S. Afr. J. Anim. Sci. 10, 323 - 334 (1980)

A STRATEGY FOR BEEF PRODUCTION IN NATAL AND EASTERN CAPE

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(Key words: *Strategy, beef, Natal, Eastern Cape)*
(Sleutelwoorde: *Strategie, vleisbeeste, Natal, Oos-Kaap)*

The single most important problem of the red meat industry is that any strategy decided upon today shows its influence only after 3 to 6 years (Lombard, 1979a). When evaluating various possibilities for production an important, if not the most important, task is to estimate the expected profitability. This necessitates a reasonable evaluation of likely price trends in the near future. However, unpredictable climatic, economic and sociologic circumstances, the first one influencing supply and the latter 2 the price consumers are prepared to pay, make it almost impossible to predict product prices for several years in advance (Lombard, 1979a). Nevertheless, in order to maintain sound growth of the red meat industry this enterprise must endeavour to maintain its market share. Lombard (1979a) suggested that to ensure this:

(a) The short and long term unpredictability of the product price must be reduced to such an extent as to allow efficient production planning and control of supplv.
(b) Mechanisms that favour efficiency of production and marketing should be fostered.

Unexpected increases in beef suppies can outstrip demand growth and thereby result in the virtual collapse of prices. It is therefore abundantly clear that growth in production should occur according to a predetermined rate (Lombard, 1979a) and this will be realised only if breeders and feeders conform to the planned growth. The permit/quota system is one method of forcing producers to conform. The criticism of such controls probably arises out of the fact that restrictions are applied at too late a stage in the production chain. It is difficult to visualize how this virtual "brickwall" will result in orderliness in time to come.

Economists maintain that a single centralized control organization tends to stifle changes in the open market. If there is no control some producers make the wrong decision, others do not change and a few choose correctly. Progress can thus still be made, but a centralized body is forced to make conservative, middle of the road decisions, so as to minimize the risk factor. Consequently, slow progress is realized, but at least chaos is generally avoided.

Any strategy which is offered should have as its prime objective to present to the producers a number of alternatives and guidelines according to which they can make their decisions. The final choice should be theirs rather than to actively encourage a single, overall strategy for a region.

In the past artificial support for the better grades, in an attempt to reduce seasonal peaks, has led to an over-supply which has had to be bought-in. The attempted smoothing of the natural cycle thus sometimes has disastrous results.

Current Situation

Population distribution and landownership

With an area of approximately 90 000 km^2 Natal is the smallest of the 4 provinces and contributes some 7,5% of the total area of the R.S.A. (Dev. Prog. Natal Reg., 1974). In supporting nearly 20% (4,3 million people) of the national population of whom 75,9% are Bantu it is the most densely populated area, but only 37,8% of the people reside in the urban area. The latter is mainly the consequence of the fact that the proportion of Bantu in rural areas (77,9% is the highest of all the provinces (South African Statistics, 1978). The proportion of the land incorporated in Kwazulu and Transkei and the present population distribution are given in Fig. 1 and Table 1.

Ownership patterns indicate that nearly 60% of the land is owned by whites, while the Bantu areas account for a further 33%. Of the available land 80% is natural veld and only 13% is arable. With 43% of the province experiencing an annual rainfall of over 900 mm and a further 49% receiving 700 mm the area that can be

Table 1

Population of Bantu homelands on Eastern Seaboard

	Whites	Bantu	Total	% Urban
Kwazulu	3 726	2 142 293	2 151 367	11,2
Transkei	9 147	1 766 520	1 783 204	2,6

