S. Afr. J. Anim. Sci. 10, 335 – 345 (1980)

A STRATEGY FOR COMMERCIAL BEEF PRODUCTION IN ZIMBABWE-RHODESIA

D.J. Donkin
Department of Conservation and Extension, P.O. Box 8117, Causeway, Salisbury

(Key words: *Strategy, beef production, Zimbabwe-Rhodesia)*
(Sleutelwoorde: *Strategie, beesvleisproduksie, Zimbabwe-Rhodesia)*

"Strategy"

In the non-military sense this word implies a scheme or plan for the manipulation of resources in order to achieve a defined objective. In this paper it will be shown that beef production is the most suitable and most widespread commerical farming activity for most of Zimbabwe-Rhodesia, and that, subject only to economic constraints, the country can never produce too much beef for its internal consumer market plus its export markets. So the objective of beef producers must be to produce as much beef as possible within the limits of their resources under prevailing economic circumstances. The strategic aspect of production comes in through government and the Agricultural Marketing Authority, both of which have some influence on the economic environment in which beef is produced.

Natural and human resources

a) The land

The natural resources of Zimbabwe-Rhodesia have been fully described by Vincent & Thomas (1960) and only a brief summary will be attempted in this paper.

The country extends over some 39 million hectares of south-central Africa, between the natural features of the Zambezi River to the north-west the mountains of the Eastern Highlands to the east and the Limpopo River to the south. In terms of latitude it lies between 15° 40'S and 22° 30'S and although this area is within the tropics the climate, owing to temperature modifications arising from altitude, is not a "tropical" one in the popularly accepted use of the term. Altitude varies from less than 500 m in the Zambezi and Sabi-Limpopo valleys to over 1 900 m along the eastern border. The most characteristic feature of the country however, is the broad central watershed, between 1 200 and 1 500 m ASL, which spans the country along a south-east north-west axis.

Rainfall is mainly confined to the summer months and, in general terms, increases from west to east and from south to north. Lowest annual rainfall (about 300 mm) is recorded in the south-eastern lowveld and the highest (over 1 500 mm) along certain east-facing mountain slopes on the eastern border. The percentage of the country enjoying different levels of rainfall is expressed in Table 1. Over 70 per cent of the land area receives more that 600 mm per annum.

Temperatures are generally moderate and the mean annual temperature is in excess of 26°C only in parts of the Zambezi Valley. Most of the watershed area has a mean annual temperature of 20°C. "By accepted criteria, only in small areas of the country is heat-stress a problem in cattle production" (Raath & Elliott, 1968).

These factors of rainfall, altitude and temperature, coupled with soil type and natural vegetation, were used by Vincent & Thomas (1960) to classify the country into natural regions according to the land's agricultural potential. These Regions can be briefly described as follows:

Table 1

Percentage distribution of rainfall (adapted from Vincent & Thomas, 1960)

Mean annual rainfall mm	1 000	900–1 000	800–900	700–800	600–700	500–600	400–500	400
Approximate percentage of area	2,1	3,0	12,5	19,8	31,6	17,6	8,3	5,1

Table 2

Area of commercial farming, tribal trust and other land in each Natural Region (Planning Branch, Conex, 1979)

Natural region	Tribal trust lands		Commercial farming lands		Other * land		Total land	Region as % of Total land
	000 ha	%	000 ha	%	000 ha	%	000 ha	
I	128,3	0,32	447,5	1,15	127,6	0,33	703,4	1,80
II	1 255,1	3,20	4 576,6	11,72	29,7	0,08	5 861,4	15,00
III	1 814,7	7,20	3 776,7	9,66	696,3	1,79	7 287,7	18,65
IV	7 307,3	18,70	4 548,8	11,64	2 926,2	7,49	14 782,3	37,83
V	4 774,0	12,22	3 746,0	9,58	1 921,1	4,92	10,441,1	26,72
Total	16 279,4	41,64	17 095,6	43,75	5 700,9	14,61	39 075,9	100,00

Natural Region I:
High rainfall of 900 to 1 000 mm with relatively low temperatures. It is usually mountainous and mainly suited to afforestation and plantation crops like tea and coffee.

Natural Region II:
Rainfall is between 750 and 1 000 mm. The area is of high altitude, and is suited to intensive cropping with associated production of cattle based on non-arable areas, crop residues and pen finishing.

