PN-AAK-099

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THE SHORT RUN AND LONG RUN POSITION OF AUSTRALIAN BEEF SUPPLIES AND THE COMPETITIVENESS OF AUSTRALIAN BEEF IN INTERNATIONAL TRADE

by

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WORKING PAPER #5

LIVESTOCK PRODUCTION AND MARKETING

IN THE ENTENTE STATES OF WEST AFRICA

USAID Contract #AID/afr-C-1169

Center for Research on Economic Development, The University of Michigan, Ann Arbor, Michigan, U.S.A.

FEB 1979

FORWARD

This working paper was written as part of a three-year study of West African livestock economics undertaken by the Center for Research on Economic Development, University of Michigan, for the United States Agency for International Development under Contract AID/afr-c-1169. The study consisted of four eighteen-month field studies, two focusing on production and two on marketing, in addition to several investigations based on the existing data and literature. The geographic area of focus essentially involved the five member states of the Conseil de l'Entente, Ivory Coast, Togo, Benin, Niger, and Upper Volta, but also included, in a more general fashion, Mali and Nigeria. The following documents have been produced as a result of this study:

K. Shapiro, ed., Livestock Production and Marketing in the Entente States of West Africa: Summary Report. (This volume contains an overview by Shapiro plus separate summaries of each author's monograph.)

A. Ergas, ed., Livestock Production and Marketing in the Entente States of West Africa: Annotated Bibliography. (Included as part of the summary report.)

MONOGRAPHS:

Delgado, C., Livestock versus Foodgrain Production in Southeastern Upper Volta: A Resource Allocation Analysis.

Staatz, J., The Economics of Cattle and Meat Marketing in Ivory Coast.

Eddy, E., Labor and Land Use on Mixed Farms in the Pastoral Zone of Niger.

Herman, L., The Livestock and Meat Marketing System in Upper Volta: An Evaluation of Economic Efficiency.

WORKING PAPERS:

1. Ferguson, D., A Conceptual Framework for the Evaluation of Livestock Production Development Projects and Programs in Sub-Saharan West Africa.

2. Wardle, C., Promoting Cattle Fattening Amongst Peasants in Niger.

3. Swift, J., West African Pastoral Production Systems.

4. Sleeper, J., An Economic Analysis of the Role of Ox-Plowing and Cattle-Feeding in the Stratification of West African Livestock Production.

5. DeBoer, A. J., The Short Run and Long Run Position of Australian Beef Supplies and the Competitiveness of Australian Beef in International Trade.

6. Porter, R., The Uses of Economic Models in Analysis of the Cattle Sector.

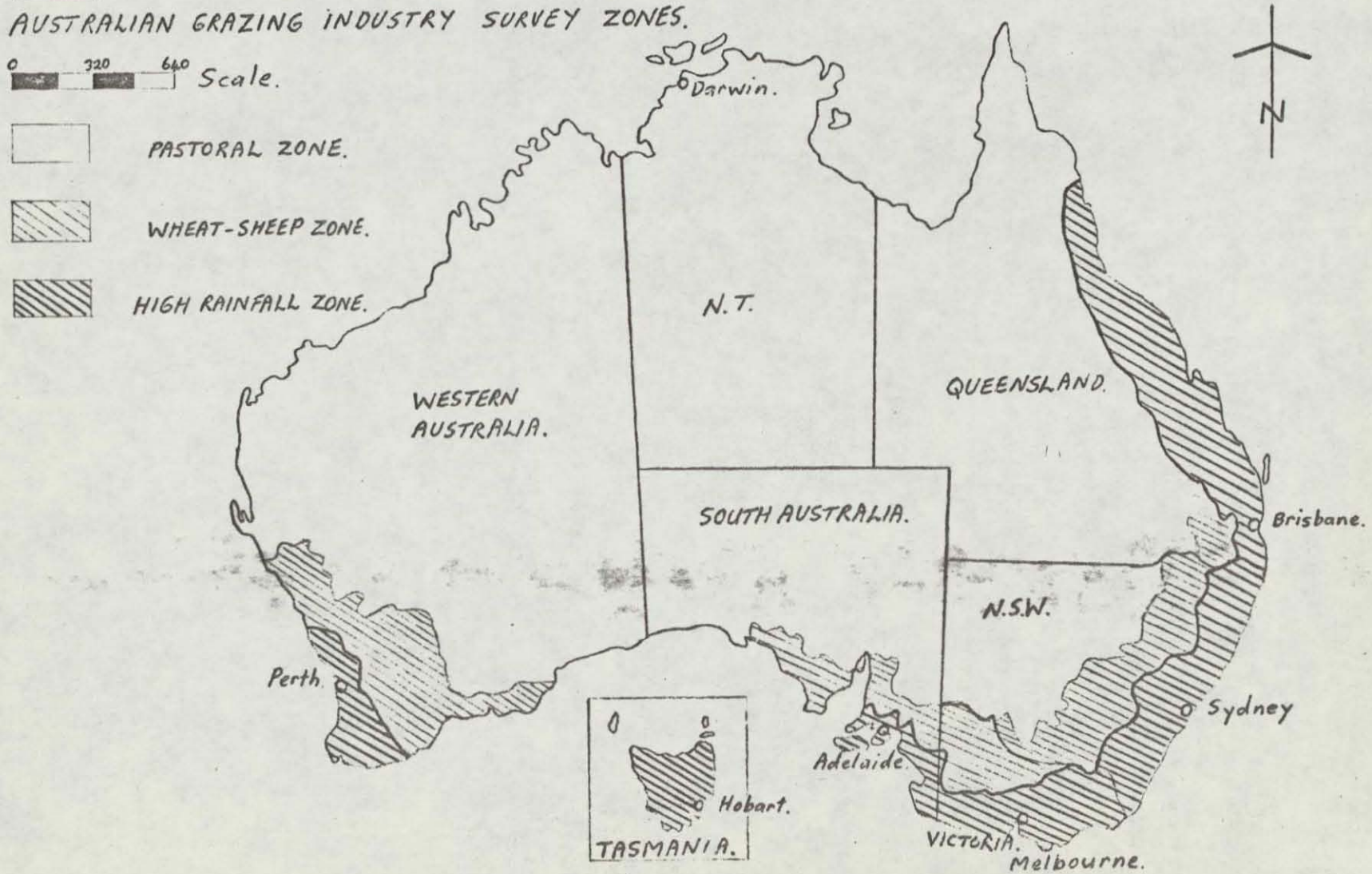
These documents are available from the United States Agency for International Development, Bureau for Africa, Office of Development Resources (AFR/DR), New State Department Building, Washington, D.C. Some may be available from the Center for Research on Economic Development. The monographs and the summary report are also available in French.