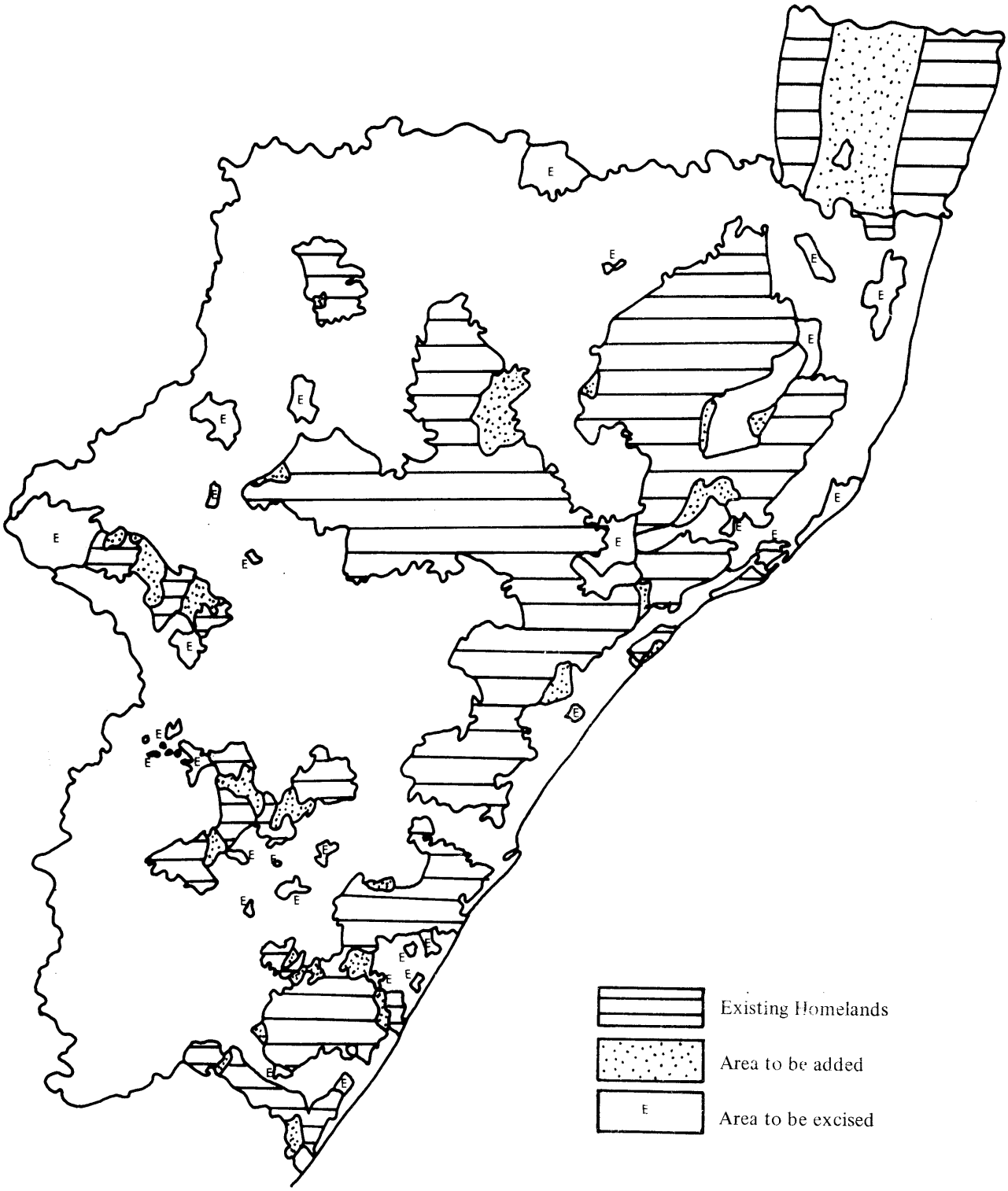

Fig. 1 Proposed consolidated areas of Natal for inclusion in Kwazulu (Thorrington-Smith, Rosenberg & McCrystal, 1978)

Table 2

Supplies of red meat to the controlled markets of Natal and the Eastern Cape (Meat Board, 1980, personal communication)

	Mass (kg x 10^5) slaughtered		
	Cattle	Calves	Sheep
Durban	439,3	3,9	155,8
Pietermaritzburg	37,4	0,5	115,1
East London	59,4	1,6	193,9
Port Elizabeth	217,9	4,4	683,2
Total R.S.A.	3 381,7	45,6	8 271,6

cultivated is limited in many cases by excessive slope. Not only does this make cultivation difficult and expensive, but the erodability of the soils imposes further limitations. In many areas over 50% of the slopes exceed 15% (Dev. Prog. Natal Reg., 1974).

Table 3

Importations and Local Supply of red meat to the controlled markets (Meat Board, 1980)

	% of Total		
	Cattle	Calves	Sheep
Durban/Pmb			
Neighbouring territories	0,63	0,00	0,53
Transvaal	1,86	0,08	2,34
O.F.S.	26,76	38,79	31,84
Cape	11,80	4,44	54,04
Sub-Total	40,50	43,30	88,20
Natal	58,90	56,70	11,30
Port Elizabeth/East London			
Neighbouring territories	0,72	0,00	0,00
Transvaal	0,63	0,01	0,12
O.F.S.	2,79	0,03	0,25
Natal	0,02	0,01	21,90
Sub-Total	3,50	0,05	22,30
Cape	95,80	99,95	77,70

Characteristics of the meat market

(i) Beef at the controlled markets

A total of 228 932 cattle were slaughtered at the Durban and Pietermaritzburg abattoirs during 1979 (Meat Board, 1980, personal communication) and the mass of beef (Table 2) represented 4,1% of the total for the 9 controlled markets of the R.S.A. In view of the fact that these slaughterings constitute a smaller proportion of the national total than the population does, suggests that either the per capita consumption of meat is lower in Natal than in the rest of the country, or that there is a greater preference for other classes of meat. However, in spite of the large Asiatic community who traditionally eat mutton the ratio of cattle to sheep slaughterings for Natal was only 1 : 0,57 whereas that for the Eastern Cape was 1 : 3,16 and the average for the country as a whole 1 : 2,44.