Natural Region III:
Rainfall is between 650 and 800 mm, but with reduced effectiveness owing to erratic distribution and higher temperatures. This region is marginal for cash cropping alone, but cash crops are complementary to semi-intensive livestock production.

Natural Region IV:
Rainfall, between 450 mm and 650 mm with periodic seasonal droughts, is too low for dryland cropping. This region is therefore suited mainly to semi-extensive livestock production.

Natural Region V:
Rainfall is less than 500 mm and the region is only suited to extensive ranching.

XX:
Unsuited to Agricultural production owing to terrain or soil limitations.

In the light of experience and further information some minor alterations have been made to the boundaries of Vincent & Thomas's original Regions. Furthermore, land which they classified as unsuited to agricultural production (XX) has been included in Natural Region V (Ivy, 1980).

The area and percentage distribution of the country is given in Table 2.

b) Land apportionment

(i) *Tribal trust lands*

Following the end of the Matabele war in 1896 and the Mashona rebellion in 1897, large tracts of land were permanently alienated for the use of the native peoples of the country. Today these areas are known as the Tribal Trust Lands and account for over 40 per cent of the total area of the country (Table 2). All this land is operated on a system of communal tennure, and the rapidly expanding population has fast outpaced the ability of traditional methods of farming to provide sufficient food for sales on the open market as well as for internal consumption. The tribal lands contribute less than eigth per cent of the value of the nation's total marketed agricultural output (Table 3).

Although this low percentage appears to be very small proportion of the gross agricultural output, it of course, does not reflect the true productivity of the tribal trust lands. These areas grow sufficient grain to feed most of their people, and livestock are not usually kept and sold for commercial meat production. This fact is a result of the basic economic realities inherent in the opportunity cost of providing milk, manure (for fertilizer) and traction for ploughing. There is indeed considerable scope for improving the agricultural efficiency and output of the tribal trust lands. It is however, a slow process and when it does occur it will not necessarily be in a form that will have any major effect on the nation's cash economy. For this reason, the rest of this paper will concentrate mainly on beef production from the commercial farming sector, which comprises 44 per cent of the land area of the country.

(ii) *Commercial farming area*

All farming properties held under individual tenure are included under this heading – namely the former "European" farming areas and the former African Purchase Lands. These latter freehold farms are relatively small and although the owners are far more affluent than tribal area farmers, little more than 15 per cent can be considered productive from a commercial point of view. From Table 2 it is apparent that the commercial farming areas occupy a relatively greater area of the more favoured natural regions (I, II and III). Table 3 indicates that over 90 per cent of the country's commercially marketed agricultural output is produced in these areas.

It must be appreciated that the major proportion of the gross agricultural output of the country comes from the 4 main commodities – beef, cotton, maize and tobacco. It is obvious that the bulk of crop production (excluding major irrigation schemes) comes from Region II.

(c) Technical knowledge

The early white settlers in Zimbabwe Rhodesia brought with them the cattle husbandry methods used in their various countries of origin. Originally the main value of cattle was trek oxen – the primary source of draft power. It was only after the full development of the railway system and the wider use of the motor car from 1920 onwards that the attention of cattle producers was directed towards beef production *per se*. Production levels were low and, apart from disease factors, a number of theories were put forward to explain this.

It was not until 1936 that Murray, Romyn, Haylett & Eriksen demonstrated conclusively that under normal range conditions shortage of protein was the overriding limiting factor in winter nutrition. Over subsequent years this vital aspect of improved efficiency in beef production has been the subject of numerous investigations (Ainslie, 1958; Vorster, 1962; Bembridge, 1963; Elliot, 1964; Louwrens, 1964; Bauer, 1965; Ward, 1968; Hale, 1974; Steenkamp, van der Horst & Andrews, 1975; Richardson, Oliver & Clark, 1975; Grant, 1975).

For its size, Zimbabwe-Rhodesia has a well staffed and effective research organization, operating under the broad direction of the Agricultural Research Council. A considerable body of technical knowledge on all aspects of modern beef production has been built up, and precise guidelines on cattle management, pen finishing, fertility, breeding and performance testing of beef cattle are available to commercial cattle producers through the Department of Conservation and Extension (Conex) and other related advisory services.

A notable milestone in the dissemination of technical information to cattle producers was achieved by the publication in 1978 of the Beef Production Manual (Animal Production Branch, Conex). This book has been well received, both inside and outside Zimbabwe-Rhodesia.

