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THE GOVERNMENTS OF MALAYSIA AND THE STATE OF JOHOR

W.P. BEEF

WORKING PAPER

JOHOR TENGAH AND TANJONG PENGGERANG REGIONAL MASTER PLAN

1971

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B E E F

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There are technical problems to overcome and they must be wholly solved by theorising. Investors wishing to develop land for beef should be encouraged and will contribute to many facets of development of the industry. Unfortunately, labour utilization on beef ranches is low and this has tended to slow down acceptance of investment.

3. Markets and Marketing

The analysis of market prospects is based on the most conservative of the projections in Appendix 2. The main assumption which affects the possible role of beef is the one that projected demand from Singapore and Johor will represent a target for possible production from Johor. It is however realised that there will be no great discontinuities in the transport of beef around the country as distances are relatively small.

TABLE 1 PROPOSED BEEF CONSUMPTION IN WEST MALAYSIA, SINGAPORE AND JOHOR

	Million lbs. beef			Total West Malaysia & Singapore	Total Singapore & Johor
	W. Malaysia	Johor	Singapore		
1975	48.6	7.4	14.8	63.4	23.2
1980	56.3	8.5	18.8	75.4	27.3
1985	73.9	11.2	24.1	98.0	35.3
1990	89.8	13.8	30.7	120.3	44.3

B E E F

1. Introduction

Proposals have been made to initiate a dairy industry in South East Johor. This will have, as a by-product, a considerable output of beef animals and a small output of female stock which can be utilised for beef breeding.

The location of the South East Johor project area, close to Johor Baharu and its proposed new port and Singapore, gives it an advantage in terms of the market. The climate, soils and terrain are all suitable for the abundant growth of good quality pasture grasses.

The Government wishes to diversify its agricultural production.

The market prospects appear good and there could be opportunities for meeting demands from other countries.

There are technical problems to overcome and these cannot be wholly solved by theorising. Investors wishing to develop land for beef should be encouraged and will contribute to many facets of development of the industry. Unfortunately, labour utilisation on beef ranches is low and this has tended to slow down acceptance of investment.

2. Markets and Marketing

The analysis of market prospects is based on the most conservative of the projections in Appendix A. The main assumption which affects the possible role of beef in the area is that projected demand from Singapore and Johor will represent a target for possible production from Johor. It is however realised that there will be no great diseconomies in the transport of meat around the country as distances are relatively small.

TABLE 1 PROJECTED BEEF CONSUMPTION IN WEST MALAYSIA, SINGAPORE AND JOHOR

	Million lbs. beef				
	W. Malaysia	of which Johor	Singapore	Total West Malaysia & Singapore	Total Singapore & Johor
1975	48.6	7.4	14.8	63.4	22.2
1980	56.3	8.5	18.8	75.1	27.3
1985	73.9	11.2	24.1	98.0	35.3
1990	89.8	13.6	30.7	120.5	44.3

In order to assess type of stock and production methods, an assumption has to be made about meat quality requirements. Over the period ending 1990, it is assumed that all the Johor demand will be for meat butchered in the existing manner for traditional cooking methods. In Singapore, half of the demand will be for this type of meat, the other half being for quality meat butchered in western type cuts.

TABLE 2 PROJECTED DEMAND FOR TRADITIONAL AND WESTERN TYPE MEAT IN SINGAPORE AND JOHOR -
Million Lbs. Beef

	<u>Traditional</u>	<u>Western</u>	<u>Total</u>
1975	14.8	7.4	22.2
1980	17.9	9.4	27.3
1985	23.3	12.0	35.3
1990	29.0	15.3	44.3

A further assumption is necessary to arrive at the number of carcasses necessary to supply this demand. It is assumed that animals of 570 lb carcass weight will be required to meet the demand for western cuts and smaller animals of say 400 lbs carcass weight will meet the demand for traditional cuts. Of the larger carcasses, some 400 lbs of each will be suitable for western type butchering and the remainder for the traditional market. Of the smaller carcasses, it is assumed that 170 lbs. will be suitable for western type cuts and 230 lbs for traditional cuts.

TABLE 3 NUMBER OF CARCASSES PER YEAR TO FILL SINGAPORE AND JOHOR DEMAND

	<u>400 lb. carcasses</u>	<u>570 lb. carcasses</u>
1975	37,000	12,980
1980	44,750	16,500
1985	58,250	21,050
1990	72,500	26,840

Current retail prices are in the region of \$1.80 per lb. Current wholesale prices are between \$1.35 and \$1.45 per lb. A Johor farm gate price which allows a wholesaler's margin of 20¢ per lb. deadweight would appear to be reasonable as this allows say \$80 per animal to cover transport, slaughter, storage and distribution. This would suggest a Johor farm gate price of \$1.20 per lb. deadweight for meat for the traditional trade. Quality meat would be expected to

show a premium and this is assumed to be 10¢ per lb. at the farm gate giving a Johor farm gate price of \$1.30 per lb. deadweight.

Potential farm gate values of the numbers in Table 3 would therefore be:

	\$mn
1975	27.4
1980	33.7
1985	43.5
1990	54.7

Marketing

A study of meat marketing in Johor was carried out during the course of the project and this is reported in Appendix A, and the Working Paper "Meat Marketing in Johor".

The major conclusions of the study are:

- i) Most meat with the exception of pork is imported to Johor and a large proportion are imported live. Most beef is imported from Kelantan and Thailand.
- ii) Meat is mainly retailed in comparatively small quantities and purchased daily.
- iii) It is sold mainly as fresh meat reflecting consumer preference which is at present for daily purchase.
- iv) Grading of meat is rudimentary but adequate for preparation of traditional dishes.
- v) Hygiene in markets is generally at a low level.

At present, only the large wholesale companies handling imported meat have experienced butchers who are able to cut meat in western style cuts. While this is only necessary for the comparatively small domestic market amongst Europeans, it could become important if graded and prepacked meat were exported.

Most slaughtering is done close to the local markets, again a reflection on the preference for fresh meat. Any export trade would have to be channelled through a slaughterhouse of acceptable quality.

3 Technical constraints

3.1 Stock type

It is difficult to see a thriving industry being built up from local stock only. Neither of the two main types of local cattle, L.I.D. and Kelantan, have a potential for profitable beef production on their own and selection and breeding will take many years before the achievement of noticeable results. Both have very slow growth rates and the Kelantan particularly has a very small carcass. There are, however, reports of zebu cattle on good grazing in Brunei achieving daily weight gains of well over 1 lb.

There are several tropicalised beef breeds which have been successful in many parts of the world and an injection of these will be essential to a Malaysian beef industry. There is also the possibility of several types of crossbred animals being suitable and profitable in this environment, the tolerance to the local conditions exhibited by local animals being introduced by cross breeding. There are difficulties in management of exotic temperate type beef animals such as Hereford, Charollais and Simmental and these should only be imported where management is confident it can maintain high standards. The breeds which are specially bred for heat tolerance and contain some bos indicus blood, such as Santa Gertrudis, American Brahman and Beef master, can be kept more easily and the first two are used extensively for upgrading zebus. If a foot and mouth disease free source of Latin American Criollo cattle can be found, these also may be of value in a crossbreeding programme.

Another line of production which will find considerable application is the use of the LID x Friesian animals from the dairy industry. There will be male calves available from the outset of this programme and the first crossbreeds will contain 50 percent Friesian blood. The European Friesian steer has a very high rate of weight gain and produces a highly acceptable type of beef. As weight gain and meat quality are highly heritable factors, this type of crossbred could do well as a beef animal. One suggestion made in S.V.6 part III is that Swiss or German Simmental are introduced as part of the dairy breeding programme. These cattle have heat tolerance almost on a par with zebus and produce good beef cattle plus an acceptable level of commercial milk production.