A factor which may explain the relatively low slaughterings in the controlled areas is the lower proportion of the population in the urban areas which probably derives most of its fresh meat from the controlled markets.

(ii) In spite of efforts to counteract the marked fluctuations in supply of various grades to the markets which are the endpoints of the traditional beef producing areas (Durban and Witwatersrand) these fluctuations have continued (Steemkamp, 1979). Furthermore, while the seasonality of production of the better grades of beef the peaks in cattle marketed, as a % of feedlot capacity, still tend to occur towards the end of the year (Steenkamp, 1979).

It would be expected that an increase in the supply of the better grades towards midsummer (Steenkamp & Lombard, 1977; Steenkamp, 1979) would at least maintain a relatively constant retail price over the Christmas holiday period. However, the surveys by the Meat Board (1977/78 and 1978/79) of weekly prices at butcheries indicate a greater peak during the holiday period in Durban than for the Witwatersrand (Anonymous, 1978, 1979a). A comparison of the average monthly auction prices for grade I beef at the controlled markets does not appear to warrant these seasonal peaks to the consumer (Anonymous, 1979a). The suspicion is created that the holiday-makers who flock to the Natal coast during the summer and winter holiday periods are perhaps being exploited. Admittedly, the better grades tend to be in short supply over the July period (Steenkamp, 1979). A further question which arises is why the prices in the coastal retail markets were

higher during 1978/79 than for the Witwatersrand. It would be expected that if these high prices are due to limitations of supply to the abattoir this would result in pressure from the producers to supply these centres.

The relationship between abattoir prices and cost to the consumer does not appear to be quite what it should be.

(iii) Present sources of beef

Beef production in the Natal region does not meet the demands of the local controlled market and the deficit has to be made-up from the Orange Free State and Transvaal with little if any beef reaching this market via importations from neighbouring territories.

Estimates of importations to the Natal controlled markets vary from 20% (Delport, personal communication) to 40% (Dev. Prog. Natal Region, 1974), while on the basis of Meat Board data (1978/79 Annual Report) supplies from within the province account for nearly 60% of slaughterings during 1979 (Table 3). These estimates more than likely do not differentiate between cattle consigned directly to the controlled market from the area of origin and those which may spend some time in local feedlots. Interpretation of the data for the Eastern Cape (Table 3) is more complicated.

According to the most recent census (South African Statistics, 1978) the cattle population of Natal is 1 200 229 of which 977 403 are beef animals. The total population has increased by 19% since 1975. The recent poor profitability of beef farming has precipitated a country-wide 15 – 20% decrease in herd size with the disposal of breeding cows being such that cows marketed as a percentage of total marketing increased in 1979 for the first time since 1971 (Lombard, 1979b). However, Natal appears to be the only area in which animal numbers did not decrease during 1979 (Anonymous, 1979b).

Those producers who managed to survive without seriously reducing the breeding herd will be in a very favourable position if anticipated higher prices materialize in the near future.

The distribution of beef animals (Table 4) within the Natal Region is such that 79% of the 475 700 A U (Beef) is located in three Bioclimatic areas viz. the Highland Sourveld (158 600 A.U.), the Dry Tall Grassveld (135 200 A.U.) and the Moist Tall Grassveld (81 400 A.U.). The role of other classes of livestocks and the competition for resources that can be expected (Table 5) is reflected by the fact that 60% of the dairy cattle occur in the

Table 4

Distribution of beef cattle and importance of this branch of farming (Dev. Prog. Natal Reg., 1974)

Bioclimatic Group	No Beef Cattle	% of Natal Total	% of Farm Income	% area in Kwazulu
1 & 2	42 800	6	5 – 16	1 = 51,7 2 = 57,6
3	58 400	8	3	15,0
4	244 000	33	24	17,7
6	125 000	17	26	17,7
8	208 000	29	30	26,9
9, 10 & 11	52 800	7	40 – 80	9 = 80,9% 10 = 59,2 11 = 16,9

Midlands Mistbelt (Group No. 3) and the Moist Tall Grassveld (Group No. 6), while sheep (65,2%) are found mainly in the Highland Sourveld. The additional population in areas 6 and 8 accounts for 90% of the sheep population.