Ann Arbor, Michigan
February, 1979

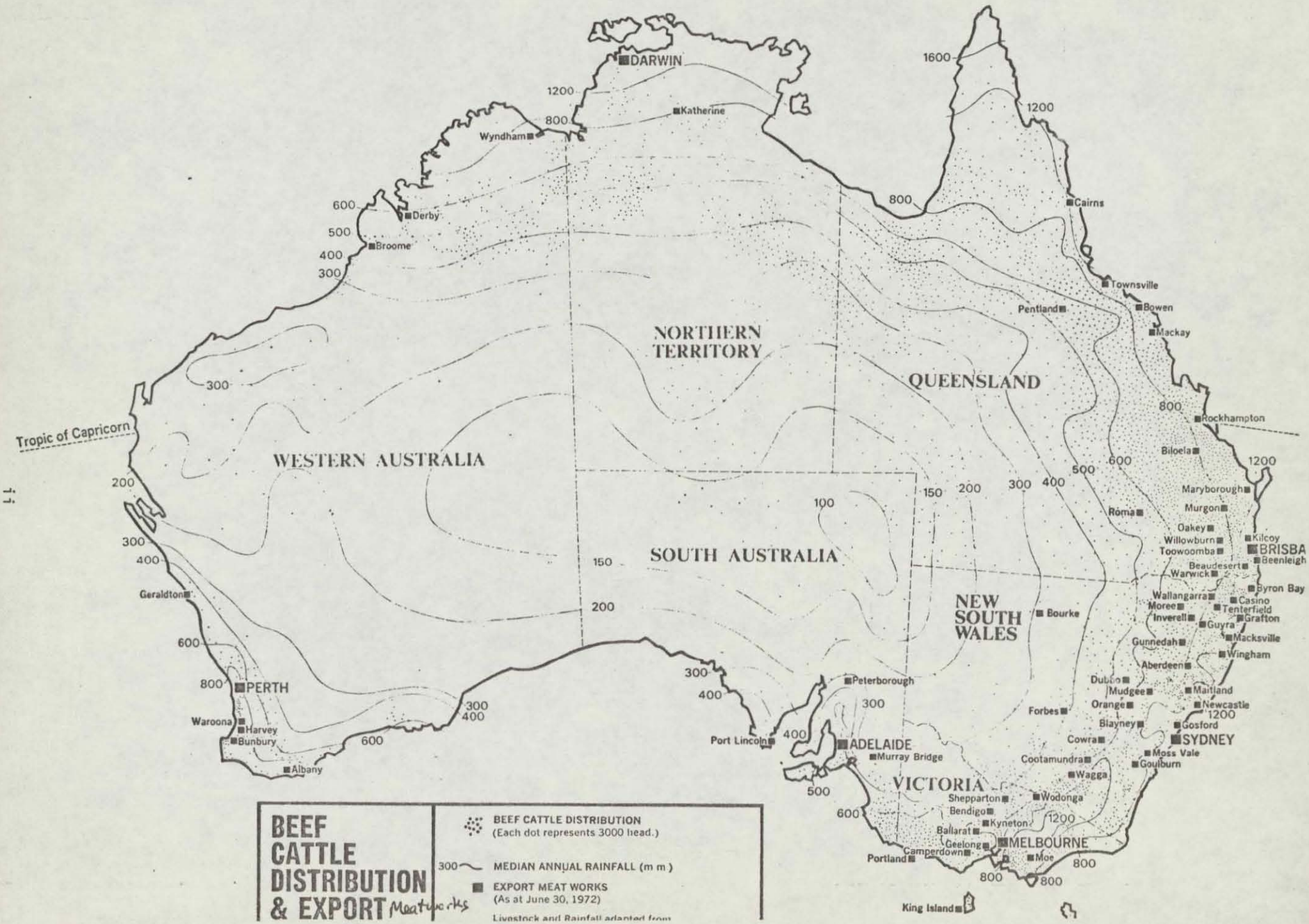
Kenneth Shapiro
Project Director

MAP 1.

AUSTRALIAN GRAZING INDUSTRY SURVEY ZONES.