The dairy programme also assumes a culling rate amongst adult cows of 20 percent. These would be culled for various reasons connected with suitability as dairy stock. It is likely that at least half the culls will be capable of further breeding, particularly with natural service, and would also provide sufficient milk to raise beef calves. These should also be incorporated into beef programmes and crossed with beef bulls.

Thus the industry could be built up as a result of all or some of the following types of crosses.

LID x Friesian - males straight for raising
and fattening
50% of culled females for crossing
with beef breeds.

LID x Temperate beef breeds - Hereford, Simmental,
Charollais.

Kelantan x Temperate beef breeds - Hereford,
Simmental, Charollais

LID x Tropicalised beef breeds - S. Gertrudis,
Beefmaster, A. Brahman

Kelantan x Tropicalised beef breeds - S. Gertrudis,
Beefmaster, A. Brahman

Tropicalised beef breeds imported and raised direct.

At the present stage it would appear desirable to attempt all these lines of breeding, with the idea of developing breeding systems that would be workable to serve both large and small producers. Possibly the crosses which should have lowest priority are those with straight temperate animals although if private individuals wish to use them this could be encouraged.

Control of imports of stock for breeding, development and production should be exercised through the Veterinary Division and should be mainly concentrated on the need to avoid bringing problem diseases into the country. There should be some attempt to control quality and this would probably mean that the pedigree of all imported bulls should be produced and the general blood line history of imported females. This requirement should ease future genetic work.

3.2 Grass establishment

The main feed of beef animals should be grass and legume mixtures. The mixture is essential to provide the cheap source of carbohydrate and protein necessary to ensure high fecundity, high weaning weights, rapid growth and fattening rates and thus profitability. The basis of most beef enterprises will be grazed pastures and the correct types, establishment and management of these have yet to be developed in Malaysia.

As has been suggested for the dairy enterprises, a good starting point would be the guinea grass/centrosema pasture mixtures that have been a success in Northern Australia. Private information from a large beef producer operating in that area states that pastures have been established by aerial sowing of seed and fertiliser for the following costs:

Land clearance - involving ball and chain mechanical clearing, burning in situ - leaving strongest trees for shade in rain forest (their definition)

M\$90-\$160 per acre

Pasture seed - Guinea grass + Centrosema

Cost of seed - M\$16 per acre

Aerial application - M\$0.60 per acre.

Fertiliser

Cost of superphosphate and muriate of potash - M\$18.40 including aerial application.

Total cost M\$125-\$195 per acre.

The pasture has persisted for 7 years and after 2 years all tree trunks and most stumps had rotted away. No further fertiliser had been applied after the initial dose.

The particular property is situated in an area of 100-120 inches rainfall per year with one regular and well defined dry period of 6-8 weeks. It is not in full production yet but extends to 49,000 acres, at the moment is carrying 27,000 finishers and is the finishing ground for cattle brought in from other areas of Australia.

The establishment system described is not necessarily entirely appropriate to Malaysian conditions but does show that the problem is not without solution as the climate and

soils are to a large extent comparable with South East Johor. It is worth mentioning in this context that certain types of mechanical clearing, resulting in excessive soil disturbance have given rise to grass establishment problems at Sungei Tekam Research Station.

3.3 Grass utilisation and nutrition

Having established the right types of pasture, methods of utilisation have to be developed which take account of the system of production decided on. Factors which would have to be taken into account are paddock size and grazing system, carrying capacity, fertiliser programmes, and the conservation of fodder with its place in any possible feedlot operation.

With the potential rate of grass growth on well tended pastures, both stocking density and frequency of rotation may have to be quite high in order to maintain pastures a) in good order and reasonably weed free and b) in a state of optimum nutrient availability. A careful balance will have to be maintained between frequency of grazing and grass growth, in order that undesirable growth is checked by competition and shade from grass but at the same time grass is not allowed to lose its protein value by becoming too rank. At the same time, overgrazing will reduce the tonnage of total nutrients and therefore the overall carrying capacity.

Although guinea grass/centrosema pastures should provide a good balance of nutrients together with a high rate of production - 60-70 tons of fresh weight and 17 percent protein on a dry weight basis, different types of grass may be necessary for different soil and terrain conditions and for different end uses. It is possible that Para grass will be necessary in areas liable to flood such as the river valleys of both Tanjong Penggerang and Johor Tengah. Napier grass could also be useful in a conservation programme, especially if ensiled and fed with a small amount of protein supplement.

Paddock size would be related to the size, intensity and type of beef operation. It is possible to envisage beef production units with paddocks larger than 500 acres each and a set stocking system or with paddocks of 50 acres and rotational grazing. Feedlot operations would effectively only have bare holding yards and all grass would be cut and carried to the animals. Smaller farm operations would obviously have to be scaled down.

The nutrient availability to a grazing animal can only be calculated from feeding trials. An attempt to derive a theoretical base for an early assessment of carrying capacity is made below using data from cutting trials and from Morrisons 'Feeds and Feeding' - the standard work on the subject.

TABLE 4 DRY MATTER (DM), TOTAL DIGESTIBLE NUTRIENTS (TDN) AND DIGESTIBLE PROTEIN (DP) OF SELECTED FODDERS AND GRASSES

	Tons fresh wt.	% Utilised	Percentage			Utilised '000 lbs. in Malaysia		
			DM	TDN	DP	Per acre DM	TDN	DP
Napier grazed	100	60	18.9	12.1	1.4	25.4	16.2	1.9
Napier cut	100	95	22.0	12.6	0.7	47.0	26.8	1.5
Napier silage	100	95	26.8	11.6	0.3	57.0	24.7	.64
Guinea grazed	60	60	26.8	13.8	0.8	21.6	11.1	.64
Para grass grazed	60	50	27.8	14.9	1.0	18.7	10.0	.67
Bermuda grazed	45	50	25.0	15.0	2.0	12.6	7.6	1.0

The feeding standards given by Morrison tend to be high but as conditions in Malaysia have yet to be evaluated, they are used as a first basis for assessing potential carrying capacity of pasture.

TABLE 5 DAILY REQUIREMENTS IN LBS. PER DAY OF DRY MATTER (DM), TOTAL DIGESTIBLE NUTRIENTS (TDN) AND DIGESTIBLE PROTEIN (DP) FOR BEEF ANIMALS

		DM	TDN	DP
Pregnant beef cow	1000 lbs.	20	9	0.7
Beef cow nursing	3-4 months	27	13.5	1.2
Growing cattle	300 lbs.	9	5.5	0.67
	400 lbs.	11.4	6.7	0.76
	500 lbs.	13.0	7.8	0.81
	600 lbs.	14.7	8.7	0.84
Finishing cattle	700 lbs.	19.1	13.4	1.36
	800 lbs.	20.4	15.0	1.52

FIGURE 1 Daily Requirements of Cow and Calf of DM, TDN and DP.