What is very important however is that a significant part of the land in Bioclimatic groups 4, 6 and 8 is owned by the Bantu (Table 6) and they own $\frac{1}{3}$ of the cattle.

Because of social, traditional and religious constraints these areas are likely to show a low level of efficiency of between 3 and 11 kg of beef per unit of cattle population compared to between 33 and 44 kg for developed systems (Lombard, 1978b).

Future Trends

Requirements for beef

If the average annual growth rate of 2,6% is maintained the population of South Africa will have more than doubled by the year 2000 and the black population of Kwazulu alone could be more than 6 million (Thorrington-Smith, Rosenberg & McCrystal, 1978). In all probability 75% of the latter will be urbanized. The agricultural sector will thus not only have to meet the needs of double the present population, but it will have to cater for a large proportion of blacks in areas which are not self sufficient.

Although the per capita consumption of beef in recent years has shown a downward trend of about 1% per annum in preference to chicken (Lombard, 1977) and with the gross National income of Kwazulu expected to

Table 5

Importance of various livestock types in the different bioclimatic areas of Natal (Dev. Prog. Natal Reg., 1974)

Bioclimatic Group	Description of Vegetation	% Natal in this group	Estimated relative income		
			Beef	Dairy	Sheep
1	Coast Lowlands	10,0	5	12	–
2	Coast Hinterland	9,5	16	20	–
3	Midlands Mistbelt	7,0	3	36	–
4	Highland Sourveld	20,5	24	37	19,1
5	Fynbos Bergveld	2,0	–	–	–
6	Moist Tall grassveld	11,5	26	28	7,0
7	Valley Bushveld	1,0	33	4	–
8	Dry Tall Grassveld	18,0	30	29	12,4
9	Zululand Bush and Lowveld	3,0	70	2	–
10	Valley & Thorn Bushveld	16,0	42	–	–
11	Dry Bushveld	1,0	80	–	–

more than double by 1990 (Thorrington-Smith, *et al.*, 1978), there can be little doubt that the total demand for beef will increase. The per capita consumption, however, may vary in the short term depending on variations in the price of the different types of meat. This will apply particularly as the wage gap is narrowed, provided of course that the gain in earning power surpasses the rate of inflation.

Table 6

Landownership in the important beef farming areas of Natal (Reg. Dev. Prog. Natal Reg., 1974)

Bioclimatic	European	Bantu	%
3	467 500	127 100	21,4
4	1 233 200	498 100	28,8
6	826 300	179 100	17,8
8	117 700	401 000	77,3

In considering the future demand for meat Boshoff (1979) showed that since 1970 beef has maintained a relatively constant 59% share of the market with poultry advancing at the cost of mutton. With massive increases in the price of maize the chicken's share is likely to stabilize (Boshoff, 1979) although Lategan (1976) predicted that it could reach 45% by 1985.

These predictions are for the meat market as a whole and closer study reveals that while beef dominates the fresh and manufactured meat trade it is in the high quality segment of the trade where mutton exerts strong competition. Poultry, in turn, plays its role in the average quality segment.

Disregarding the probable increase in purchasing power and basing forecasts on existing consumer patterns beef supplies would need to improve by 1 – 2% per annum to keep pace with simple growth of the human population. However, Lombard (1979a) believes that a long-term growth rate of between 4 and 6% would be more realistic. With a 3% increase in demand 75 000 more cattle will need to be slaughtered in 1990. The suggested target for mutton based on the population growth rate plus growth in real per capita Black income yields a figure of 5,3% (Lombard, 1978a).

Current consumer patterns show that when buying red mead the Bantu in Natal prefer the more expensive cuts that can be braaied (Nel, personal communication).

The evidence for a declining per capita consumption of red meat is based presumably on the population as a whole. An effective strategy aimed at preserving the beef market should be founded on more informative data. The fast-food entrepreneurs would appear to have their greatest impact on the younger, more impressionable elements of the population including the blacks. Consequently the extent to which consumer patterns are influenced by income and tradition requires clarification.

When considering the influence of the price of meat on quantity purchased it is generally recognized that supermarket prices are higher than those charged by specialist butchers yet the supermarkets are drawing the buyers (Meyer, 1979). The question must therefore be asked as to whether or not price influences meat purchasers as much as one is led to believe? Although mutton and lamb are recognized as being expensive forms of red meat it is not difficult to market unexpected surplusses (Boshoff, 1979). It will thus be of interest to observe the trend in Argentina, a country in which the beef consumption was the highest in the world (Anonymous 1979c), but where prices have also now increased by 361% in 12 months to head the world (1,52 U.S. dollars/kg liveweight vs 1,25 in U.S.A.).