Table 3

Relative marketed agricultural output (million ZR$, 1964 value) of commercial and tribal sectors over fifteen years (CSO 1980)*

Year	Tribal Trust lands Million $	%	Commercial farming Million $	Total Million $
1964	6,4	4,2	143,3	149,5
1965	6,0	4,0	142,6	148,6
1966	7,0	4,6	145,8	152,8
1967	7,9	5,2	145,2	153,1
1968	5,2	3,8	131,3	136,5
1969	9,7	5,7	162,0	171,7
1970	7,8	4,8	154,7	162,5
1971	11,1	5,6	186,1	197,2
1972	16,5	7,6	200,8	217,3
1973	14,6	6,7	202,7	217,3
1974	19,4	7,3	245,1	264,5
1975	18,2	6,6	256,8	275,0
1976	18,0	6,6	255,6	273,6
1977	13,2	5,1	243,6	256,8
1978	12,7	5,3	238,7	251,4

* Central Statistical Office

d) Veterinary services

If an efficient livestock industry is to flourish the diseases which threaten cattle must be controlled. As an indication of the catastrophic potential of cattle diseases, Lawrence (1979) records that, in 1896, Rinderpest killed 95 per cent of the cattle in the country and in 1902 – 1904 East Coast Fever killed almost 50 per cent of the white owned cattle. Dipping in many tribal areas ceased as a result of terrorist activity, leading to serious outbreaks of tick-borne diseases which caused the death of an estimated 750 000 African-owned cattle in 1979.

It was as a direct result of the Rinder pest and East Coast Fever outbreaks that the country's Department of Veterinary Services was given effective and wide-ranging powers for the control of livestock diseases. These controls were the basis for what has become one of the most efficient veterinary services in Africa (Lawrence, 1971).

Table 4 indicates the high degree of disease control achieved in the commercial farming area over three decades.

Table 4

Deaths and losses in commercial farming areas as per cent of beef herd (CSO)

Year	1945	1955	1965	1975
%	4,9	4,8	4,2	2,7

The existence of the nation's beef industry stems from the success with which the disease threat has been controlled. That the breakdown of law and order can undermine the cattle industry has been clearly demonstrated and it is imperative that full control of dipping, cattle movement and compulsory vaccinations be restored as soon as possible.

e) *Cattle breeds in Zimbabwe-Rhodesia*

A range of cattle breeds of widely differing genetic origin is available to cattle producers in this country. The relative numbers of bulls of the main breeds available are given in Table 5.

Some interesting changes in popularity are apparent between 1970 and 1979. Notable gains have been made by the Brahman, Mashona, Simmentaler, Nkone and Tuli, while marked losses have been recorded by Angus, Bonsmara, Hereford, Red Poll, Shorthorn and South Devon. The increased popularity of the indigenous Mashona, Nkone and Tuli breeds is significant. Sixteen years ago Vorster (1964) observed that the indigenous breeds (native stock) "after being reared and bred for 20 years on the (Matopos) Research Station, produced more beef per breeding cow than any of the imported breeds." In the experiment he described, the "imported breeds" were Afrikaner and Hereford.

In neighbouring Botswana the Tuli shows up very well against other pure breeds under extensive conditions (Table 6).

Similar evidence has been provided by Maule (1973) and Ward (1977).

Vorster's observations, as do those in Botswana, refer of course, to extensive systems of production with minimal supplementary feed. Most commercial beef producers in Zimbabwe-Rhodesia have responded to economic incentives and extension advice. In consequence they are

Table 5

Breed classification of bulls on farms 1970 and 1979 (CSO)

Breed	Farm count		Number of bulls		Per cent of total		Relative change
	1970	1979	1970	1979	1970	1979	(1970 = 100)
Aberdeen Angus	373	230	2 071	1 403	5,1	3,3	64,7
Afrikaner	1 470	865	12 241	10 675	30,0	24,8	82,7
Bonsmara	13	10	275	171	0,7	0,4	57,1
Brahman	423	990	3 342	10 443	8,2	24,3	296,3
Charolais	220	179	846	876	2,1	2,0	95,2
Hereford	1 326	776	9 699	6 291	23,8	14.6	61,3
Mashona	75	99	345	548	0,8	1,3	162,5
Nkone	38	45	269	427	0,7	1,0	142,9
Red Poll	89	18	178	31	0,4	0,1	25,0
Santa Gertudis	32	46	281	301	0,7	0,7	100,0
Shorthorn	69	29	1 136	156	2,8	0,4	14,3
Simmentaler	31	312	68	1 715	0,2	4,0	2 000,0
South Devon	99	40	305	174	0,7	0,4	57,1
Sussex	1 157	1 202	7 564	7 430	18,5	17,3	93,5
Tuli	189	186	1 060	1 518	2,6	3,5	134,6
Other	228	108	1 116	826	2,7	1,9	
Total	*3 746	2 928	40 796	42 985	100,0	100,0	

* Some farms run more than one breed.

