problems of the dairy cattle industry fall into either of four categories: breeding, feeding, management and health. Breeds *per se* cannot be put forward as an obstacle for the country already possesses as many different breeds as one could possibly wish for. The propagation of superior genetic material, however, is progressing relatively slowly although the means are readily available in the form of artificial insemination, milk recording and performance and even progeny testing. Moreover, stud breeding is controlled by an Act of Parliament and breed societies are highly organised. Thusfar, however, the emphasis has clearly been too pronounced in terms of purely subjective evaluation.

Nutrition at present probably lies at the root of more problems than any other single factor. This includes the effects of winter nutritional depressions of both a qualitative and quantitative nature which not only retard growth but also impair the reproductive rate of stock. But nutrition is hardly separable from management, and many causes of reduced productivity, such as low fertility, may be ascribed to a combination of inadequate nutrition along with faulty management. Likewise disease, even though a serious problem in South Africa

which ranges from protozoal and viral endemics to practically all known erosion diseases, can be effectively controlled by routine inoculations, dipping and other forms of prophylaxis which are strictly applied.

The beef industry can be divided into four major production sectors: Firstly, the extensive ranching areas situated in the savannah regions of the northern Cape (Region 1a), northern and eastern Transvaal (Region 1b and c) and northern Natal (Region 1d). Here the climate ranges from a relatively tick-free but phosphate deficient condition to a tick-infested area but without any obvious mineral inadequacies. Indigenous stock form the basis, but latterly there exists an increasing tendency to crossbreed with a view to producing weaners with a higher growth potential, for fattening elsewhere. The creation of the Bonsmara breed (3/8 Afrikaner: 3/16 Hereford: 3/16 Shorthorn) along the lines of the American Santa Gertrudis, was also inspired by this line of thought.

Secondly, there are the semi-extensive grazing areas, particularly along the Drakensberg escarpment but also in the form of transitional regions between the aforementioned extensive sheep farming and cattle ranching areas and the semi-intensive cropping areas (Regions 4 and 8). In most of these, climate in no way restricts the use of exotic beef of dual-purpose breeds and herds of Hereford,

Sussex, South Devon and Simmental cattle are not uncommon. At the higher altitudes of the Drakensberg grazing area an indigenous dual-purpose breed known indeed as the 'Drakensberger' is gaining popularity (Region 3b). Although closely bred for many years, a breed society was not formed until 1947, and it is only very recently that associate membership of the South African Stud Book Association was obtained under the aforementioned stud book act.

The third category is one of intensive feeding and fattening of slaughter stock, the latter generally purchased for the purpose. This occurs mainly in the semi-intensive cropping areas, particularly in parts where maize is grown along with other fodder crops (Regions 5, 6 and 12). Due to a somewhat unfavourable maize : beef price relationship in earlier years, the economics of intensive fattening have thus far been rather shaky, but the situation is improving rapidly more and more cattle are being marketed every year via these channels. (In 1969, out of a total maize production of 4,690,000 tons only 1,769,000 tons went to animal consumption).

Finally, in the western Cape (Regions 20-25) a major effort is being made to breed beef from the milk cow population by crossbreeding with lean meat-breed (Charolais, etc.) sires.