Map. 2


BEEF CATTLE DISTRIBUTION & EXPORT Meatworks
BEEF CATTLE DISTRIBUTION (Each dot represents 3000 head.)
300 MEDIAN ANNUAL RAINFALL (mm)
EXPORT MEAT WORKS (As at June 30, 1972)
Livestock and Rainfall adapted from
WESTERN AUSTRALIA
NORTHERN TERRITORY
QUEENSLAND
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
Tropic of Capricorn
DARWIN
Katherine
Wyndham
Derby
Broome
Cairns
Townsville
Bowen
Mackay
Pentland
Rockhampton
Biloela
Maryborough
Murgon
Roma
Oakey
Willowburn
Toowoomba
Kilcoy
BRISBA
Beenleigh
Beaudesert
Warwick
Byron Bay
Wallangarra
Casino
Moree
Tenterfield
Inverell
Grafton
Guyra
Macksville
Gunnedah
Wingham
Aberdeen
Dubbo
Mudgee
Maitland
Newcastle
Orange
Forbes
Blayney
Gosford
SYDNEY
Cowra
Moss Vale
Cootamundra
Goulburn
Wagga
Bourke
Wodonga
Shepparton
Bendigo
Kyneton
Ballarat
Geelong
MELBOURNE
Camperdown
Portland
Moe
King Island
Geraldton
PERTH
Waroona
Harvey
Bunbury
Albany
Port Lincoln
Peterborough
ADELAIDE
Murray Bridge

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THE SHORT RUN AND LONG RUN POSITION OF AUSTRALIAN BEEF SUPPLIES AND THE COMPETITIVENESS OF AUSTRALIAN BEEF IN INTERNATIONAL TRADE

1.0 Background to the Current Situation

The Australian cattle industry has, until quite recently, been oriented towards the domestic market. Prior to the development of refrigerated shipping in the late 1800's and early 1900's the industry was relatively small and exports were confined primarily to hides and tallow. Consequently, large areas of what are now prime cattle producing areas remained undeveloped because of their unsuitability for Merino wool production. Even with the advent of refrigerated shipping, Australian beef exports were minor and were concentrated in the U.K. trade. The spectacular increase in beef exports in the early 1960's was due primarily to the growth and development of the U.S.A. market and secondarily to increased exports to the "other three" markets of Europe, Canada, and Japan. The export-led boom brought about a sustained increase in the build up of the Australian cattle herd which continues to the present day. In the initial stages this build up was largely through increased investment in traditional beef producing areas through intensification and higher turnoff rates, but recently competition for resources has developed with other rural industries, particularly sheep production. Beef and veal exports, as a percentage of total production, averaged about 14% over the 1951-55 period, 21% over the 1956-1960 period, 27% over the 1961-1965 period but had reached 44% by 1968. 1970 was the first year that over half of total beef and veal production was exported (50.3%). The peak year for percent exports was 1973 when 61.5% of production was exported in response to very favorable export market developments in the early 1970's.

About 884,000 metric tons were exported that year but by 1977 (April, 1976-March, 1977) exports of beef and veal had passed the 1 million metric ton mark

for the first time, although this represented only 52.7 percent of the all-time record output of almost 2 million metric tons. The large increase in per capita domestic consumption in response to low prices over the 1974-1977 period was responsible for the reduced export proportion (domestic consumption rose from 42 kg per head in the year ended June 1973 to 65 kg per head in the year ended June, 1977).

Along with this increased export dependence has come diversification in production and marketing. Specific sectors of the industry and specific areas in Australia are now much more export oriented than others. In the early days of the beef export industry, specific areas such as the Kimberley Region in the north of Western Australia (see Map 1), the Gulf country of Queensland and the Channel country of southwest Queensland produced cattle almost exclusively for export (and still do) due to a miniscule local market near the meatworks and very large, specialized cattle producing operations within these areas. These meatworks tended to be seasonal and produce lean, boneless beef primarily for the U.K. market. Following the export boom and the expansion of cattle numbers in non-traditional production areas, export abbatoirs were constructed along the east coast and south coast areas in particular where exports on a year round basis were possible. However, the northern production areas (Queensland, Northern Territory, and northern Western Australia) still remain as the major export areas and are most heavily dependent on export prices and export markets. Much of the increased beef production in the southern producing areas, while originally planned in anticipation of export markets, has been diverted to domestic markets. In contrast to the United States, interstate shipments of meat in Australia are relatively minor and every state produces an exportable surplus so the large urban markets are serviced primarily by local production.

Given this background, it is evident that to fully understand Australia's

supply situation for beef it is necessary to analyze the production structure of the industry on a regional viewpoint, and also to look at local and international demand conditions. In particular, the effect which the current depressed state of the beef market in Australia is expected to have on the short-term and long-term supply situation must be taken into account. Since this study is also concerned with the competitive position of Australian beef exports in the international market, the overall trading position of Australia in international markets must be considered.

This study proceeds in seven sections. First, the production structure of the Australian beef cattle industry is set out in some detail. Included are aspects such as marketing, processing, and production systems. Second, the demand structure of domestic and export markets is briefly reviewed since this has a considerable bearing on exportable surpluses. Third, world demand and supply conditions are reviewed. Next, given the market prospects for Australian beef, a detailed review of supply projections is carried out using a number of different projection techniques. Fifth, the long-term competitive position of Australian beef is discussed in the light of these supply projections. Sixth, the results are applied to the competitive position of Australian beef in West African markets in general. Specific markets in West Africa are not mentioned, however. Finally, the study is summarized and some research recommendations made concerning a more detailed analysis of this topic aimed specifically at red meats marketing prospects in West Africa.

2.0 Production Structure of the Australian Beef Cattle Industry

2.1 Production zones

Australia has three major grazing zones (Map 1): pastoral, wheat-sheep, and beef-sheep (high rainfall). These zones are based largely on total moisture, the season of heaviest rainfall, and the length of the growing

season. The pastoral zone is best divided into two subzones: Northern Pastoral and Southern Pastoral. The Northern Pastoral is used almost exclusively for extensive cattle production except for the drier areas of western Queensland while the Southern zone is still used largely for sheep production although this zone is one of the major areas where cattle numbers have increased at the expense of sheep production in the past fifteen years. The Southern Pastoral zone is characterized by low and variable rainfall.