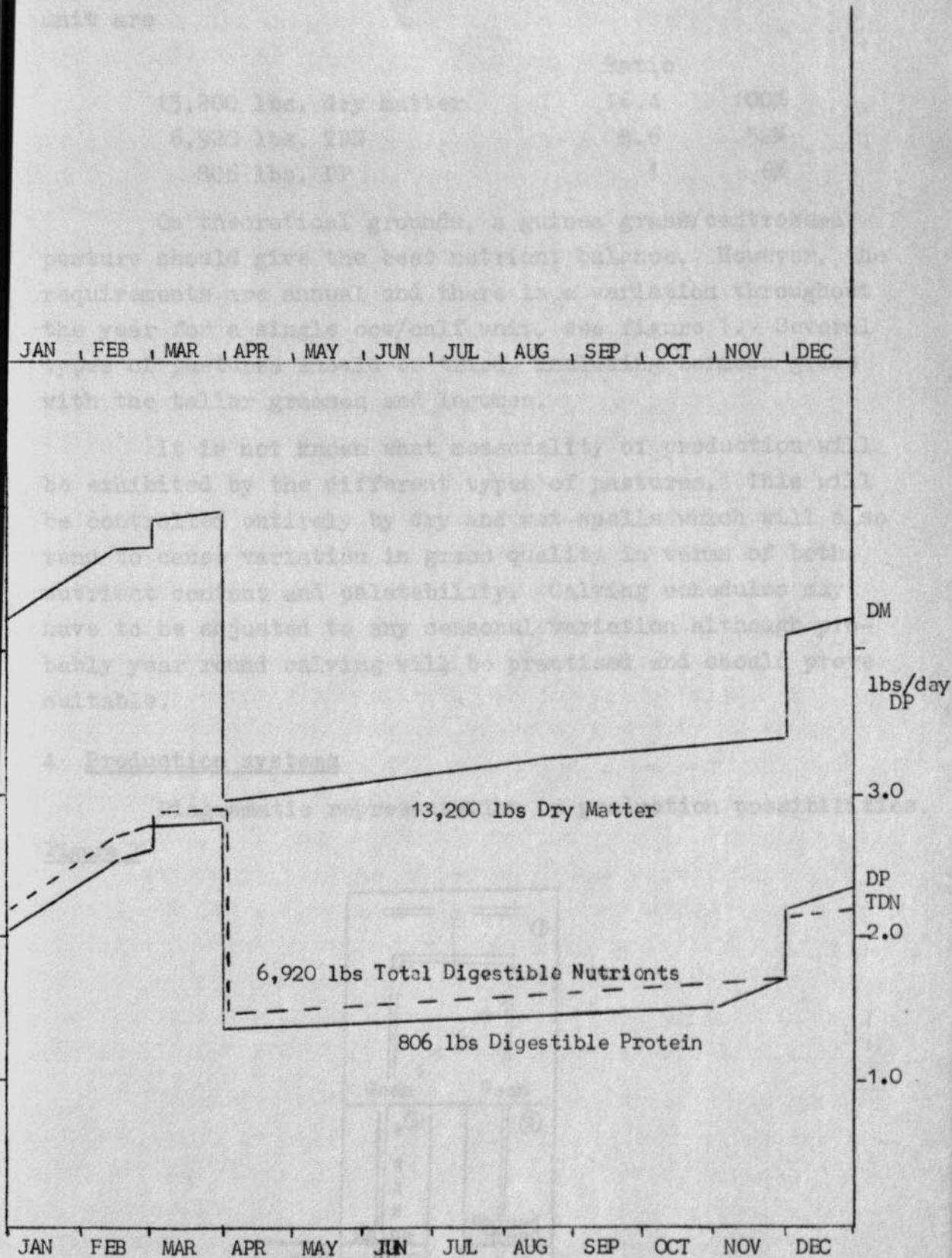
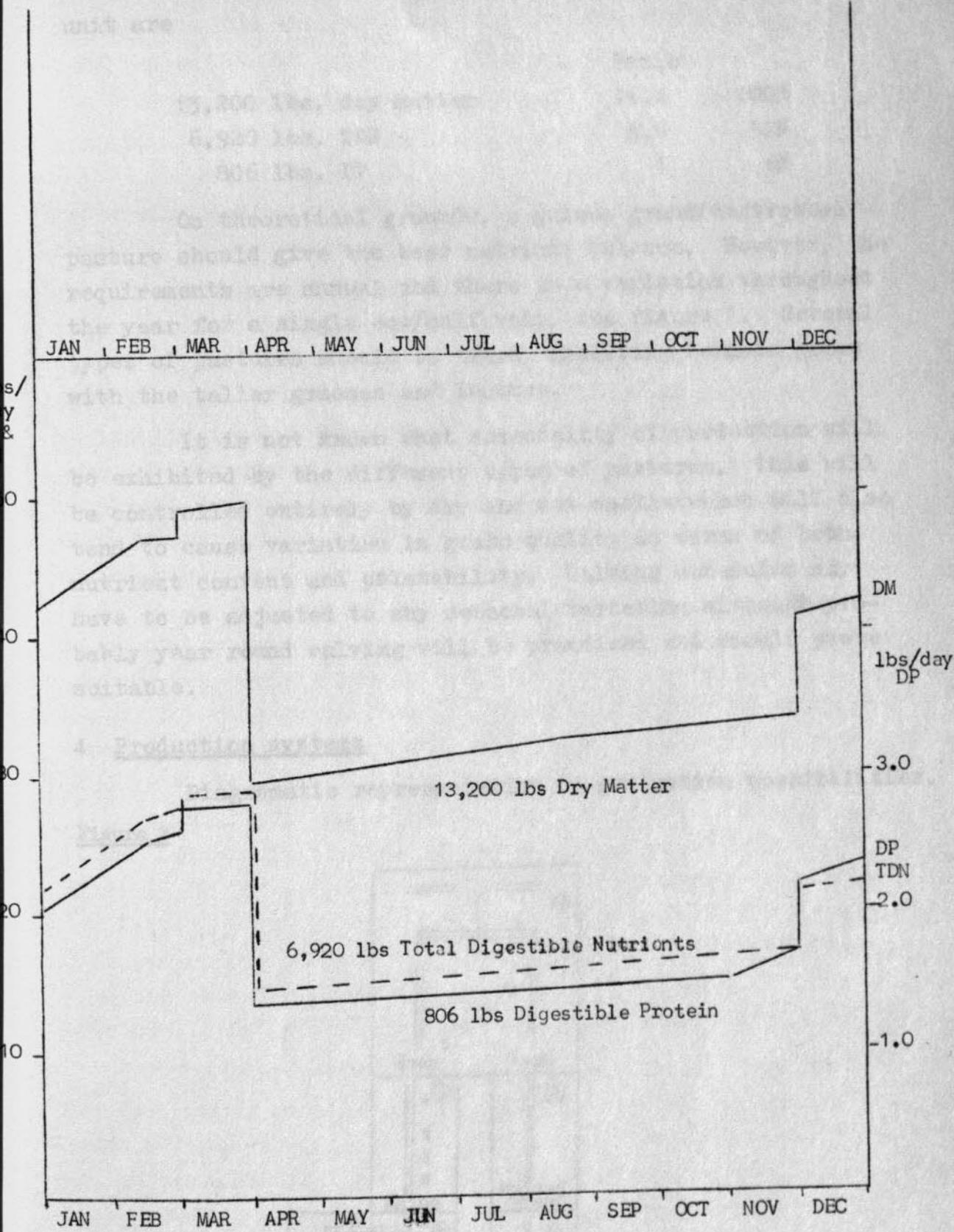


FIGURE 1 Daily Requirements of Cow and Calf of DM, TDN and DP.