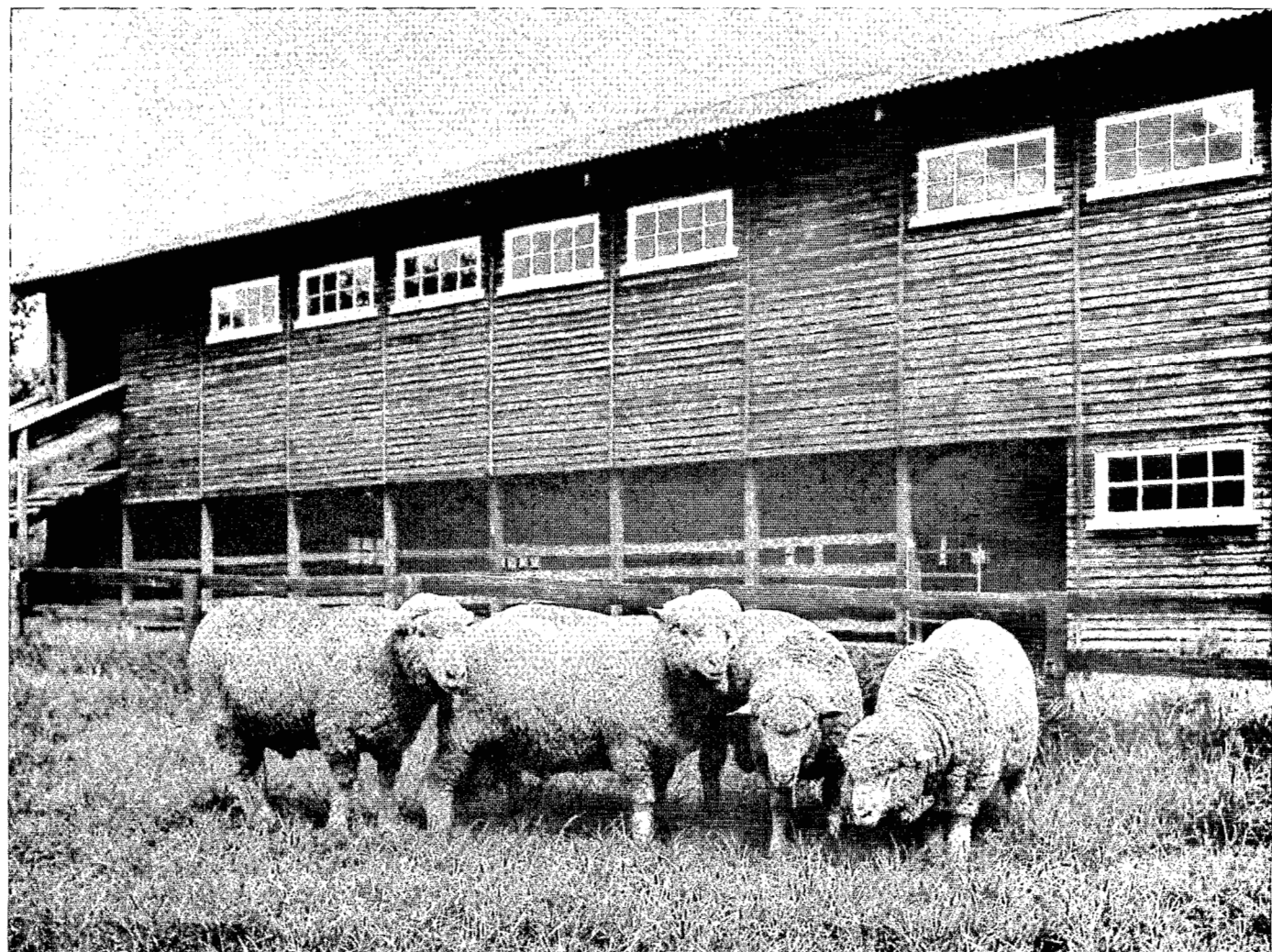
(b) Sheep

The fine-woolled sheep industry is concentrated firstly in the semi-desert Karoo regions (Regions 19a and b). This is a healthy area and nutrition poses the greatest single problem, periodic droughts being a constant hazard. It is obvious moreover that farmers generally have overestimated the carrying capacity of their natural pastures and this has resulted in progressive deterioration of the available resources. The Karakul pelt industry is in a healthier economic position at the moment than the wool industry. However, whereas the arid regions (below 250 mm per annum) are considered the obvious domain of Karakul sheep (Region 19c), there is a tendency at present for them to penetrate the wool producing districts, purely because of understandable economic considerations. Karakul sheep, of course, can overcome a drought situation more readily since the lamb is slaughtered at birth thus easing the burden of the dam as well as the pasture. In both the wool and pelt industries the major problems are related to the quality of the end product, along with the reproductive capacity and rate of the female stock. Research is currently largely geared to the solving of these problems.