Table 6

Calving percentages and productivity of five pure breeds (Animal Production Research Unit, 1978, Gaborone)

Breed	No. in sample	Calving %	Mortality %	Mass of weaner calf/cow/yr kg	Mass of 18 m calf/cow/yr kg
Tuli	772	86	6,7	141	231
Bonsmara	108	83	–	–	–
Tswana	662	78	7,6	130	212
Afrikaner	2 652	67	11,7	102	163
Brahman	388	68	–	–	–

able to provide an environment that permits the choice of any of the breeds currently available.

This improvement in environment is reflected in the steady improvement in calving percentage over the past 20 years as shown in Table 7.

When grouped in this way (to eliminate effects of annual fluctuations) it is apparent, too, that a new plateau appears to have been reached.

Ward and his co-workers (Division of Livestock and Pastures, 1979) have undertaken an extensive breeding project to evaluate the major breeds of cattle available in Zimbabwe Rhodesia, and to assess their combining ability in cross-breeding programmes. This project will ultimately provide a vast quantity of data, which will verify or nullify many of the currently held opinions concerning the merits of different beef breeds. In addition it will place the selection of the correct breed for a specific production situation on a far more factual basis than hitherto.

Table 7

Apparent calving percentage of the commercial beef herd Averages of 5-year periods (CSO)

Year	Apparent calving %
1945 – 1949	49,3
1950 – 1954	43,6
1955 – 1959	46,8
1960 – 1964	42,0
1965 – 1969	53,9
1970 – 1974	59,4
1975 – 1979	62,4

The Beef Cattle Population

Following the Rinderpest and East Coast Fever disasters at the turn of the century, and encouraged by the control of disease and the opening up of new areas for commercial ranching propositions, the country's beef cattle population has shown steady and rapid growth (Table 8). An outbreak of foot and mouth disease in 1931 stopped exports for 3 years and this, coupled with the world-wide economic depression, resulted in a decline in the numbers of cattle held by commercial producers. It was not until 1939 with the establishment of the Cold Storage Commission (CSC) which guaranteed prices and markets, that the industry started developing again.

Table 8

*Cattle numbers in Zimbabwe Rhodesia ('000) (AMA, *1976 CSO)*

Year	Commercial cattle	TTL cattle	Total herd
1915	395	446	841
1920	773	774	1 517
1925	1 006	1 096	2 102
1930	901	1 558	2 459
1935	807	1 653	2 460
1940	826	1 636	2 462
1945	1 001	1 912	2 913
1950	1 149	1 832	2 980
1955	1 246	1 901	3 147
1960	1 552	1 964	3 516
1965	1 631	2 201	3 832
1970	2 514	2 730	5 244
1975	3 267	2 654	5 921
1977	3 571	2 836	6 407
1979	**	2 369	–

* AMA Agricultural Marketing Authority

** Owing to the war situation that prevailed during 1978/79 the TTL figures are unreliable.

From 1940 to 1965 the cattle population increased at a steady rate which accelerated from 1965 to 1970. This increase was attributed partly to increased prices and better feeding and management, but was mainly a result of the full stocking of those areas of the country which had hitherto derived their farming income almost entirely from cropping.

"Given the relatively undeveloped nature of (Zimbabwe) Rhodesia's agricultural resources, this record of expansion is impressive, especially when viewed against a background of rising productivity in the herd" (Agricultural Marketing Authority, 1976).

a) Production potential of the commerical beef herd

In 1976, the Agricultural Marketing Authority published a detailed review of all the grazing resources in the commercial farming area. Assuming optimum utilization of all available resources and the application of known technology, the conclusions of this paper may be summarized as follows:

	Carrying capacity LU (000)	Head (000)
Veld	2 607	3 259
Ley pastures	67	84
Crop residues	105	132
Fertilized grass pastures	494	617
Bush clearing (high rainfall areas)	200	249
Total	3 473	4 341

This indicates an overall potential increase of 1 972 000 head (over 80 percent). However, it must be kept clearly in mind that increases of this magnitude are possible only if economic circumstances permit. For example, fertilized pastures do not become profitable until the price of beef is high relative to the price of fertilizer (particularly nitrogen). Similarly, bush clearing is an expensive operation and with current knowledge it does not involve a "once only" technique. Its widespread application is therefore likely only when the beef price is high enough to warrant this extra investment in improving the productivity of grazing land.