The annual requirements of a cow and calf/grower unit are

	Ratio	
13,200 lbs. dry matter	16.4	100%
6,920 lbs. TDN	8.6	52%
806 lbs. DP	1	6%

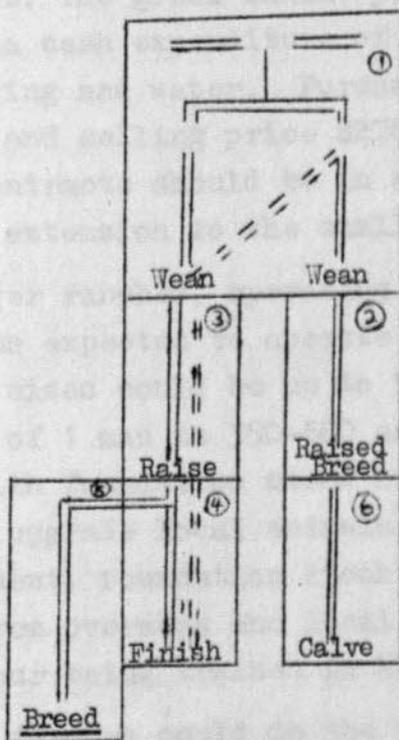
On theoretical grounds, a guinea grass/centrosema pasture should give the best nutrient balance. However, the requirements are annual and there is a variation throughout the year for a single cow/calf unit, see figure 1. Several types of pastures should be tried, including Bermuda grass with the taller grasses and legumes.

It is not known what seasonality of production will be exhibited by the different types of pastures. This will be controlled entirely by dry and wet spells which will also tend to cause variation in grass quality in terms of both nutrient content and palatability. Calving schedules may have to be adjusted to any seasonal variation although probably year round calving will be practised and should prove suitable.

4 Production systems

Diagrammatic representation of production possibilities.

Figure 2



Any cumulative combination of these activities is a possibility for any production unit - or any single operation. Many variations of scale are also possible.

Both ranching on a large scale - over 5000 acres - is possible, as eventually is smaller scale beef farming. This may be in combination with other enterprises and the beef enterprise may be either the main enterprise, a complementary activity or a supplementary activity.

The larger enterprises are likely to undertake the full process. They may contract out certain parts of the process and this could have a beneficial effect on both the size of their own business and on the size and diversity of contractor farms. The most likely form of contract arrangement is that weaned calves are sent out to other farms for raising. Either the weaners are sold at an agreed price with guaranteed repurchase at 600-700 lbs liveweight or they are sent out and rent is paid for their keep and feed. They would then come back in for final fattening. This system would enable ranchers to control the quality of the final product and arrange marketing to the best advantage. It would also mean an increase in carrying capacity of their breeding stock of 30 percent. The rearing farms would be able to carry about 3 animals to the acre and raise these in 10-11 months. If the contract were set on a liveweight basis of say 45¢ per lb. the gross income per acre per year could be \$450-500 for a cash expenditure of under \$100 per acre on fertiliser, fencing and water. Purchase price could be say \$135 per animal and selling price \$270-300. A ranch prepared to offer such contracts should be in a position to channel both credit and extension to the smaller farmers initially.

The larger ranches, operating the whole production process, would be expected to operate on a very extensive scale. Paddock sizes could be up to 500 acres and labour use at the rate of 1 man to 350-500 acres. They would probably operate with foundation stock of a tropicalised beef breed and would upgrade local animals purchased on the open market. Management, foundation stock and some capital would be brought in from overseas and local participation would be sought with labour being trained in Malaysia.

Smaller farmers could do the same thing but with higher labour costs per unit. They could also operate feed

lots for finishing cattle over the last 3-4 months to sell them directly as beef.

Beef under coconuts is a possibility and has been examined in the Working Paper on coconuts. Beef as part of a mixed farm operation is similarly described in the Working Paper "The Development of Mixed Enterprise Holdings".

Beef also comes from the dairy herd and raising and finishing can also be part of the operation of the dairy farm. Some dairy farms may wish to concentrate on maintaining a high proportion of milking cows and would have both male calves and heifer calves for sale. There would also be a proportion of culled cows, unsuitable for dairy production but capable of successfully breeding and weaning beef offspring.

5 Institutional constraints

Training

There are no personnel in Malaysia who can be considered trained in commercial beef production. As with other new enterprises, the best training programme will be on-farm training under experienced workers and managers. This may limit the early growth of the industry and confine it to those operations with the capital to employ trained personnel from overseas sources. If a contract industry builds up around the early larger farms, then advice can be given using the personnel on such farms. Perhaps experienced managers could be induced to undertake lecturing and practical demonstration at the farm training centres.

Research

Only limited research has been carried out in W. Malaysia although research into beef production is now high on the list of priorities at MARDI. This organisation is planning a beef research unit at its regional research centre near Kluang.

A small herd is being run on the College farm at Serdang. This is used mainly for demonstration.

FIDA have set up a pilot scheme at their Sungei Tekam Research Station using local cattle and a variety of grasses. It will be at least another two years before really worthwhile results start emerging.

This latter activity is the only one which promises early results and, while FLDA is motivated by commercial objectives, it would seem better to encourage commercial producers to set up their own operations in order to feed through the problems that they encounter. MARDI will then be able to design its research package to provide a real service to beef producers.

6 Evaluation of beef enterprises

The main evaluation is of a beef ranch of about 5,500 acres, carrying stock at the rate of 1 breeding cow and her offspring per acre. The calves are weaned at 4-6 months and are raised to 600-700 lbs live weight before being finished on the best pastures at 800-900 lbs liveweight and 18-21 months of age.

The major costs of such an enterprise are:

Land clearance	\$150/acre
Pasture establishment	\$142 "
Pasture maintenance	\$ 60 "
Roads	\$ 1 "
Fencing	\$ 15 "
Water	\$ 15 "
Cattle purchase	\$400/animal
Farm machinery	\$66,000 total
Buildings - Admin. and operational	\$40,000 "
Housing	\$98,000 "
Transport	\$43,000 "
Workshop and equipment	\$20,000 "
Management	\$80,000/year
Labour	\$50,000/year

Cattle are bought in over years 2 to 6 inclusive and a total of 5500 are purchased and bred with AI. Land is cleared over years 1 to 4 and pastures established in years 2 to 5. The maximum number of breeding cows is reached by year 6.

The eventual annual output is 1200-1300 surplus breeding heifers, over 2000 steers and about 800 cull cows. Heifers are sold at \$600 each, beef steers at \$400 and culls at \$300.

The cash flow, excluding deductions for taxes is:

	\$ '000
Year 1	(265)
Year 2	(953)
Year 3	(1262)
Year 4	(1078)
Year 5	(421)
Year 6	36
Year 7	955
Year 8	1189
Year 9	1242

The rate of return is 18 percent and the pay back period is 10 years. Undiscounted total capital required is just under \$4 million. Total employment on such a ranch would be in the region of 12-15 men including management.

Average costs are in the region of \$120 per acre and output about \$350 per acre. Capital requirements are in the region of \$750 per acre spread over 5 years.

Calculations of the profitability of smallholder beef made in other working papers show that the enterprise could provide a useful addition to income. It is estimated that a 20 acre coconut holding could support 12 breeding cows on grass grown as an intercrop and that for an initial outlay of \$10,500 a gross margin of \$3,200 might be obtained. Labour has not been charged in this calculation but a cash requirement of \$70 per cow per year is necessary for a total income of about \$340 per cow. This situation assumes that effective production of beef would come from about 60 per cent of the holding.

7 Conclusions and recommendations

With the chance for good grass growth, beef production should be encouraged. As there are investors willing to take the initial risks, little in the way of stimulation by government action is necessary. However, investors should be encouraged and ways should be constantly sought for the involvement of a wide cross section of investors in production.

Although beef ranching does not employ many people directly, the inflow of expertise that such ranches would provide will be essential to further planning.