Non-woolled sheep, Dorper in particu-

lar, are concentrated in areas surrounding the central Karoo (Parts of Regions 1a, 19b and c), but predominantly situated to the north where Karoo scrub vegetation makes way for sweet, low bush savannah. The major problems of the industry are turnover, i.e. fertility and, particularly, fecundity, so-as to keep production costs as low as possible in view of surplus lamb and mutton on local as well as overseas markets. The relatively small number of fat-tailed indigenous sheep still encountered (Black-head Persian, Afrikaner, etc.), play a relatively insignificant role as meat producers and are largely used as grading-up material for Karakul-pelt production.

The Drakensberg region (Region 3b and c) in its entirety on the other hand, also carries a large woolled sheep population. Here a need is felt for dual-purpose mutton sheep, without sacrificing the quality factors associated with Merino wool. Corriedale, German Merino and Dohne Merino already play their part, but yet higher fertility and, once again fecundity in particular, along with a greater growth potential are sought as part of the concept of further intensification. Apart from strictly managerial problems leading to low reproductive rates and high lamb mortality, plus low wool yields due to ineffective selection policies, the major problem is one of



nutrition. The whole region concerned is composed of typically 'sour' pasture with high feed values in spring and summer, but embracing severe winter nutritional depressions. This calls for intensive feeding during the winter months and although highly effective recipes have been made available by research, the economics of such practices in relation to the price of the end product usually remained questionable. In this regard, the current widespread use of non-protein nitrogen (urea and biuret) in supplementary licks with minerals and a carbohydrate (maize meal or cane molasses) has brought about a significant change in the whole pattern of stock farming.

Finally, the winter rainfall western Cape area (Regions 20-25) can be considered as the *par excellence* intensive lamb production area with German Merinos and the locally developed Dormer as the main breeds. Research on all aspects of intensified lamb production is the major interest of the animal scientists here.

(c) Goats

Over 80 % of the total mohair clip of roughly 5 million kg is produced in a fairly restricted area south of the true Karoo (Southern Regions 19b and 17). Both the relatively temperate climate and the bush-type vegetation favour the Angora goat, which in reality is a rather frail animal easily succumbing from drastic changes of temperature and nutrition. The major problem confronting the industry apart from those related to mohair quality, is the reproductive rate, habitual abortion in particular. The basis of this endocrinological disturbance is probably a genetic one, to some degree associated with very close breeding over many generations. Intensive research and extension services are, however,

constantly being maintained in order to keep the problem at bay.

So far as meat goats are concerned, genetic improvement of growth rate and carcase quality, without detriment to an inherent high fertility and ranging ability appear to be the most urgent problems. From a managerial viewpoint, it is essential, however, to study very closely the browsing behaviour of these animals along with their correct integration with cattle, so-as to prevent the very grave deterioration of natural resources which is so evident wherever goats have been permitted to denude the vegetation to a state which is beyond repair.

(d) Pigs

The pig industry may be divided into three broad categories: Firstly, big specialised producers, usually not far away from either the major urban centres or large manufacturing plants. The present set-up and its problems are to a large degree similar to those encountered anywhere else in the world, although high ambient temperatures may locally be responsible for suppressed growth rates in summer. Improved controlled environment housing is, however, geared to overcoming these problems. This on the other hand, creates a serious problem concerning the efficient disposal of manurial waste.

The second group, whilst employing recognised baconer breeds such as the Landrace, integrate pig farming with either grain, dairy or fruit production, and to some degree utilise the by-products of these enterprises in their rations. The system is unstable, though, in so far that these producers are inclined to come in when prices are favourable, but also to get out as soon as prices drop because of a short-term glut. Lastly, there are what might be termed 'unorganised' pig farmers who rely on a fairly large popu-

lation (400,000) of so-called 'native pigs of a larger type'. A fair proportion of these animals are to be found in the African tribal areas and they are slaughtered mainly for strictly local sausage manufacturing purposes. Their contribution towards the gross livestock economy is, in fact, therefore, small.