About one-tenth of Australia's land area is in the Wheat-Sheep zone (Table 1).

Table 1. Land Use in Major Farming and Grazing Zones, 1962

Zone	Total Area		Area Used		Area used as % of total area
	Million ha	%	Million ha	%	
Pastoral	607	79	381	80	63
Northern	n.a.	n.a.	265	55	n.a.
Southern	n.a.	n.a.	116	24	n.a.
Wheat-Sheep	71	9	53	11	75
Beef-Sheep	51	7	30	6	59
Other	41	5	14	3	34
Total	770	100	478	100	62

Source: Williams, 1967

This zone tends to be intermediate in total rainfall between the higher rainfall coastal zones and the semi-arid and arid pastoral zones. Beef cattle have come into this area during the beef export boom.

The Beef-Sheep or high rainfall zone tends to parallel the coastal areas. The growing season is typically five to seven months and tends to be fairly reliable.

The expansion of beef cattle numbers during the decade of rapid growth in the national herd (1964-1973) was more rapid in the southern states than in the traditional production areas of Northern Australia reflecting diversification into beef cattle in the Southern Pastoral zone and the wheat-sheep zones. Growth in southern Australia (New South Wales, Victoria, South Australia)

was 8.9 percent per year in beef cattle numbers during this period while the growth in the traditional northern producing areas (Queensland, Northern Territory, Western Australia[1]) was only 3.7 percent. Cattle numbers accelerated even further after 1970. During 1970-1973, growth rates per annum were 15 percent and 9.3 percent in the Southern areas and Northern areas, respectively.

Beef production is not synonymous with beef numbers, however, and the Southern zone production tends to be proportionately higher than numbers because of higher turnoff rates and higher average carcass weight. Some basic production data on a statewide basis is given in Table 2.

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[1]Western Australia is considered as a traditional Northern Producing area since the major beef producing areas in W.A. are north of the Tropic of Capricorn.

Table 2.
Summary of Some Beef Production Characteristics on a Statewide Basis

Item	State	Average for 5 years ended March 1960	1965	1970	1975	Yr ended March 1976	1977
Cattle numbers (millions of head)	NSW&ACT	3.8	4.5	4.6	7.9	9.1	8.6
	Vic	2.6	3.2	3.8	5.4	5.9	5.2
	Qld	7.2	7.2	7.3	9.6	11.3	11.6
	SA	0.6	0.7	0.8	1.6	1.9	1.6
	WA	1.0	1.2	1.4	2.2	2.7	2.5
	Tas	0.4	0.4	0.6	0.9	0.9	0.9
	NT	1.1	1.1	1.1	1.3	1.6	1.6
	Aust	16.7	18.3	19.6	29.0	33.4	32.1
Production (thousand metric tons)	NSW&ACT	240.0	254.9	236.8	361.3	535.5	583.8
	Vic	168.0	201.1	233.6	368.8	492.8	482.6
	Qld	299.3	303.1	319.1	362.3	495.5	530.6
	SA	39.5	34.6	37.4	61.1	92.0	108.8
	WA	42.2	54.6	63.4	86.4	147.4	157.3
	Tas	19.7	22.9	26.7	41.3	59.2	57.1
	NT	5.2	7.4	15.7	14.2	12.6	7.9
	Aust	816.0	880.0	934.8	1299.4	1840.4	1933.6
Beef and veal exports (thousand metric tons, carcass weight equivalent)	NSW&ACT	24.6	43.8	39.6	94.8	143.5	270.3
	Vic	14.0	46.7	59.8	113.5	121.4	214.3
	Qld	120.0	127.9	143.6	174.9	206.3	382.0
	SA	1.7	2.4	5.2	4.0	16.0	37.1
	WA	9.5	16.2	19.2	28.7	42.1	84.3
	Tas	0.5	3.3	5.5	11.5	17.0	27.7
	NT	-	1.2	5.4	4.8	2.7	3.6
	Aust	170.3	241.4	278.3	442.2	549.0	1019.4
Exports as a percentage of production	NSW&ACT	10	17	17	26	27	46
	Vic	8	23	26	31	25	44
	Qld	40	42	45	48	42	72
	SA	4	7	14	6	17	34
	WA	23	30	30	33	29	54
	Tas	2	14	21	28	29	49
	NT	-	16	34	34	21	46
	Aust	21	27	30	34	30	53

2.2 Beef cattle production systems

A feature of the beef industry is its diversity between the regions described. In general, moving south to north and from the coast to the inland, the climate becomes drier and the industry more specialized in extensive grazing operations. Properties become larger while cattle numbers and cattle equivalents per man are greater. The most extensive areas are the Kimberleys and Northern Territory. The Bureau of Agricultural Economics

grazing surveys during the 1963-1965 period found average property sites at 400,000 hectares carrying 9000 cattle equivalents for an average stocking rate of 40 hectares per beast. Many properties are run basically as harvesting operations.

Queensland is the key state in the beef industry because it carries, on average, one-third of all cattle, has the highest export propensity of any state (Table 2), and has more full-time beef cattle producers, has many of the lowest cost production areas, averages over one-third of all Australian beef and veal exports, and has several large-scale abbatoirs producing almost exclusively for export. About 36 percent of Queensland properties specialized in beef in 1970-1971. Breeding and fattening was the major enterprise and was carried out on about 50 percent of all properties.