Beef herd - Cash flows

	Exp.	Inc.	
1.	265	-	(265)
2.	968	15	(953)
3.	1377	115	(1262)
4.	1478	400	(1078)
5.	1268	847	(421)
6.	961	997	36
7.	566	1521	955
8.	566	1755	1189
9.	566	1808	1242
10.	626	1887	1261
11.	599	1809	1210
12.	566	1809	1243
13.	566	1809	1243
14.	566	1809	1243
15.	566	1809	1243
16.	566	1809	1243
17.	566	1809	1243
18.	566	1809	1243
19.	566	1809	1243
20.	566	1809	1243
	Terminal value of stock		4210

NPV
@ 15% 705

NPV
@20% -427

IRR 18.10%

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Technical Coefficients

Calving %	65	65	70	75	80	80	85	85	85	85	85	85	85	85	85	85	85	85
Weaning %	60	60	65	70	75	75	80	80	80	80	80	80	80	80	80	80	80	80
P.W.M.* %	4	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Culling	10	10	10	10	10	10	10	10	10	10	15	15	15	15	15	15	15	15

Herd numbers

Breeding Cows	500	1932	3177	4372	5500	5500	5500	5500	5500	5500	5500	5500	5500	5500	5500	5500	5500	5500
o C. Wean.	150	580	1032	1656	2062	2062	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
♀ C. Wean.	150	580	1032	1656	2062	2062	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
Steers	4	147	563	1001	1623	2021	2021	2021	2156	2156	2156	2156	2156	2156	2156	2156	2156	2156
Heifers	147	147	563	1001	1623	2021	2021	2021	2156	2156	2156	2156	2156	2156	2156	2156	2156	2156
Steers	144	144	546	970	1590	1980	1980	1980	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112
Heifers	144	144	144	546	970	1590	1980	1980	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112
Breeding Cows End year	432	1677	2872	3856	4851	4851	4851	4851	4851	4851	4851	4851	4851	4851	4851	4851	4851	4851

Sales

Heifers			144	546	326	941	1331	1331	1463	1194	1194	1194	1194	1194	1194	1194	1194	1194
Steers sold		144	546	970	1590	1980	1980	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112	2112
Culls sold	50	193	318	437	550	550	550	550	550	550	550	550	550	550	550	550	550	550

Purchases

	500	1500	1500	1500	1000													
--	-----	------	------	------	------	--	--	--	--	--	--	--	--	--	--	--	--	--

* Post weaning mortality

APPENDIX A

BEEF - DEMAND AND MARKETING

(a) DEMAND

The beef market does not have the same degree of complexity as that for milk and milk products. However there are a number of problems in studying it and projecting future levels of consumption. The major of these is in estimating the present level of consumption. The Veterinary Department keeps a record of all animals slaughtered in licensed premises. All animals are supposed to be slaughtered in such premises but considerable slaughter does take place elsewhere. It is estimated that illegal slaughters are 20 percent of recorded slaughter in the case of buffaloes, and 23 percent for cattle. It is further estimated that the average buffalo carcass weighs 400 lbs. and cattle 250 lbs. Using these estimates the consumption of beef in 1967 is estimated as follows:-

Buffaloes slaughtered 44,607	=	17,852,800 lb.
Cattle slaughtered 58,231	=	14,566,720 lb.
Imports of chilled beef	=	2,800,000 lb.
		<hr/>
		35,219,510 lb.

This was equal to 4 lbs. per head in that year.

In making projections of future demands for beef and mutton the following assumptions have been made.

- (a) that population will grow at approximately 2.8 percent per year. (Statistics Department Estimate).
- (b) that per capita income will grow at 2.5 percent per year.
- (c) that there will be no change in relative prices.

A number of estimates of the income elasticity of demand for beef have been made.

In the case of beef the situation is again somewhat more clouded. The FAO estimates used for agricultural commodity projections to 1975 and 1985 were 1.07 for all meats and 1.2 for beef. In the Indicative World Plan for

griculture, the estimate for all meats was lowered to 0.9. Purvis' estimates for all meat based on 1957/58 data was 1.26. These estimates suggest that a value in the range 1.0-1.4 might be appropriate. Data from the 1957/58 Household Budget Survey support such a view. Using consumption figures for each racial group (sub-divided into urban and rural) a national per capita consumption figure of 2.2 lbs. per annum is obtained. This would indicate that per capita beef consumption increased by 80 percent over the decade. However consumption estimates based upon Veterinary Department slaughter statistics provide a different picture. In 1958 recorded slaughterings were 26,513 buffaloes and 34,456 cattle. Using estimates of illegal slaughter and carcass weight as for 1967 this would yield a total consumption of 23 million pounds or 3.6 lbs. per head. 1958 was however during the Emergency when food control was very severe and it may be reasonable to assume that illegal slaughter, particularly of cattle and buffaloes, was at a lower level than at present. Taking no illegal slaughter as a minimum consumption level the per capita consumption estimate falls to approximately 3.0 lbs. This would imply an increase of one-third in per capita consumption over the 10 year period, which is more consistent with an income elasticity of demand in the neighbourhood of 1.0. However because of this uncertainty an income elasticity of demand of 0.5 has been used to project a 'low' estimate as well as 1.0 which is closer to what 'conventional wisdom' would suggest.

A survey was carried out in South Johor by South East Johor Project on household expenditure on meats, fish and dairy products. The proportion of households interviewed purchasing buffalo or ox beef in the three major racial groups is shown in Table 1.

TABLE 1 PROPORTION OF HOUSEHOLDS BUYING BUFFALO AND OX BEEF, BY RACIAL GROUP AND INCOME GROUP

Income Group	<u>Malays</u>		<u>Chinese</u>		<u>Indians</u>	
	Buffalo	Ox	Buffalo	ox	Buffalo	ox
Less than \$100	5	77	0	10	0	0
\$100 - 199	9	83	1	16	2	13
\$200 - 299	8	85	2	24	0	5
\$300 - 499	13	78	3	40	0	15
\$500 & over	6	88	15	40	13	21

Buffalo meat is clearly a minority product in South Johor. Ox beef was eaten by almost all Malay families, but by a minority of the other racial groups; although 40 percent of upper income Chinese did buy ox beef their expenditure was low (Table 2).

TABLE 2 MEDIAN MONTHLY EXPENDITURE PER ADULT EQUIVALENT BY CONSUMING HOUSEHOLDS, BY RACE AND INCOME GROUP

Income Group	Malays		Chinese	Indians
	Total Pop.	Consumers only	Consumers only	Consumers only
Less than \$100	0.15	0.23	0.10	-
\$100 - 199	0.35	0.52	0.20	0.66
\$200 - 299	0.68	0.98	0.40	-
\$300 - 499	0.61	1.12	0.33	2.50
\$500 & over	1.21	1.56	0.36	5.00

In all income groups more than three-quarters of Malay households reported buying beef, and there was only a slight tendency for this proportion to rise as incomes rose. As one would expect the amount spent did however rise at higher income levels. In lower income groups beef is very much a luxury, being purchased only very occasionally; at higher income levels it has become a regular item in the diet, most families reporting buying it weekly. Median expenditure reported by consumers with household incomes of over \$500 per month was \$1.56 per consumption unit, equivalent to about 1 lb. of meat per month, not a large amount by western standards, but this is also a reflection of cooking methods and the types of dishes prepared. Full details of Malay beef consumption levels and frequency of purchase are available in Project file SEJP/3/D53.

There was a marked rise in reported consumers by Chinese with increases in income. However, the amounts purchased were small, less than 40 cents per consumption unit per month. Higher income Indians who eat beef, however, do so in fairly large quantities. The median for consumers in the over \$500 group was \$5.00 per month or about 31 lbs. per consumption unit per annum.

A number of supplementary questions were also asked to elicit information on consumer preferences with regard to meats. Respondents were asked which of the two types of beef they preferred. The results are given in Table 3. The majority of consumers indicated no particular preference for either type of beef. Among Malays those who did indicate a preference were roughly equally divided between the two alternatives.