Fulfilling Future Requirements

In order to continue to fulfill an important role in the supply of animal protein for human needs Harwin (1976) is of the opinion that the optimum conversion of forage into edible beef, both as regards palatability of taste and price, must constitute the broad goal of cattle production. He suggested that this could be achieved by endeavouring to:

(a) Increase the production of breeding cows both in terms of number and individual mass of offspring at a minimum cost per breeding unit and
(b) to achieve the optimum mass and carcase grade as economically and as soon after weaning as possible with a minimum of grain feeding.

While it has long been accepted that rapidity of gain in mass and consumer acceptability of the resultant carcase are essentials in achieving the optimum conversion of forage into edible beef the economy of the enterprise has not received sufficient attention. While considerable emphasis has been placed on factors such as calving rate and pre-weaning growth the economic advantage of progress in these traits has seldom been evaluated. Harwin (1978) supports this view by stating that in the past too much emphasis has been placed on maximizing production rather than maximizing profits. Beef producers therefore have the task of improving the expertise of production and of increasing the utilization of forage crops for beef production.

If it is accepted that the beef market requires an increased supply and assuming that the almost negligible growth of the cattle population is a consequence of the rate at which animals are removed from the natural grazing (either directly to slaughter or via the feedlot) and not by the volume of the market requirements, then, a realization of either of the 2 alternatives proposed under (a) and (b) would create the opportunity for more beef to be produced with the existing animal population. These objectives could be achieved by:

(i) Increasing the rate at which animals reach an acceptable finish. In turn, this would free veld for rearing of greater numbers of off-spring. Improving the growth rate by feeding concentrate and/or utilizing faster maturing breeds are the more obvious alternatives.

(ii) Increasing the number of animals that can be carried on the existing area of land either by managing the grazing more effectively or by improving the grazing in such a way as to increase its carrying capacity.

(iii) Utilizing by-Products as animal food in order to support herds of cattle.

(iv) By capitilizing on the beef potential of the dairy herds, viz. rearing the calves presently slaughtered for veal and by improving the beef qualities through proper selection of sires.

Reducing the age of marketing through the use of concentrate feeds

(a) Feedlotting

The extent to which the country has been able to meet its expanding requirements and at the same time to reduce the dependence on neighbouring territories must in no small way be due to the role of the feedlot (large or small) in taking animals off the land and at the same time imparting the desired finish. At present 25 – 30% of cattle marketed in controlled areas have been grain fed. The continuous unprecedented increases in price of maize are placing the whole feedlot enterprise on an ever increasingly shaky footing and alternatives will have to be sought. Griessel (1978) predicted that by the end of the century 50% of all animals marketed will be feed-lot finished. This is clearly a short-term solution and in the high rainfall eastern regions of the country alternatives are possible.

(b) Finishing cattle on pasture

Several investigations have been conducted to examine the possibilities of improving the gains of beef cattle on perennial pasture by the inclusion of energy rich supplements. To date the results have not been encouraging in that daily gains are seldom improved (substitution occurs) and although the carrying capacity is increased, returns do not warrant the use of the extra energy.

Preliminary results from the use of veld instead of pasture have been encouraging (Harwin, 1978).

Increasing the carrying capacity of the veld

For many years now it has been suggested that the summer rainfall eastern parts of the country are probably the only areas where intensification of livestock production is feasible. The relatively static animal population in the grazing areas of the country has created the impression that the grassland has reached, or is rapidly approaching, saturation. This would appear to mean that there is just no more grass to be converted to beef and that the use of more productive breeds or types is likely to offer little relief under these circumstances.

Although there are many concepts to the term intensification, essentially it implies increasing the return on capital invested (Lombard, 1970). Often this necessitates increased inputs of labour, feed etc. in the hope that the extra profit earned will more than cover the additional cost.

If the purpose is to carry a greater number of animals on an existing area of grassland then according to Edwards (1966) improvement can take the form of either better veld management (fencing, watering facilities, controlling livestock movement and grazing pressure), veld reinforcement (addition of improved pasture plants and/or addition of plant nutrients) or by complete and immediate replacement of the veld by improved perrennial pastures.