One aspect of increasing veld productivity that holds out considerable promise, is the recent development of tropical legumes (Clatworthy & co-workers 1974 – 1978). These have two potentials: firstly, for raising the quality of winter veld grazing to the extent that winter mass losses are avoided, and secondly, for increasing growth by between 10 and 20 percent over the summer period. Although much developmental work still remains to be done it is apparent that this new approach is destined to have a fundamental and permanent influence on veld productivity in the medium and high rainfall areas.

Marketing of Beef

a) The Cold Storage Commission

Beef marketing in Zimbabwe Rhodesia is closely associated with the Cold Storage Commission (CSC). Although there are various other outlets for slaughter cattle, Commission slaughters account for over 80 percent of total national slaughters. (Table 9).

The Cold Storage Commission is a statutory organization under the Agricultural Marketing Authority. All matters of policy and major decisions relating to pricing are referred to the Authority, which has the responsibility of advising the Minister of Agriculture, with whom the final decision rests. The Commission's mandate is to create – through the provision of a guaranteed market for all slaughter cattle – stability in the cattle industry which will ensure its maintenance and continued development.

The functions of the Cold Storage Commission are:

(i) To purchase at prescribed prices all livestock delivered by any person to the works of the Commission.

(ii) To operate abattoirs and freezing works for the purpose of chilling and storing beef, and works for the

Table 9

Proportion of the national beef kill by various outlets (Central Statistical Office)

Year	1971 / 72	1972 / 73	1973 / 74	1974 / 75	1975 / 76	1976 / 77
CSC	78,5	80,0	82,4	82,6	84,0	88,5
Private butchers	17,5	16,5	13,9	12,8	12,1	8,1
Farm slaughterings	4,0	3,5	3,7	4,6	3,9	3,4

purpose of processing beef. It should be noted that whereas the Commission is obliged to act as residual buyer, nowhere does the constituting Act compel the producer to sell his livestock to the Commission. The only exclusive right that the Commission enjoys is that of exporting fresh, chilled or frozen beef.

b) Features of the beef marketing system in Zimbabwe Rhodesia

(i) *Beef carcass classification*

On 1st July, 1977, a new beef classification system was put into operation, replacing the previous carcass grading that was based entirely on visual assessment. The new system is designed to be as objective as possible and is based on four main factors that can either be measured or readily assessed on a visual basis. These factors include:

Age:
Assessed by eruption of permanent incisor teeth and by the degree of ossification of the spinal processes. The symbols used to describe age are: 0,2,4,or 6 teeth in young animals, FM ("full mouth", but showing a marked degree of spinal ossification).

Flesh development:
Assessed by the relationship between carcass length (the distance in centimetres between the pubic bone and the last neck vertebra) and hot carcass mass (kg). After extensive measurements over thousands of carcasses this relationship has been summarized in tabulated form. The symbols used to describe the degree of flesh development are: A (very well fleshed); B, C, D and E (very poorly fleshed).

Fat cover:
Assessed visually, since there is no simple measurement which accurately expresses the amount and distribution of fat in carcasses. The symbols used to describe fat cover are: 1 (carcasses that are uniformly and fairly well, but not excessively covered with subcutaneous fat); 2 (carcasses which have a light fat cover, but lack the uniformity or amount required for 'Class 1'); 3 (carcasses with little or no subcutaneous fat); and 9 (carcasses that are overfat owing to excessive amounts of subcutaneous, channel and cod fat).

Sex:
Four categories are recognised, the symbols being: CO (cows and heifers); OX (steers and oxen); BU (bulls, 2-tooth and older); and BY (young bulls with no permanent incisors and showing no marked secondary masculine characteristics).

The price paid for a carcass is based on age, with premiums or penalties accruing according to fleshing, fat cover and, in the case of bulls, sex.