TABLE 3. NUMBER OF INDIVIDUALS BY BEEF PREFERENCE AND INCOME GROUP

(a) Malays Beef Preference	Less than \$100	\$100-199	\$200-299	\$300-499	\$500 & over
Buffalo	43	117	58	63	41
Ox	34	130	63	64	38
No Preference	120	203	65	56	29
Do not eat	34	25	5	8	5
No answer	3	4	2	1	1
(b) Chinese					
Buffalo	-	7	11	11	13
Ox	2	10	13	20	9
No Preference	2	19	31	28	18
Do not eat	17	119	97	59	19
No answer	-	3	11	2	8
(c) Indians					
Buffalo	-	2	1	3	1
Ox	-	3	-	1	2
No Preference	1	11	4	3	7
Do not eat	2	35	15	13	14
No answer	-	-	2	-	-

This would seem to indicate that more individuals prefer buffalo meat than actually buy it. This may be because of lack of supplies; because a few who said they prefer buffalo really cannot tell the difference or because there was some lumping of answers to the questions on expenditure.

Respondents were also asked why they did not purchase more beef. The answers to this question have been tabulated in Table 4. As expected, the principal reason given by Chinese and Indians for not consuming more beef was religious beliefs. Among Malays price was the principal reason offered.

TABLE 4 NUMBER OF INDIVIDUALS BY REASON FOR NOT BUYING MORE BEEF AND INCOME GROUP

(a) Malay Reasons	Less than \$100	Income Group			
		\$100-199	\$200-299	\$300-399	\$500 & over
Don't like it	14	39	28	29	22
Too expensive	181	321	109	80	31
Not available	4	3	4	4	1
Religious reasons	-	3	3	4	2
Other	35	114	49	74	57
<hr/>					
(b) <u>Chinese</u>					
Don't like it	1	34	38	42	20
Too expensive	7	21	23	8	4
Not available	1	8	8	8	2
Religious reasons	12	84	80	47	22
Other	-	11	14	15	19
<hr/>					
(c) <u>Indians</u>					
Don't like it	-	5	3	1	1
Too expensive	1	8	1	-	3
Not available	-	-	1	-	-
Religious reasons	1	31	15	14	13
Other	1	7	2	5	7

The results of this survey suggest that for Malays an income elasticity of demand in the region of 0.5 to 1.0 would be appropriate, possibly nearer the upper end of this range, and also that ox beef is a perfectly acceptable product to the vast majority of the population.

Table 5 shows projected consumption levels per capita and in total for West Malaysia up to 1990.

TABLE 5 PROJECTED BEEF CONSUMPTION TO 1990

Income Elasticity	Per Capita (lbs/head)		Total (Million lbs.)	
	0.5	1.0	0.5	1.0
1967	4.0	4.0	35.2	35.2
1970	4.16	4.32	39.5	41.0
1975	4.45	4.88	48.6	53.4
1980	4.77	5.53	56.3	69.6
1985	5.13	6.25	73.9	90.0
1990	5.54	7.07	89.8	114.6

Beef Production Projection

These demand projections need to be viewed together with likely production trends to ascertain the market position in the future. The changes in size of the national cattle and buffalo herds, imports of live animals and estimated slaughter from the national herds since 1958 are shown in Tables 7 and 8.

For buffaloes total slaughterings were relatively stable over the 1961-67 period. However imports of live animals (mainly from Thailand) fell in the last two years and this has been made up from domestic animals. This increase in the rate of slaughter to total population has accentuated the decline in total numbers which began in 1964. This decline is almost certainly a reflection of a switch from animal to mechanical power. This change is hastened by double cropping of padi which reduces the time available for cultivations

A somewhat similar picture emerges with cattle; numbers started to turn down in 1964 as the domestic slaughter rate rose. This is undoubtedly for similar reasons to the above. There has been an increase in imports of live cattle (again mainly from Thailand) which together with increased domestic slaughter has maintained beef supplies.

With the major padi irrigation and double cropping schemes coming into production in Kedah/Perlis and Kelantan over the next five years a further reduction in the number of draught animals must be expected. In Province Wellesley in 1968 5 years after the introduction of double cropping there were approximately 0.1 buffaloes and 0.05 cattle per acre of main crop padi. This compares with 1967 figures for Kedah/Perlis of 0.27 and 0.14 respectively and in Kelantan of 0.20 and 0.33. Assuming that animal numbers in the areas covered by the Muda and Kemudu Schemes decline to the same level as in Province Wellesley, the following reductions should be expected:-

	<u>Buffaloes</u>	<u>Cattle</u>
Kedah/Perlis	33,800	18,400
Kelantan	5,000	14,000
T o t a l	<u>38,800</u>	<u>32,400</u>

This would result in national herds of approximately 200,000 buffaloes and 250,000 cattle. It should be noted that these estimates make no allowance for declines in numbers elsewhere in the country and thus should probably be viewed as maxima. Assuming percentage slaughters as in 1967 this would allow domestic slaughter of 34,280 buffaloes and 46,975 cattle, which would yield 25,456,000 pounds of beef. Table 6 shows the overall situation in 1975 in comparison with 1967, assuming projected demand to be at the lower of the two levels shown in Table 5.

TABLE 6 BEEF SUPPLY AND DEMAND BALANCE 1967 AND 1975

	<u>1967</u>	<u>1975</u>
Domestic demand	35,219,520	48,635,000
Domestic slaughter	29,438,200	25,456,000
Balance to be imported	<u>5,781,320</u>	<u>23,179,000</u>

In 1967 slaughter of domestic animals was sufficient to meet 5/6 of national requirements. By 1975 however it is likely that barely half of national needs will be met

TABLE 7

WEST MALAYSIA CATTLE NUMBERS, IMPORTS AND SLAUGHTER 1958-67

BUFFALOES

Year	Number (1)	Known Slaughter (2)	Est.-Total Slaughter (3)=(2)x12	Net Imports (4)	Domestic Slaughter (5)=(3)-(4)	Domestic Slaughter as % of total $\left(\frac{5}{1}\right) \times 100$
1958	254,696	26513	31816	5922	25894	10.17
59	263,350	32576	39091	8483	30608	11.62
60	269,355	35838	43006	7912	35094	13.02
61	275,528	38726	46471	6166	40305	14.63
62	275,816	36160	43392	5888	37504	13.59
63	275,153	36398	43678	5812	37866	13.76
64	283,922	38243	45892	5814	40078	14.12
65	274,698	38159	45791	6237	39554	14.40
66	259,433	38338	46006	4206	41800	16.11
67	237,848	37174	44609	3851	40758	17.14

TABLE 8

WEST MALAYSIA CATTLE NUMBERS, IMPORTS AND SLAUGHTER 1958-67

CATTLE

Year	Number (1)	Known Slaughter (2)	Est.-Total Slaughter (3)=(2)x12	Net Imports (4)	Domestic Slaughter (5)=(3)-(4)	Domestic Slaughter as % of total $\left\{ \begin{array}{l} (5) \\ (1) \end{array} \right\} \times 100$
1958	290,853	34456	42381	2420	39961	13.74
59	304,599	35239	43344	2234	41110	13.50
60	308,148	38097	46859	2147	44712	14.51
61	305,882	38391	47221	1661	45560	14.89
62	297,628	35486	43648	1794	41854	14.06
63	304,432	34533	42476	1544	40932	13.45
64	305,759	33945	41752	516	41236	13.49
65	311,844	38563	47432	1253	46179	14.81
66	310,476	44820	55129	4173	50956	16.41
67	285,686	47342	58231	5692	52539	18.39

domestically unless steps are taken to expand beef production very quickly. The majority of imported beef in 1967 came in the form of live animals, the major source of which was Thailand. It was noted earlier that the number of buffaloes coming from that country has been declining. To meet the 1975 requirements in the form of live cattle would require at least 75,000 live animals, a 15 fold increase over 1967. Such an increase appears extremely unlikely. Import of live animals has been common in the past because of the preference for fresh meat and Muslim slaughter. Malaysia will either have to look elsewhere for supplies e.g. Australia or there will have to be a switch to chilled or frozen meat imports.