Veld Management

Sound veld management practices are virutally the only means of effective grassland improvement in those areas with a rainfall of less than 800 mm. Undoubtedly such improvement leads to an increased carrying capacity of the natural vegetation. These practices probably also decrease the period of the year for which conserved fodder must be utilized since with protection of the more palatable species the quantity and quality of feed exhibit fewer restrictions. The sourveld areas of Natal and the Eastern Cape are of the few regions where veld burning is still practised on a relatively wide scale. Long term studies have not only outlined the detrimental effects of such practices on the composition of the sward (Dillon, 1980) but the deleterious effect on the yield of dry matter has also been amply demonstrated (Tainton, 1981). In simple terms, were it possible to replace the match with the mower then twice as many animals could be carried on veld which is burnt annually. However, due to characteristics of the terrain such as slope and boulders there are many instances in which the mower cannot be used. Rising fuel prices also tend to militate against the use of machines to remove ungrazed herbage. The utilization of protein supplements has done much toward reducing the problem especially in the sourveld areas, but selective grazing continues to pose a problem. Recently, attention has once again been turned to the possibility of encouraging the grazing of winter grass by spraying the herbage with urea and molasses. Care must be executed to avoid spraying so heavily that the grass is grazed right down to soil level. With insufficient coverage selective grazing is not eliminated (Edwards, personal communication).

Table 7

Beef Potential of Natal (Edwards, 1980, personal communication)

	Steer		Cow + Calf	
	Gain over Summer kg/ha	Stocking rate Animals/ha	Calf gain kg/ha	Stocking rate cow + Calf/ha
Veld	85 – 150	1	65 – 165	0,6
Re-inforced/Fertilized	300 – 500	3 – 4	± 250	± 1,5
Replacement	900 – 1 000	6 – 9	± 850	4 – 5

Radical veld improvement

Although total rainfall (together with variability and reliability) is only one of the factors defining the areas in which veld replacement could be successful, those parts with a rainfall of over 800 mm may be suited to the replacement of veld by improved grasslands (Edwards, 1966). According to Edwards & Booysen (1972) virutally the whole of Natal provides conditions which would allow veld replacement (> 800 mm rainfall) with only a small area being limited to veld reinforcement. However, a more conservative estimate suggests that the 87% veld of areas 3, 4, 6 and 8 could be replaced by ± 30% perrenial pasture and by 60% reinforced veld. Basing calculations on the increased stocking rate (Table 7) for a cow and a calf, the potential for Natal would be as in Table 8 which represents very nearly a 100% increase in A U and thus a similar % increase in slaughterings from this area. The calculations in Table 9 indicate an increased potential of 197%. Similar calculations have been made by Theron (1975) and by Theron, Mappeldoram & Lesch (1974) showing a potential improvement of 400% to give a stocking rate of 1,86 MLU/ha.

These intensification systems not only increase the carrying capacity during the normal grazing season by 3 – 5 fold, but they also extend the grazing season through earlier spring grazing, later autumn grazing and by providing foggage for winter (Harwin, 1978).

While the potential for increasing the output of the land, in terms of meat, clearly exists, under systems of RVI the question often asked is whether the tremendous costs of the operation are profitable? Theron (1976) states that data from research and practical farming support the economic viability of pasture improvement. The factors which influence the degree of profitability such as locality, proportion of veld to improve, class of pasture and integrating the pasture program and the returns that can be expected have been documented by Theron (1976). The data supports the greater profitability of yearlings in preference to the cow and calf. Initially this may be the trend, but obviously the time will come when the number of breeding units has to be increased in order to supply the greater number of steers.

Application of these techniques has been slow because of traditional systems of trekking and because farmers consider it cheaper to buy extra grazing land rather than intensify on the existing area.

Although a considerable amount of work has been done in this field, the utilization of cool season pastures where irrigation is possible has tended to be confined to utilization by dairy cattle. However, such pastures could play a role similar to that of the feedlot and more attention should be given here. Recent work (Bartholomew, 1980, personal communication) at the Cedara Research Institute has yielded some very encouraging results when yearling steers grazed rye grass at various stocking rates (Table 10). Over a 192 day grazing period the ADG favoured the low stocking rate, while the gain/hectare was 23% higher at a stocking rate of 9 steers per hectare. The daily feed cost (based on fertilizer costs) was 39, 28 and 22 c for the 5, 7 and 9 stocking rates, respectively and the cost/kg gain was 45, 38 and 37 c.

This system would appear to have a definite potential in playing a role similar to that of the feedlot.

Table 8

Beef potential of Natal calculated where existing animal population is carried on improved grazing

Bioclimatic Group	[1] Present Livestock Population (A.U.)	[2] Potential with veld improvement (A.U.)	% Beef	Potential A.U. Beef Cattle
3	106 800	112 140	35,5	398 097
4	400 100	421 050	39,6	190 318
6	207 600	217 980	39,2	85 448
8	193 000	202 965	70,1	142 278
Total				816 141

[1] Dev. Prog. Natal Reg. (1974)
[2] Edwards (1980

Providing more animals to grow out for slaughter

If the methods of intensification proposed viz, faster turnover and increased carrying capacity are employed this will create the need for greater numbers of feeders. These could be provided by either increasing the calving rate or increasing the number of breeding units.