(ii) *Producer prices*

Minimum prices per class payable to producers by the Cold Storage Commission are announced by the Minister of Agriculture in the Government Gazette prior to 1st January of the year to which they apply. In deciding these prices the marketing outlook, the needs of the industry and the submissions of producer representatives are taken into consideration.

Those responsible for preparing the price schedule recognized the seasonal pattern of deliveries (Fig. 1), and price changes from week to week have been applied. The schedule aims to manipulate delivery patterns by offering premium prices at those times of year when it is most difficult to get slaughter cattle into "finished" condition.

The object of this is to obtain an even pattern of deliveries to all Cold Storage Commission works throughout the year. Fig. 1 indicates that objective has not been consistently achieved. It is important for the Commission to attract increased quantities of good quality beef during traditional shortage periods in order to be able to maintain continuity of supply to its customers. The higher prices paid during these periods are there to encourage such "out of season" production.

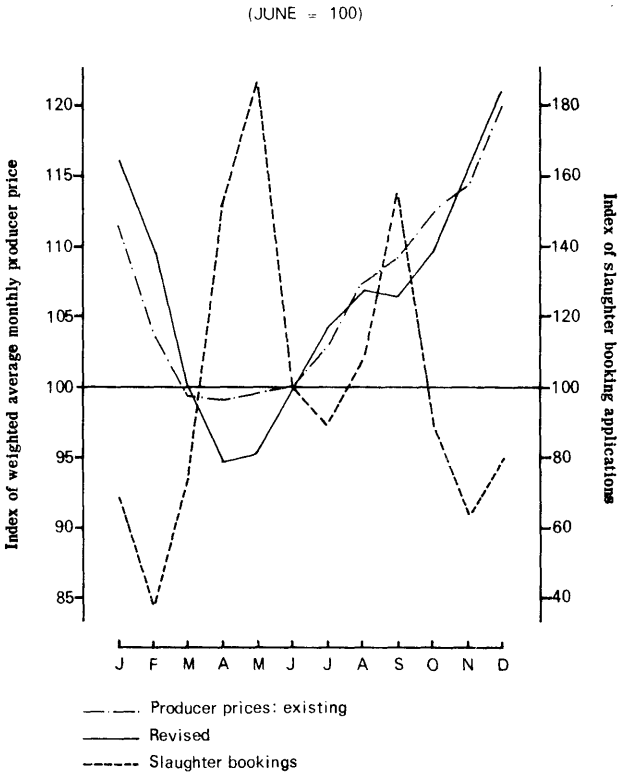

Fig.1 Index of weighted average monthly producer prices for beef and applications to the CSC for slaughter bookings (Agricultural Marketing Authority 1977)

(iii) *Local selling prices*

Government is committed to stability in the price of beef to the consumer, with a resultant element of subsidy or discount in consumer prices which, over the past few years, has kept wholesale prices at a level 18 to 25 percent lower than the producer price.

Since price control has not been imposed on retail outlets, the margin available for merchandizing has permitted the traditional type of butcher to survive. This is contrary to trends in other countries where either controls or competition have cut margins to such narrow limits that most meat retailing is now in the hand of high-turnover supermarkets, selling pre-packed cuts.

Until the recent world beef surplus this wholesale discount was financed by profits realized from exports. With the slump in export returns the Cold Storage Commission's trading loss has been met by Government and it is the local beef market that has proved to be a stabilizing influence.

(iv) *Exports*

Although the proportion varies from year to year, it is true to say that approximately half of the country's beef production is exported. Exported beef is however, seldom in the form of whole carcasses, but rather as hindquarters or packed cuts. This feature ties in fairly well with the local market where there is a steady demand for cheaper forequarters yielding beef cuts such as brisket, flat rib and neck.

(v) *Cold Storage Commission activities in the livestock market*

By its original mandate, the Commission is closely concerned with the overall development of the beef industry in Zimbabwe Rhodesia. At first the Commission served only as a purchaser of slaughter stock, but it has become progressively more involved in its role of providing stability for the industry (Agricultural Marketing Authority 1977).

The Cattle Finance Scheme:
In 1940 the Commission first placed grazer cattle on agreement with commercial farmers. The purpose then was to provide an outlet for young and for under-finished animals (mainly from tribal areas and from areas affected by drought) by placing them with farmers who had the necessary grazing and other facilities to raise them to slaughter condition. Young female stock placed with commercial farmers could be used as breeding cows for length of their useful life before being returned to the Commission for slaughter. In this way the Commission actively fostered the expansion of the beef industry by enabling farmers with adequate grazing, but insufficient capital to stock their properties and so become established as beef producers.