(e) Poultry

The poultry industry is steadily advancing closer to the large urban centres, especially around the Witwatersrand complex, the Durban-Pietermaritzburg complex and the western Cape complex. Indeed, modern controlled environment batteries are becoming increasingly dependent upon reliable municipal water and electricity supplies. Moreover, a close proximity to slaughter and processing plants as well as to the distribution wholesalers, all favour this growth pattern. The gravest problem of the entrepreneur is certainly disease control and since this is very closely associated with feeding and housing, constant consultation with veterinarians, nutritionists and ventilation engineers has become a *sine qua non* to successful business. In order to maintain high levels of efficiency in production it is essential moreover that breeding systems be guided by specialist animal scientists. As in the case of pigs, disposal of manure is a great cause of concern to many producers. Although city gardeners purchased fair quantities in earlier years, this valuable by-product will have to be put to better use in future, particularly in ruminant rations as a source of valuable protein substitute.

(f) Equines

A number of ecological regions of the Republic have traditionally been noted for the excellence of their horse stock. However, whereas in the previous two centuries South Africa was exporting horses, the entire industry has been reduced to a small core of, no doubt excellent, Thoroughbred breeders and isolated enthusiasts scattered throughout the country. Yet while mechanisation has practically ousted the draught animal altogether, it is still felt that the medium-heavy draught horse has a role to play on intensive units, especially irrigation farms, as a deterrent against over-capitalisation. Riding horses, on the other hand, should be used much more widely on extensive stock farms as part of sound managerial practice. It is difficult these days, however, to convince farmers that their concern can be managed with greater effect from the saddle than from the seat of a truck or other motor vehicle.

(g) Ostriches

Despite the ostrich being indigenous to South Africa and, in fact, represents the only truly domesticated species of the African animal kingdom, the industry is entirely confined to an area known as the Little Karoo, midway between the





Great Karoo and the southern coastal belt. With the ostrich serving a luxury trade (plumes and skins), it is obviously a concern of the producers that the industry be kept within reasonable limits since the margin between a thriving restricted industry and one of overproduction is not very wide.

FUTURE TRENDS

It appears reasonable to argue that the dairy industry of a country such as South Africa should aim in the first place at local self-sufficiency. Being the most important protective food, fresh milk obviously is first on the list of

dairy products and the whole price structure should be such as to encourage production realistically in relation to demand. A high level of efficiency is, however, necessary so as to ensure that this does not become a luxury food. Next, it is imperative that any seasonal surpluses — and in a country of seasonal rainfall such surpluses must be anticipated — should easily be diverted to the various markets for industrial milk, without severe curtailment of the farmer's income. The change in the ratio of dairy : beef cattle referred to previously indicates that this has actually happened. On the other hand, there will be a switch-over to more dual-purpose type cows of which the South African Friesian is an obvious example, and females not required for pure breeding

will be inseminated with lean beef-breed semen with a view to producing a calf that can be profitably reared and fattened. The essential role of milk recording to identify the weaker producers on the hand and of artificial insemination to cheaply settle them to beef-breed bulls on the other, is hence very clear. With regard to industrial milk, for many years to come much will continue to be produced off natural pastures, the yields fluctuating sharply from one season to the next. However, dual-purpose females will probably to a large degree replace the specialised dairy breeds, not only in view of the calf economy, but also to obtain a better slaughter value for the culled milker. The possibility of using light-bodied dairy cows (for example, Jersey) bred to heavy lean meat-breed sires for calf production, is actually being investigated and seems economically very sound under semi-extensive conditions, with intensified feeding of the calves after weaning.

Prospects for the beef industry appear more favourable than for most other livestock branches. Not only will the internal consumption be stepped up following the rapidly rising purchasing power of late of the large African population, but conditions apparently are favourable also for export, provided a constant supply of the right quality product can be maintained. It is very desirable, however, that the channels of slaughtering and processing be radically expanded and improved. Moreover, there is a very urgent need in the national beef herd to step up the rate of turnover through increased fertility and more rapid gains in the feedlot.