Since both methods of intensification create the opportunity for an increase in the size of the breeding herd, this will probably constitute the long-term policy. However, to provide for the immediate needs it may be possible to increase the calving rate so as to keep pace with the demand.

It is generally acknowledged that the chronically low calving rate of the National beef herd is a major factor restricting the profitability of the cow/calf operation. This is usually the explanation offered for the difficulty farmers have in showing acceptable financial returns on capital invested in the beef operation (van Niekerk, 1977). However, Steenkamp (1979) has questioned this conclusion and proposed that the calving % is dictated not by the unwillingness to spend money on feed etc., but by the poor financial returns.

Evaluations of the profitability of the breeding herd have recently suggested that increased inputs, although undoubtedly increasing the calf crop, do not necessarily improve the profitability of the exercise (Berry & Whitehead, 1980).

This situation applies particularly in those parts of Natal and the Eastern Cape where the feeding system is heavily dependent on the use of conserved fodder during winter and Steenkamp (1977) has shown that in Natal the weaner-costs are higher than in the rest of the country, despite weaning rates above 90%.

In evaluating the costs of producing weaners Steenkamp (1977) concluded that current production costs (particularly feed) were such that it was more profitable to operate at low performance levels especially when it is borne in mind that these levels could be substantially increased by efficient management and judicious breeding in the absence of expensive supplementary feed.

Berry & Whitehead, (1979) have shown that in the intensive farming areas of East Griqualand and the Underberg – Ixopo area the profitability of the farming enterprise is not necessarily determined by the calving rate. In these areas a very respectable average of over 80% is being attained (Berry & Whitehead, 1980; Boulle, 1980). Those farmers who cultivate a smaller proportion of their farms experience a lower turnover of beef cattle with a consequent increase in the average age of the herd and a reduced proportion of breeding cows (Berry & Whitehead, 1980). In the less intensive Northern Natal the calving rates are appreciably lower (Berry & Whitehead, 1980; Boulle, 1980) and those farmers with less cultivated land have to spend more on purchased feed. Surprisingly, however, farmers in the latter area show the highest gross margins and this supports the conclusions of Steenkamp (1977).

The data obtained by Berry & Whitehead, (1980) clearly indicated that the less profitable enterprises need to pay particular attention to the age at which heifers enter the breeding herd.

Table 9

Beef potential of Natal based on 60% radical veld improvement and 30% veld replacement with respective stocking rates of 4 and 1,5 A.U. per ha

Bioclimatic Group	Area of Veld ha	% European Owned	Area of Veld European owned (ha)	Potential Carrying Capacity A.U.	Current Proportion Beef Cattle %	Potential A.U. Beef cattle
3	266 300	74,3	198 926	208 872	35,5	74 150
4	1 118 500	71,2	796 372	836 190	39,6	331 131
6	676 400	82,1	555 324	583 090	39,2	228 571
8	1 080 600	74,6	806 127	846 433	70,1	593 349
Total						1 227 200

Utilizing by-Products

The annual sugar crop of 20 million tons yields considerable quantities of by-products that can or are being used to support cattle to varying degrees. According to van Niekerk (1979) the by-products obtained are:

	Annual Production
Molasses	700 000 tons
Bagasse	3 200 000 tons
Sugarcane tops	3 500 000 tons
Molasses vinasse	90 000 tons

(i) Molasses

Although this energy-rich by-product has been used as cattle feed for many years it is only recently with improvements in handling and distribution (road tanker) that the tonnage used in animal feeds has reached such significant proportions (190 000 tons). Although it is a relatively cheap form of energy, rates of inclusion in finishing rations beyond 15% depress the utilization. Consequently, it is used mainly for the palatability and binding attributes.

As nearly 340 000 tons is used for ethanol production, and this proportion is likely to increase considerably, a further by-product viz., molasses vinasse is going to be available in increasing quantities (van Niekerk, 1979). Due to its poor protein (10%) and energy content it is mainly used as a binder in winter licks and pellets.

(ii) Bagasse

Although large tonnages are available after extraction of the cane juice the low inherent feed value makes it more suitable as a fuel for steam generators in the sugar mills. A refined form of bagasse which is obtained from the sugar cane pith is valuable as (a) an absorbent carier for molasses to eliminate handling problems and (b) a very effective source of fibre for complete cattle feeds (van Niekerk, 1979).

(iii) Sugar cane tops

It has been estimated that if this roughage could be effectively utilized in the fresh or ensiled form then the sugar growing areas of Natal could support in the region of 130 000 AU. The utilization of this maintenance roughage is limited mainly by:

(1) Reluctance of sugar farmers to diversify.
(2) Because of the cane harvesting methods used, the bulky tops are difficult to collect.