Cattle that are supplied in this way remain the property of the Commission, and are placed with only those graziers who are rated able to care for the cattle without loss to themselves or to the Commission.

The principle payment for cattle financed under this scheme and for interest due to the Commission, is met from the gross return realized by producers when the animals are finally slaughtered. Any calves produced and any suplus realized over the initial value of the cattle are put to the credit of the producer. Conversely, any short-fall must be made good by him.

In this way the scheme is self financing and any surplus generated in its operation is included in the overall trading accounts of the Commission.

Custom Feedlot Scheme:
Droughts and depressed prices for young stock in 1972/73 compelled the Commission to support the young-stock market in various ways. The most notable followed upon negotiations with the producer organizations in 1977 when the Commission introduced its Custom Feedlot Scheme.

Under this scheme the Commission set up cattle feed-lots to which producers may consign cattle to be pen-finished for slaughter. The producer retains ownership of his cattle and pays the Commission a fee to cover care and cost of feed for the animals for the period they are in the feedlots. This fee is deducted from the producer's returns after the animals have been slaughtered.

This scheme gives the breeder an additional option, in addition to selling on the open market or finishing on the farm. In this way producers, particularly those from low rainfall areas where grain crops are not produced, are able to enjoy the true ultimate value for their cattle by selling them, finished and slaughtered, at the guaranteed producer price.

Tribal area sales:
The Commission does not confine its acitivities to the commerical farming areas and for many years has acted as a residual buyer at auction sales in the tribal trust lands, thereby underpinning prices at these sales. The Commission's residual bid at these sales is based on a visual assessment of the animal's sex, age and condition, and its resultant slaughter value. Young stock acquired in this way are placed with other producers under the finance Scheme or are grown-out and feedlot-finished for slaughter.

Table 10

The relative importance of four major commodities commercial farming areas, measured as a percentage of the value of agricultural output (CSO)

Commodity	Beef	Cotton	Maize	Tobacco
Year	%	%	%	%
1970	19	8	21	15
1971	19	10	23	14
1972	22	10	23	13
1973	27	12	12	15
1974	17	11	21	17
1975	17	19	17	17
1976	18	10	15	21
1977	22	9	16	17
1978	20	10	14	19
Average	20	10	18	16

c) The importance of the beef industry

Table 10 indicates the position enjoyed by beef production as one of the major agricultural enterprises in the country.

Prior to 1965, tobacco accounted for over 35 percent of the value of the country's marketed output, and it is expected that some of this lost ground will be made up with the return to normal marketing conditions. Nevertheless, beef at an average of 20 percent, has made a consistent and significant contribution to the value of agricultural output.

Although important in terms of output, the beef industry is even more important in terms of its geographical distribution. Vincent & Thomas (1960) estimated that grazing land comprised 84 percent of Zimbabwe Rhodesia. Similarly, a survey by the Agricultural Marketing Authority (1976) indicated that veld grazing occupied 88 percent of the commercial farming areas. Owing mainly to the nature of the grazing, small-stock raising is relatively insignificant, which means that the vast majority of the surface area of the country is used for raising beef cattle.

Beef Production Systems in Commercial Farming Areas

Any system of beef production can be categorized according to the source of the stock (i.e. breeding or buying-in) and the means of disposal. The alternatives for disposal may be either the selling of young stock as weaners or yearlings, or the selling of slaughter stock. The age of slaughter varies from pen-fattened weaners aged about 10 months at slaughter, through yearlings and two-years olds which also need pen-finishing, to $3\frac{1}{2}$ or $4\frac{1}{2}$ year old cattle slaughtered "off the veld".

The slaughter price of cattle is guaranteed, but the intermediate market does not necessarily reflect this end price. If producers wish to take advantage of it, they have to carry stock through to slaughter, either off the veld or via the feed pen. The ratio between the end price of beef and the producer price of maize is closely related to the profitability of using grain to finish beef cattle. In Zimbabwe-Rhodesia the narrowest ratio was 1:9,9 in 1970 and the widest in 1972. In 1979 it was 1:13;5. By comparison, the range over the same period in the United States of America was between 1:15,5 in 1973 and 1:28,0 in 1971 and 1978 (Donkin, 1979).