In the Southern regions, most properties averaged 400 to 800 hectares, most pastures were improved and an average of less than 2 hectares per cattle equivalent were required. These figures obviously varied as the properties surveyed moved from the higher rainfall to the pastoral zone. Agriculture tends to be more diversified in the Southern areas, there are fewer full time beef properties, fewer properties receiving more than 50% of gross income from beef, and more beef and veal turned off from dairy farms. Breeding and selling store (feeder) cattle was by far the major type of beef enterprise. Store cattle are sold for further grass fattening rather than for feedlotting in contrast to North America or Japan.

2.3 Production systems by zones

The Bureau of Agricultural Economics Beef Industry Surveys are the primary source of information on the operating characteristics of beef cattle properties. Details of these surveys were summarized for a BAE submission for an Industries Assistance Commission Enquiry into short term assistance for the beef industry (BAE, 1975a). This study indicated that

60 percent of cattle numbers are located on "beef specialist" properties (properties where 85 percent or more of gross income is derived from the beef enterprise) and about one-half of cattle numbers on these properties are found in the high rainfall zone. Overall, the high rainfall zone supported about 14 million head, on average, over the 1968-1969 to 1970-1971 period or 47 percent of the national herd. This area tends to have more improved pasture areas, more improvements, and more diversified enterprise structures. Tables 3 and 4 summarize the most recently available data on the BAE surveys. The substantial growth in cattle numbers since the survey period (1968-1969 to 1970-1971) would have changed these figures somewhat given the differential growth rates of cattle numbers between states mentioned earlier.

The relationship between average property size and the efficiency measures used in Table 3 helps explain why the southern producing areas produce proportionately more meat than their numbers of cattle would indicate. For example, in the year ending March, 1977, N.S.W., Victoria, and Queensland produced 583,800 metric tons, 482,600 metric tons and 530,600 metric tons of beef and veal from 8.6 in head, 5.2 in head, and 11.6 in head, respectively. During the survey period (1968-1969 to 1970-1971), of the 68,359 producers running more than fifty cattle, only about one-fifth (13,834) were "specialist" producers. These specialists ran 9.07 million cattle of which 55 percent were breeding cows and heifers. In addition, a sizeable number of farms have less than 50 head and it is thought the beef boom of the early 1970's has increased the number of small, part-time beef producers who entered the industry in anticipation of continued high prices.

Table 3.
Measures of Land Use and Productivity in the Australian Beef Industry
(average units per property, 1968-1969 to 1970-1971)

Item	Unit	Qld	N.T.	W. A. Kimberleys	W. A. S.West	NSW	Vic	SA	Tas
Land Use									
Cash crop	ha	73	3	0	80	108	35	71	11
Fodder crop	ha	36	7	0	18	17	4	32	10
Native past.	ha	6375	347893	210805	86	1223	124	8475	247
Impr. past.	ha	458	5310	86	453	377	290	395	367
Other past.	ha	1021	40955	27480	110	45	112	2165	64
Average Total property area	ha	7963	394168	238371	665	1770	565	11138	699
Productivity Measures									
stocking rate[a]	ha/beast	24.2	55.3	29.7	1.8	4.2	1.8	28.9	2.3
branding rate	%	64.7	44.4	50.6	81.8	72.6	78.4	77.3	77.9
mortality	%	7.9	7.6	7.5	2.2	3.1	2.5	6.1	2.5
turnoff	%	47.5	21.6	11.9	49.3	50.5	54.1	41.3	66.8
Meat cattle									
herd size	no.	256	7121	8007	161	177	137	177	132
sheep flock size	no.	499	0	0	1542	1877	1225	1567	1204
Total cattle equivalents[b]	no.	329	7121	8007	371	424	306	385	306

(a) Total property area divided by total cattle equivalents.

(b) Total cattle equivalents using eight sheep as one cattle equivalent.

Source: B.A.E. (1974)

Table 4.
Distribution of Properties by Enterprise Combinations, 1970-1971.

State	Beef Specialists	Beef/Sheep	Beef/Sheep/cereal	Beef/dairy	Beef/non farm and beef/other	Total %	Total No.
Unit	%	%	%	%	%	%	No.
N.S.W.	18	32	18	4	28	100	25730
Vic.	13	35	7	7	38	100	16130
Qld.	36	7	-	1	56	100	15438
S.A.	7	28	8	3	54	100	4075
W.A.	16	17	16	5	46	100	4430
N.T.	80	-	-	-	20	100	184
Tas.	11	32	1	10	46	100	2372
Austr.	20	26	10	4	40	100	68359

Source: B.A.E. (1974)

2.4 Marketing Australian Beef

Australian beef marketing procedures have been undergoing some change in recent years and the producer now faces a somewhat wider choice of marketing options than existed previously. The market remains dependent on private trade and is reasonably competitive although the decline in the auction system of live cattle selling in recent years has probably lessened pricing efficiency while increasing some aspects of operational efficiency by cutting down on transshipments of cattle. First, a number of selling systems are described and then the transport system is mentioned briefly. Next, the slaughtering sector is discussed and the cost structure is set out. This is fairly important in that transport and processing costs are a large component of the c.i.f. price of Australian export beef and the projected movement of these costs will affect the competitiveness of export beef in the world markets.

2.4.1 Systems of selling

Three avenues are available for the producer of cattle for final slaughter.

(a) Auction sales - The sale of cattle through a supervised saleyard is still the most common method of selling cattle. The major saleyards are located in the capital cities and also in areas of concentrated beef production for export (e.g. Gracemere Saleyards near Rockhampton, Queensland). Abattoires have traditionally been situated near these saleyards to minimize transshipment costs. Smaller saleyards also exist in most provincial centers in cattle producing areas. Bids have traditionally been made on a "per head" basis for all animals in a lot. Under this system the buyers had to visually estimate the weight and dressing percentage of the animals in a pen to convert the bidding price into an equivalent price per kilogram dressed weight since this latter figure serves as the market indicator for the industry. This

occurs because of the lack of a standardized system of grades and standards which would allow price comparisons to be made on a live animal basis.