Although it is available only during the harvesting season the time at which it occurs viz. winter period is highly favourable.

(iv) By-products of the Poultry Industry

With some 50% of the countries broilers to be found in a single unit operating in Natal a total of 6 000 tons of broiler litter are available each month.

Because of the high crude protein content (23%) and fair source of energy (50–55% TDN) it is used mainly as a protein supplement in sourveld areas. In beef fattening rations it can be successfully used at levels up to 20%.

(v) Future developments

Sugar cane and maize are the most efficient agricultural products capable of converting solar energy into plant energy for eventual ethanol production. Van Niekerk (1979) is of the opinion

Table 10

Effect of stocking rate on profitability of beef from irrigated Midmar rye grass receiving kg N/kg (Bartholomew, 1980)

Stocking rate Steers/ha	Mass Gain kg/ha	A D G kg	Cold Carcase Mass kg	Grading	Margin	
				3 2 1 P S	R/Animal	R/ha
5	834	0,868	197	1 1 0 3 1	120,44	602,21
7	986	0,733	175	1 2 3 0 0	60,59	424,15
9	1 025	0,593	151	4 0 2 0 0	22,22	276,45

that if the 3 million tons of surplus maize were to be converted to ethanol this would yield nearly 1 million tons of distillers trains – a feed of high nutritive value.

Fermentation of cane juice in turn would yield 86 kg (DM) of by-product per ton.

Beef from the dairy herds

The acceptability of carcasses obtained either as pure-breds or after selection of suitable beef sires has been amply demonstrated. Natal and the Eastern Cape with their large numbers of dairy cows have a virtually untapped reserve and much can be gained by growing-out the 25 000 calves currently slaughtered at the controlled markets of these two areas.

Conclusions

In the future beef could become more and more a luxury item in the human diet and factors such as palatability are going to become increasingly important (Harwin, 1976). While present demand favours light carcasses the increased consumption of processed beef and steaks is unlikely to justify this trend.

Based on the aspects emphasised by Harwin (1976) it is evident that in order to maintain the role of beef the goals must include:

1. In the short term

   To make the fullest utilization of the existing resources and paying full attention to economics:

   (a) By either avoiding surplusses (daily, seasonal, yearly) in order to maintain the confidence of the producer. This implies that the production systems must be modified (laborious) or vast storage facilities will need to be created (costly). There is a vital need to spread the marketing of higher grades in order to reduce the seasonality. The timing of the feedlot phase in relation to seasonal price trends for meat is going to become increasingly significant.

   (b) By reducing the wastage of potential beef

      (i) Unnecessary slaughter of calves

      (ii) Increasing the rate of turnover of beef animals (only 21% in 1978). Here alternatives to, and within, the feedlot must be sought and management on the farm must be improved. Clearly, grain will continue to play a role in the finishing of beef only for as long as grain prices remain competitive. The escalation of feed costs emphasises the fact that feed conversion and economic efficiency are so important that selection strategies must stress economic efficiency and not performance *per se*. Alternatives to the traditional feedlot ration such as the greater use of by-products will require continued attention.

   (c) By improving the reproductive rates

   (d) By using superior genetic material in those situations which justify such a step.

2. Long term

   To manipulate and create conditions which will allow the cattle population to be considerably increased. There is obviously going to be an increase in the trend for cattle to be kept on land which cannot be used for direct cultivation of human food. Also, the phenomenal price increases for grain are unlikely to diminish. Consequently, the increased utilization of roughages can be expected with grain playing an ever diminishing role. Cattle that perform efficiently (economically) under forage production systems will have to be developed. Thus the techniques of low cost pasture intensification, improved forage utilization (including crop residues) will need to go hand in hand with the developemnt of cattle types which will optimize production and maximise profits under such forage regimes. The animals must be bred for the environment since it is going to be too costly to change the environment. The production system is going to dictate the optimum carcase size rather than the present consumer preference.

   If intensification takes the form of a greater reliance on grain feeding then perhaps this could occur in the maize producing areas of the Orange Free State and the Transvaal. However, the demand for grain as human food must make such a development a short-term occurrence. The long-term strategy must surely be to base intensification on grass and in this respect the summer rainfall,

eastern areas of the country have a vast potential. The possibility than Natal will change from a market making heavy reliance on other parts of the country to one that is able to export beef, is not too far fetched.

Acknowledgements

The considerable assistance received from Drs. P. Edwards, G.O. Harwin and B.D.H van Niekerk and from Mr. S. Fiske is gratefully acknowledged.

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