The Market in Johor

Johor is at present not an important cattle producing State. In 1967 the Veterinary Department estimated that there were 3,210 buffaloes and 11,553 cattle in the State. An analysis has been carried out on the numbers of animals available for slaughter in each State, numbers recorded as slaughtered, and expected consumption in each State based upon national average consumption levels. This analysis is described in Appendix B of Association Paper on cattle available in Project file SEJP/3/E04. It shows the probable extent of interstate movement of live cattle and suggests that either there are also considerable movements of meat between States, or that there is considerable variation between states in beef consumption which is not related to income i.e. presumably related to available supplies.

This discrepancy was particularly marked in the case of Johor. The quantities estimated for the State were as follows:-

	<u>Buffaloes</u>	<u>Oxen</u>
Number locally available	550	2,125
Number "imported"	1,117	2,995
Number slaughtered	1,667	5,120
Quantity of meat produced from above	1,947,000 lbs.	
Expected consumption	4,173,000 lbs.	
Difference	2,226,000 lbs.	

These figures imply that consumption of meat in Johor is only about one-half as great as might be expected. Other sources tend to confirm this picture. The S.E.J.P. survey indicated that Malay households buy about 2 katis of beef per month or about 5 lbs. per person per year. This is below the national estimate of 7 lbs. per head. The above survey was also carried out in both urban and rural areas, with a slight urban bias. In rural areas supplies of beef are virtually non-existent. A survey carried out by the Department of Agriculture in 3 kampongs reported no cattle at all in them and an average beef consumption of about $\frac{1}{2}$ kati per month per household, or 1 kati per head per year. Also in conjunction with F.A.M.A. a brief survey of meat marketing was carried out. Data obtained in this survey were broadly in line with a state-wide consumption of about 2-2.5 million pounds of beef.

In these circumstances projecting future consumption of beef becomes subject to considerable potential error. In the future one would expect two main forces to act in determining beef consumption, higher incomes and increased availability. It seems reasonable to assume that, as the racial distribution of population in Johor is similar to that in W. Malaysia as a whole, beef consumption would also be similar if sufficient were available, and that this "potential" market will grow at the same rate as in the nation as a whole. The growth of this "potential" market is shown in Table 9.

TABLE 9 GROWTH OF MARKET FOR BEEF IN JOHOR
(MILLION POUNDS)

Income Elasticity	0.5	1.0
1975	7.36	8.09
1980	8.53	10.54
1985	11.20	13.64
1990	13.60	17.36

Since at the present time beef produced in Johor from local animals amounts only to about three-quarters of a million pounds, there is obviously considerable scope for increased local production.

At the present time animals are mainly bought live on inspection for a lump sum, not by weight. Prices however seem to average about 50-70 cents per pound or more. Assuming a retail price of about \$1.80 per pound, a wholesale price equal to 35 percent of this (or 60 cents per pound liveweight) would appear to be reasonable.

A potential market for beef produced in Johor exists in Singapore because of its proximity. Singapore being Chinese might not be expected to be very big market for beef. Consumption in 1968 has been estimated as follows:-

Buffaloes slaughtered	= 3,500	= 1,400,000 lbs.
Cattle slaughtered	= 8,913	= 2,228,250 lbs.
Net Imports beef & veal	=	6,867,498 lbs.
		<hr/>
		10,495,748 lbs.

This means a per capita consumption of about 5.25 lbs. per year or 25 percent above that in Malaysia. There are two probable reasons for this:-

- (a) Higher incomes
- (b) The relatively large European population.

There are about 65,000 "other races" in the Republic many of whom are of British, Australian or American origin. If these consume beef at western levels of about 50 lbs. per head this would account for about 3 million lbs. There is also the hotel trade catering to western diets. These groups probably account for a large part of the imports of fresh, frozen and chilled beef.

The overall market for beef in Singapore will obviously depend on the future growth of the European population as well as overall income growth. With population growing at 1.5 percent per year, per capita income at 4 percent, an income elasticity of demand of about 1.0 and a rapidly increasing tourist industry, overall demand would be expected to increase at least 5 percent per annum. Table 10 shows projections to 1990 assuming growth rates of 5 and 7.5 percent per annum.

TABLE 10

GROWTH OF BEEF CONSUMPTION SINGAPORE
1970-1990 (million pounds)

Year	<u>Growth rate (percent/annum)</u>	
	5.0	7.5
1970	11.57	12.13
1975	14.77	17.41
1980	18.85	25.00
1985	24.06	35.89
1990	30.70	51.52

Possibly about one-half of this market could be in the "luxury" type of categories, i.e. requiring special cuts, as opposed to the "curry meat" market. This could provide an outlet for up to 3-4,000 carcasses of "beef" type breeds and could be supplied from Johor if price and quality standards are met.

(b) Marketing

In April 1970 a brief survey (Table 11) of meat marketing in Johor was carried out by the F.A.M.A. Counterpart. This review of the present situation and discussion of the impact of increased output of meat (especially beef) upon the marketing system and requirements is based largely upon the work of the counterpart. A full report on meat marketing is contained in the Working Paper "Meat Marketing in Johor".

The major market for beef is among the Malay section of the population. Beef marketing in Johor, and presumably in the rest of Malaysia, is faced with a number of problems:-

(a) Most people are not heavy or regular beef eaters; this is partly because of low income levels and also because of a lack of any tradition of beef eating.

(b) The Malays and Indians mainly live in rural areas and thus the market is dispersed.

(c) Although animals here are small by western standards (the average buffalo is reckoned by the Vet. Dept. to yield a 400 lb. carcass, and cattle 250 lbs.), nevertheless the quantity of meat produced by one carcass is relatively large in terms of the market demand.

(d) Because of climatic conditions meat deteriorates rapidly unless stored under refrigeration. This however is not popular since meat is traditionally eaten fresh i.e. within a few hours of slaughter, and this practice undoubtedly helps reduce disease risks. Thus retailers prefer daily delivery of meat.

Given these problems the present beef marketing system goes a long way in providing meat in reasonable condition to as large a section of the population as possible at a reasonable price. Regular beef slaughter takes place at 5 main centres in the State (Table 12).

Johor Baharu	-	4.5 animals/day
Kluang	--	about 2 animals/day
Batu Pahat	--	about 4 animals/day
Muar	--	about 4-5 animals/day
Segamat	--	about 1-2 animal/day

Slaughter of these animals takes place in the government slaughter houses in the early hours of the morning, i.e. 3-4 a.m. When the carcass is cut up the meat is transported to the local market by motor vehicle or often by tricycle and is ready for sale by 6-7 a.m. Outlying districts are served by van, taxi or bus delivery, again with most of the meat being delivered by about 8 a.m. Generally speaking rural centres are served by the nearest regular slaughtering centre. Thus Kota Tinggi, Layang Layang and small towns in Johor Baharu district, and Pontian and areas in the south of Pontian district, are all served from Johor Baharu. Benut and district and most of Batu Pahat district deal with B.P. market. Kluang serves most of Kluang district and Mersing district and even into S.E. Pahang. Generally speaking Muar market serves that district but Tangkak is served more from Jasin (Malacca). One wholesaler operates both in Muar and Jasin and serves the west part of Muar district from both centres and also has a link with a retailer in Segamat. There is also a wholesaler in Segamat who supplies that area including Labis. These same channels also obviously serve restaurants, satay sellers and other cooked food vendors.