Because of these variations in ratio, the popularity of pen-finishing has waxed and waned accordingly. Beef production policy changes usually take 3 or more years to put into effect if full production levels are to be sustained. In consequence, beef producers are not in a position to respond quickly to sudden changes in economic circumstances. This means that unless the pen-finishing phase of the animal's life is guaranteed to be profitable, producers will tend to revert to more extensive systems in which most of the animal's growth comes from grazing. In such cases pen-finishing is only a short "topping off" phase, if it is used at all.

It is significant that in 2 similar investigations 3 years apart (Patullo, 1976; Gammon, 1979) the authors come to the same conclusions – that the most stable and consistently most profitable system of beef production is breeding and the sale of slaughter stock at $2\frac{1}{2}$ or $3\frac{1}{2}$ years of age.

If slaughter stock are kept to be grown out beyong the weaning stage there has to be a corresponding reduction in the size of the breeding herd to make room for them. In the widest terms this means that there will also be a reduction in the total amount of beef produced in the country.

As mentioned earlier in this paper, incentives are built into the producer price schedule in an attempt to compensate producers for the extra expense of preparing cattle for slaughter at "awkward" times of the year. These incentives will be truly effective only if they do more than compensate; they must make production *more* profitable for those farmers who are prepared to go to the extra expense and trouble.

Techniques for Increasing Output and Efficiency of Beef Production

Profitability in beef production depends upon a variety of factors including a high calving rate, good calf growth to weaning, minimum winter mass losses and maximum summer gains on grass, and optimum periods of pen finishing. Closely related to all these factors are the controls necessary to minimize disease incidence and mortality. Basic to any cattle enterprise are the culling of poor producers and the selection of replacement stock, both within and between breeds. The extent to which any of these aspects are carried through to maximum production depends on the economic circumstances prevailing.

Recommended practices to achieve maximum production in each of these production aspects are detailed in the Beef Production Manual (Animal Production Branch, 1978). It is not intended to summarize these in this paper. All farmers in Zimbabwe-Rhodesia who require technical or economic farm management advice have ready access to the extension and advisory service provided by Government, by feed and fertilizer firms, by the University and by private consultants.

The recommendations are based upon sound practice and in numerous instances have been demonstrated to be effective. Few developing countries are well served with indigenous technical expertise. To take full advantage of it, only the right economic and political environment is required.

Strategic Decisions Affecting Beef Production

It is clear from the foregoing sections that beef production is an important part of agriculture through the commercial farming area. Beef production is a long-term enterprise and, economic constraints aside, the future for the Zimbabwe-Rhodesia beef industry holds many promising features. Research into disease control, reproductive physiology, cattle breeds and crosses and cattle nutrition all contribute to the potential for greater and more efficient beef production. What could however, prove be the most significant development for beef since the veterinary controls over Rinderpest is in the recent and continuing advances being made in the screening and developing of dryland tropical legumes and their establishment in the veld and in ley pastures. The prospects of extending the summer growth period experienced by grazing animals, of increasing carrying capacity and of reducing the need for winter supplementary feeding are already proven. Their fullscale application will have a tremendous impact on the beef industry, whatever its final form. The output of beef is controlled by the degree to which economic factors favour intensification. The export monopoly and fixed producer prices paid by the Cold Storage Commission are factors which place the creation of this economically favourable climate directly with Government policy makers.

It is usual for popularly elected governments to wish to restrain internal food prices. It is fortunate that in Zimbabwe-Rhodesia there is a ready market for lower grade cuts and forequarters, because this enables the Cold Storage Commission to concentrate its export efforts on marketing the better quality hindquarters and higher grades. While good external prices prevail this system works well, but where there is a drop in world market prices, Government support of the industry becomes necessary.

Through the Agricultural Marketing Authority and its subsidiary, the Cold Storage Commission, the Government of the new Zimbabwe has an effective means at its disposal for manipulating the production of beef. The prices fixed for maize and other stockfeeds, the functioning of custom feedlots and cattle finance schemes, and the prices fixed for beef at different times of the year, all contribute to profitability of beef production. And if these are of an incentive nature they will ensure that the beef industry is both stable and thriving and a worthy contributor to the overall well-being of the nation.

Acknowledgement

The author is indebted to Dr R.C. Elliott for his constructive advice and to Mr J.E. Robertshaw for editing the manuscript.

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