More recently, major auction saleyards have installed scales and bidding has been on a per kilogram liveweight basis. Prices are still converted into an estimate price per kilogram dressed weight basis, however. Reference grades for per kilogram liveweight prices cover seven categories for export quality cattle. These grades, along with the estimated cents per kg dressed weight paid (1 $ Aust. = 1.12 $ U.S. as of December, 1977) at Cannon Hill Saleyard, Brisbane) during July were as follows:

Ox	200-250 kg dressed weight	45.8¢
Ox	251-300 kg dressed weight	46.4¢
Ox	301-320 kg dressed weight	48.2¢
Cow	200-230 kg dressed weight	37.4¢
Yearling		46.6¢

A more detailed description of export grades is given in Annex I. Prices at the major selling centers are reported regularly by agents engaged in selling cattle on behalf of the producers.

(b) Negotiated paddock sales - In response to the somewhat higher costs of using the saleyard auction system (brokers' fees of 3.5%, yarding fees, scale fees, etc.) an increasing proportion of cattle producers are now selling direct to the buyer, in this case the meatworks. The price is negotiated for the cattle in the paddock and the buyer is normally responsible for all other costs. In Queensland this practice now accounts for about 60 percent of slaughter cattle marketings and has resulted in smaller yardings at the saleyard auctions. Auction prices are available as a reference during the negotiations but the declining number of cattle passing through the auction system means that auction prices are becoming a less reliable barometer of overall market forces since many meatworks now have the majority of their supplies purchased directly.

Sale direct to the abattoirs has a number of operational advantages over the saleyard auction system:

(i) Agents' fees are generally not involved or if an agent is used the fee is lower since the agent has fewer duties and responsibilities;

(ii) total transportation, handling and in-transit feed and watering costs are lower, particularly if the abattoir is not located adjacent to the saleyards; and

(iii) bruising and stress is considerably reduced since polled and horned cattle can be kept separate if sent direct to the abattoir while at a major saleyard they are virtually always mixed which increases bruising.

(c) Sale by weight and grade - Under this system the producer has the cattle slaughtered on his behalf, usually by a public abattoir which charges a fixed slaughtering fee for the service. The carcass is then sold on a weight and grade basis to the wholesale trade. This selling method is not common, however, as most dealers requiring carcasses purchase the animals either directly from the producer or through the saleyards.

It now appears that a uniform system of carcass classification will come into operation early in 1978. A major aim of the scheme is to allow the operation of a beef price stabilization scheme which has been promised by both major political parties. The scheme would appear to be based on a set of minimum wholesale prices for the Australian domestic market for each grade of carcass. This price would be set well above prevailing world export prices in an effort to increase producers' returns without the use of production quotas or deficiency payments. A classification system is required for the scheme since every carcass will carry a reserve price for domestic market use. A further consequence of this scheme will be a further increase in excess

supply of beef in the international market since domestic supplies of cattle offered for slaughter will initially respond to the higher prices and domestic consumption will drop roughly in proportion to the price increase forced on the domestic market (see section 3 on demand studies). Thus the exportable surplus will be sold in the price elastic market, the average returns to producers will decline initially over that projected for the scheme. Also, the price elasticities of demand between the domestic and foreign may not be sufficiently different to lead to a higher blend price under a two price scheme.

The carcass classification system will be based on objective measurements of dentition (age), sex, weight of carcass, fatness, and conformation (the length of the carcass, since a well established relation exists between conformation, carcass length and carcass weight). The length measurement and conductivity probe reading (for carcass fatness) are automatically relayed to a computer where a tag is made up for each carcass.

The implications of the grading innovations on traditional selling methods are not yet clear because it is not yet known what attitude the government [and its instrumentality, the Australian Meat Board (AMB)] will take towards direct selling to meatworks. The traditional system of saleyard selling will change as the necessity to sort lots of cattle into uniform pens, mark each animal for identification, re-sort after sale, and weigh each seller's lot separately will be done away with. Each seller's cattle will be marked at unloading and no further handling will be required. Sale of the graded carcasses by auction will probably be used although the AMB is setting up a pilot scheme for selling graded carcasses through computer consoles effected through bids by buyers.

2.4.2 Transportation

Cattle are transported by rail, road, and droving to saleyards or direct to abbatoirs. Recent figures for Queensland (Parsons and Girdlestone, 1973) indicated that 58 percent of cattle movements are by rail, 22 percent by road and 11 percent by droving. Rail freight charges are considerably lower than truck transport rates so most producers located near rail depots use rail transport or a combination of road-rail transport. The major abattoirs are located near railway lines. For the export trade, the product for export is almost always containerized at the abattoir following boning and then transported to the point of export. If the abattoir or boning room is near the point of export, truck transport is used but if the containers have to move long distances then the containers move by railway to the port container terminals. During the Australian summer (roughly November - February) the northern producing regions are often unable to muster cattle for sale and also unable to transport the cattle to the saleyards - abattoirs for sale and slaughter because of wet conditions. This is one reason for the marked seasonality of slaughterings in the northern export-oriented areas.