The wool industry is undoubtedly at the crossroads. The sharp drop in wool prices of recent years has been a severe setback to the industry and together with the detriments of protracted drought a large proportion of producers find themselves in financial straits. It is imperative, however, that a healthy fine woolled population of sheep be maintained in those parts of the country particularly suited to this industry, and not to resort over hastily to other forms of animal production, *inter alia* injudicious crossbreeding with non-wool and fattailed breeds. The Karakul-pelt industry, although showing good returns at present, cannot afford to expand unconditionally, once more in view of luxury articles being easily overtraded. The quality aspect, furthermore, requires constant attention and with a view to creating new markets, pelt colours other than those currently in vogue will probably decide in the long run whether persian lamb can hold its own in a highly competitive international fur trade. It is clear on the other hand, that sophisticated biological techniques will be employed in future to step up fertility and fecundity and, hence, pelt production, without increasing the parent population significantly. And from a natural resources point of view this is most important : South Africa, in none of its grazing areas, can afford to carry any more livestock than the present load.

Indeed, serious efforts are being made throughout the country to reduce stock numbers, without necessarily any reduction in the flow of animal products.

With regard to mutton and lamb the situation is once more clearly precarious. It is most unfortunate so far as the wool grower is concerned, because a shortage on the mutton front could easily have inspired a change-over. However local as well as world-wide surpluses force one to guide producers with caution. On the other hand, it appears reasonable to suggest that mutton and lamb should in future be manufactured to a far greater extent than is currently the case, with the introduction of early maturing meat-breeds (Ile-de-France and Berrichon types) and intensified lamb feeding conditions. Even an attractively tinned, tasty and nutritious product must surely find a market somewhere in this protein hungry world of tomorrow.

What applies to the Karakul is applicable to some extent also to the Angora goat, though larger supplies of mohair might conceivably lead to increased quantities of this product being blended with other fibres. Contrarily, the future will probably see many more meat producing Boer goats in densely wooded regions however in an optimal ration with cattle as demonstrated by research. Yet the mistakes of the past may not be repeated. Never should goats be allowed to continue browsing when the cattle running with them have fully utilised the grass covering of the pasture concerned. Once the latter stage had been reached, both species should be removed to ensure recovery in good time of the total pasturage.

Pig producers will have to make serious efforts to increase locally the relatively low level of consumption. Although South Africans by and large are not great consumers of pork, the most effective means of encouraging consumption is, of course, by way of reduced prices relative to other available forms of meat. With production costs being what they are and the profit margin in pig farming relatively narrow, this cannot easily happen. On the other hand, increased efficiency in larger units may well bring about, such tendencies, meaning that pig meat shall fill to greater extent the shortages of beef experienced from time to time in South Africa. That this is actually possible has been proved by the broiler industry. Indeed, one can predict with confidence that so long as the price of poultry products remain low, they will constitute a large share of the animal protein consumption despite the preference for red meats of most discriminating housewives and their families.

Finally, a field of considerable interest in South Africa is at the moment that of game-ranching. The satisfactory use of areas unsuited to or only marginal for most agricultural purposes, requires the development of suitable forms of land use. In the last fifteen years wild life research workers and animal husbandmen emphasised

the potential value of game-ranching and the importance of game as a possible answer to meat shortages — even for export purposes.

CONCLUSION

This brief review has given an outline of the animal industry in South Africa and some indications of its rate of growth and possible future trends.

It appears reasonable to state that the basic problems which at present underlie the South African livestock industry are not very different from those experienced in most countries, particularly those subjected to the same type of mediterranean and subtropical climates. While there is still much to be learnt from our European and American colleagues in the field of animal production, South Africa is undoubtedly at present in a strong position to guide the semi-arid and subtropical world regions in many of their most pressing problems. Disease has long been under control and pasture management, improved breeding and feeding techniques and the production of fodder crops for semi-arid and even desert-type of environments, have in the last fifty years been a major preoccupation of the animal scientists and agronomists in South Africa. On the other hand, the development of large irrigation schemes is now influencing the animal industry towards the more intensified types of production.

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