Although it was noted earlier that housewives prefer fresh meat, most beef retailers interviewed indicated that they do have access to a refrigerator or some other cooling

TABLE 1

THE NUMBER OF BEEF, AND MUTTON RETAILER AND WHOLESALERS
IN THE SELECTED TOWNS AND THE NUMBERS INTERVIEWED

NO.	TOWN/LOCAL COUNCIL	BEEF	
		NO OF RETAILERS /WHOLESALERS	NO OF RETAILERS WHOLESALERS INTERVIEWED
1	JOHORE BAHARU	14	9
2	KULAI	1	1
3	ULU TIRAM	1	1
4	KOTA TINGGI	3	2
5	SEDILI BESAR	-	-
6	PONTIAN	3	2
7	BENUT	1	1
8	BATU PAHAT	14	3
9	SENGGARANG	1	1
10	RENGIT	2	2
11	MUAR	7	3
12	TANGKAK	2	2
13	PARIT JAWA	1	1
14	SEGAMAT	6	3
15	LABIS	4	2
16	CHA'AH	1	1
17	KLUANG	9	4
18	RENGAM	1	1
19	KAHANG	-	-
20	MERSING	3	3
21	ENDAU	1	1
	TOTAL	75	43

: TABLE 2
ANIMALS SLAUGHTERED, JOHOR
1968

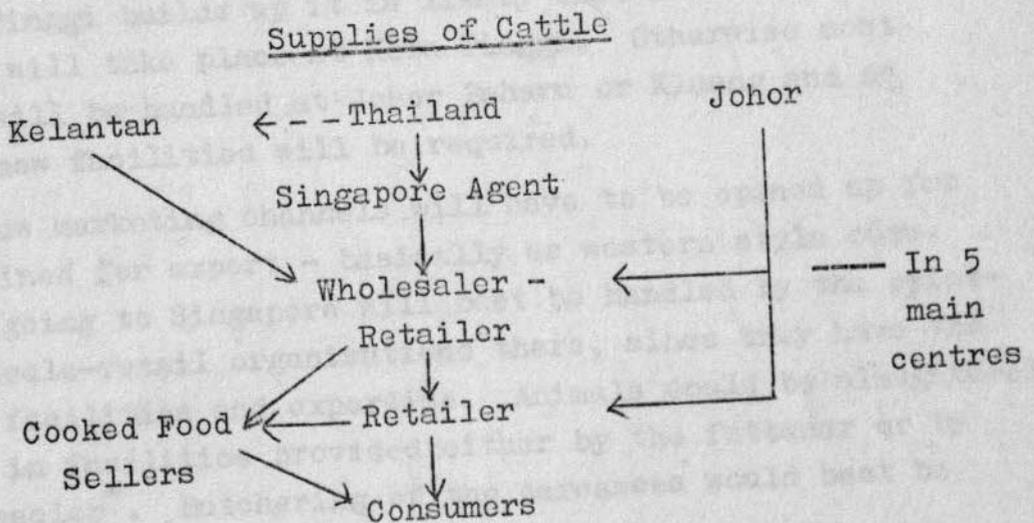
	District	Buffaloes	Oxen	Goats	Sheep
1.	Johor Baharu	525	1,167	244	5,864
2.	Batu Pahat	57	1,223	556	2,250
3.	Pontian	-	85	145	294
4.	Kluang	76	758	1,036	2,009
5.	Segamat	157	365	235	743
6.	Kota Tinggi	20	-	-	-
7.	Mersing	10	26	-	-
8.	Muar	439	981	238	2,177
9.	Sungei Rengit	-	-	-	-
TOTAL SLUAGHTERED		1,284	5,105	2,454	13,337

Source ; Veterinary Department, Johor State

facility such as an ice box and that they use this to keep any meat left over at the end of a day's business. This is then retailed with the fresh supply obtained the next day.

In earlier discussion of the demand for beef in Johor it was noted that in fact very few cattle are kept in the State. Most of the supplies of meat come from Kelantan (mainly by rail) or from Thailand by sea through Singapore. Most wholesalers receive fairly regular shipments from these sources and only look for local supplies if their major source fails them. As beef is rather a special item of the diet, it is eaten particularly on occasions such as Hari Raya. Many local animals are slaughtered at this time in small slaughter-houses throughout the State, and also illegally (i.e. not in an approved facility and without permission). Over most of the State local supplies are sufficiently sparse for wholesalers not to be able to rely on them. This is less true in the Muar-Malacca area where more cattle and buffaloes are kept.

The present marketing system for beef can best be summarised in the following diagram:-



Prices quoted in the course of the survey were remarkably uniform throughout the State. Wholesale prices quoted were generally in the region of \$1.80-\$1.90 per kati and retail prices from \$2.40 for top grades downwards. Whether meat selling in a small town for \$2.20 per kati is the same quality as that selling for the same price in Johor Baharu was not reported by the fieldworkers.

Facilities Required in Project Area

It has been proposed that a central slaughterhouse in Kluang to cater for the State's entire needs. Analysis presented in the working paper on meat marketing suggests that the economic value of such a facility would not be great. It has therefore been assumed that for the foreseeable future the marketing system will remain as at present.

As presently envisaged beef supplies from Johor Tenggara would arise from 2 sources, (a) sales of male and cull female stock from dairy herds and (b) sales from beef herds. Since both these types of enterprise will cross local Indian Dairy stock with exotic larger dairy or beef breeds the resulting stock will probably be about 800-1000 lbs. liveweight. Carcass weights will be 400-600 lbs. , somewhat larger than those at present handled by the marketing system. This will tend to exacerbate the problem of large carcasses relative to market demand.

Beef for the local market will tend to replace supplies from Kelantan or Thailand and as such should be easily handled by the present marketing system. As population in Penggerang and Kota Tinggi builds up it is likely that increased cattle slaughter will take place at Kota Tinggi. Otherwise most supplies will be handled at Johor Baharu or Kluang and no specific new facilities will be required.

New marketing channels will have to be opened up for meat destined for export - basically as western style cuts. Supplies going to Singapore will best be handled by the existing wholesale-retail organisations there, since they have the required facilities and expertise. Animals could be slaughtered in Johor in facilities provided either by the fatterer or by the wholesaler*. Butchering of the carcasses would best be carried out at the point of sale.

* Such facilities might conveniently be located at Johor Baharu.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Acres Land clearance	1,500	1,500	1,500	1,000													
Pasture estab.	1,500	1,500	1,500	1,500	1,000												
Pasture maint.	500	1,500	1,500	1,500	4,500	5,500											
Cattle bought																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Land clearance	225	225	225	150													
Pasture estab.	213	213	213	213	142												
Pasture maint.			90	180	270	330	330	330	330	330	330	330	330	330	370	330	330
Roads		3	2	2	2	5	5	5	5	5	5	5	5	5	5	5	5
Fencing		23	23	23	15												
Water		23	23	23	15												
Electricity		20	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Corals		25	25		25												
Cattle purchasa		200	600	600	600	400											
Insem/equipment		5	5	20	35	50	55	55	55	55	55	55	55	55	55	55	55
Farm machinery		33		33						60							
Administration & op.				40.0													
Housing		30	34	34							33						
Transport		43															
Workshop		20															
Management	40	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Labour		20	40	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Fuel, spares, repairs		4	8	15	20	25	25	25	25	25	25	25	25	25	25	25	25
Vet.		1	3	7	10	11	11	11	11	11	11	11	11	11	11	11	11
Minerals			2	4	5	6	6	6	6	6	6	6	6	6	6	6	6
T o t a l	265	968	1,377	1,478	1,268	961	566	566	566	626	599	566	566	566	566	566	566