2.4.3 Beef processing operations

In Australia, abattoirs are licensed by the AMB according to whether they produce exclusively for the domestic market, whether they export to all destinations (including the U.S.A.) or whether they can export to all destinations except the U.S.A. The vast majority of cattle slaughtered move through the export abattoirs. The AMB licensed meat exporters by state as of July, 1976 are given below:

State	No. licensed exporters
N.S.W.	94
Victoria	53
Queensland	29
South Australia	5
Western Australia	21
Tasmania	5
Northern Territory	1
Total	208

Most of these exporters would own and operate one or more abattoirs. Eighty-five percent of all live cattle slaughtered in the late 1960's were slaughtered at export licensed abattoirs (Parsons, 1969). The industry is dominated by facilities with an annual throughput of over 10,000 cattle per year (Table 5).

Table 5
Distribution of Australian Abattoirs According to Annual Cattle Throughput: 1965-66.

Throughput range (cattle per year)	Export Abattoirs		Non-Export Abattoirs		All Abattoirs	
	No.	% Throughput	No.	% Throughput	No.	% Throughput
1-500	0	0	891	22.3	891	3.8
501-1000	0	0	106	9.9	106	1.7
1001-5000	6	0.6	78	22.4	84	4.3
5001-10,000	11	2.3	14	12.6	25	4.1
10,001-50,000	55	40.2	6	13.5	61	35.6
50,001-100,000	19	35.3	0	0	19	29.3
100,001 and over	5	21.6	1	19.3	6	21.2
Total	96	100.0	1096	100.0	1192	100.0

Source: Parsons, 1969, p 39

In the period cited (1965/66) 111 abattoirs (9.3% of the total number) accounted for 94% of the total number of cattle slaughtered. The most recent data for Queensland indicated 5 abattoirs with a 1976/1977 throughput in excess of 140,000 cattle per year.

No. abattoirs	throughput range per annum
6	less than 20,000
3	20,000 to 40,000
9	40,000 to 60,000
6	60,000 to 80,000
7	80,000 to 100,000
5	over 140,000

The seasonal variation in slaughtering capacity was studied by Parsons (1969). The data in Table 6 confirm the earlier observation of the marked seasonal fluctuations in the Northern area summer but also the considerable seasonal variations in every state. The degree of capacity utilization in 1976/1977 appears considerably higher than the 1965/1966 data (Table 7). This would probably be a result of many smaller meatworks being forced

Table 6.
Monthly Utilization of Cattle Slaughtering Capacity of Australian Abattoirs, 1965-66

Month	NSW & ACT		Vic.		Qld & N.T.		S.A.		W.A.		Tas		Australia	
	Exp.	Non-exp.	Exp.	Non-exp.	Exp.	Non-exp.	Exp.	Non-exp.	Exp.	Non-exp.	Exp.	Non-exp.	Exp.	Non-exp.
July	40	34	43	38	68	22	67	29	39	37	37	49	51	30
August	24	30	40	34	68	26	53	29	42	36	29	45	45	30
Sept.	18	27	42	35	66	24	51	27	41	36	26	47	43	28
Oct.	29	29	53	36	39	23	68	30	36	37	35	47	38	29
Nov.	35	31	60	37	27	23	59	27	38	39	39	49	37	30
Dec.	40	33	60	36	22	22	55	33	36	40	43	50	37	30
Jan.	47	38	59	41	29	23	80	35	42	44	48	57	43	33
Feb.	55	37	63	39	33	22	76	31	39	43	51	55	47	32
March	57	36	73	38	39	22	66	29	33	40	53	48	51	31
April	68	44	70	42	51	25	90	35	32	44	57	55	59	36
May	58	38	66	36	66	25	65	25	37	36	54	44	60	32
June	54	37	63	38	81	25	69	27	37	35	54	52	64	32
Ave. util.	43	35	58	37	49	23	66	29	37	38	43	49	48	31

Source: Parsons (1969, p.41)

Table 7.
Average Slaughter Capacity and Utilization, 1976/77

State	Capacity June, 1977 (Million head)	Slaughterings 1976/77 (Million head)	% Utilization (%)
NSW	4.7	2.9	62
Victoria	3.2	2.3	73
Queensland	3.0	2.3	77
South Australia	0.75	0.57	77
Western Australia	1.1	0.8	74
Tasmania	0.45	0.3	63
N. Territory	0.14	0.05	34
Australia	13.34	9.22	70

Source: Forrest, 1977

out of the market and an all time high being reached for livestock slaughtered. During peak periods in several areas, abbatoirs were killing at rated capacity for long periods of time and producers who wished to deliver cattle were not able to ship cattle because of the back-up for slaughter.

The cost of processing is a key factor in this report since it permits a fairly straightforward translation to be made between current quoted saleyard prices (in cents per kg dressed weight) and F.O.B. (or C.I.F.) export prices. Therefore, in the short run, the competitive position of Australian beef can be ascertained from the weekly

AMB saleyard price quotation plus the processing costs given below plus the charges for handling, freight, and import duties in the West African countries. Table 8 presents the result of an August, 1977 survey (Forrest, 1977) and cover costs up to the point of delivery for domestic retail outlets and to the point of loading aboard ships (FAS) for export beef. The costs are given in cents per kg carcass weight and since most beef is exported on a boned-out basis the original carcass weight must be converted to a boned-out basis. On average, the boned-out weight is two-thirds the weight of the original carcass. The original carcass represents about 55 percent of the original weight of the live animal so a live animal weighing 500 kgs would provide about 183 kgs of boned-out beef for export. The AMB converts the shipped weight of Australian beef exports into a carcass weight equivalent by multiplying by a factor of 1.5; for mutton or lamb the factor used is 2.0.

The figures in Figure 8 include Commonwealth levies and state inspection costs but do not include documentation charges, bank charges, or rejection insurance. By adding freight rates for containerized meat packed in cartons, it is possible to make a rough breakdown of landed meat in West Africa, disregarding the problems of regular container service to these ports. Given current saleyard prices, this exercise is carried out below for one full container of frozen, boned out beef packed in cartons of about 28 kgs:

1) Cost of cattle for a container load equivalent of 16.33 metric tons of frozen boneless beef: 16.33 m.t. x 1.5 = 24.5 m.t. carcass beef. 24.5 m.t. carcass beef based on 300-320 kg carcass weight export quality ox at $0.50 per kg carcass weight = $12,250.
2) Processing cost for heavy ox, based on average cost (kg from Table 8 of $0.147/kg = 24,500 kg carcass weight x $0.147/kg = $3600. This would require about 75-80 head for one container load.

Table 8
Processing Costs for Beef for Local Trade and Export Trade

Local trade: Kill, chill, and deliver to retail butchers

Livestock description	Carcass weight (kg)	Cost ¢/kg carcass wt. high	low	average	Average total cost/carcass($)
Yearling	160	11.4	7.8	10.9	17.44
Trade steer	200	8.4	4.7	7.8	15.60
Medium ox	250	6.2	2.2	5.5	13.75
F.A.Q. cow	215	7.3	3.5	6.7	14.40

Export trade: Kill, chill, bone, pack, freeze, deliver to ship for export

Livestock description	Carcass weight (kg)	Cost ¢/kg carcass wt. high	low	average	Average total cost/carcass($)
Japanese trade,					
Chilled ox	280 plus	21.7	11.7	17.4	48.72
Heavy ox	280 plus	18.2	10.2	14.7	41.16
Medium ox	250	19.4	11.2	15.9	39.75
F.A.Q. cow	215	20.7	11.8	17.0	36.55
Third grade cow	180	21.9	14.0	18.9	34.02
Boner cow	150	23.3	16.6	20.5	30.75
Bull	250	24.6	13.3	19.9	49.75

Notes (1) F.A.Q. = fair average quality
(2) Local trade is in chilled carcasses
Export trade is in chilled halves or quarters for the Japanese chilled beef market. All other costs are for frozen, boned-out beef.

Source: Forrest, 1977

3. Freight, Australia to United Kingdom as of June, 1976 based on full container load packed by exporter and unpacked by importer, $30.50 per container.

4. Total cost per container

	$12,250
	3,600
	3,050
	$18,900

5. Average cost per kg boned out beef, frozen in cartons, delivered duty-free to importer:

$$\frac{\$18,900}{16,330 \text{ kgs}} = \$1.16 \text{ Australian per kg, or about } \$1.30 \text{ U.S. per kg.}$$

On a per kg basis, the cost breakdown is as follows:

	$/kg
Cost of meat (boned out equivalent)	0.75
Processing	0.22
Shipping	0.19
	$1.16

For most of the non-U.S. trade, a container load consists of 15.24 tonnes of meat in cartons which makes the shipping cost per kg $0.20. Freight rates to West Africa were not gathered for this preliminary study.

3.0 The Demand for Australian Beef

3.1. Domestic market

Despite the very high levels of total per capita meat consumption in Australia, the estimated own-price demand elasticities of beef in Australia are quite high. This was evident both during the high price period of the early 1970's when beef consumption fell sharply and during the current prolonged price slump from late 1973 onwards when beef consumption has reached record levels (Table 9). Domestic prices are closely tied to export prices although the types of animals sought for the two markets are somewhat different. The export trade relies heavily on larger animals with a very high proportion of lean meat (since many of the processing charges are levied on a per head basis, the fewer animals it takes to fill a container, the lower is the average cost per kg) whereas the domestic trade takes younger, smaller, and fatter animals although the degree of fat cover from the grass fattened Australian beef is quite small. In South Australia, for instance, the average dressed weight for export cattle was 246 kg compared with 164 for the local trade (Findlay and Mules, 1977). The relationship between domestic and export prices is strongest in states such as Queensland and Western Australia where a large proportion is exported but since all states consistently export over 30 percent of total beef and veal production and since importers bid on beef from all states, the price relationships between all major selling centers stay in a fairly consistent seasonal relationship to each other.

A number of studies on the demand characteristics of the Australian meat market have been carried out. The elasticities seem to be quite dependent on

Table 9.
Australian Domestic Market: Estimated Consumption of Meat

Class of meat	1970	1971	1972	1973	1974	1975	1976	1977
(a) Total consumption (000 metric tons)								
	Year ended June							
Beef & veal	478	499	508	512	540	868	963	914
Mutton	209	248	263	193	109	115	91	50
Lamb	255	291	315	244	210	243	225	202
Pork	94	87	89	103	90	70	165	179
Canned meat	28	31	33	34	32	30	n.a.	n.a.
Bacon & ham	46	59	64	72	73	67	n.a.	n.a.
Total (carcass wt.equivalent)	1135	1246	1302	1194	1090	1426	1444	1345
(b) Consumption per head per annum (kg)								
Beef & veal	39	40	40	39	41	64	70	65
Mutton	17	20	20	15	8	9	7	4
Lamb	21	23	24	19	16	18	16	14
Pork	8	7	7	8	7	5	12	13
Canned meat	2	3	3	3	2	2	n.a.	n.a.
Bacon & ham	4	5	5	6	6	5	n.a.	n.a.
Total (carcass wt.equivalent)	92	100	101	91	82	106	105	96

the proportion of beef production exported which is also dependent on world prices. When world prices are high such as in 1973, the proportion consumed domestically drops rapidly (38.5% in 1972-73) while depressed prices result in a larger proportion of domestic consumption such as occurred in 1975 when 57.7 percent was consumed domestically. Freebairn and Gruen (1977) estimate the following own-price elasticities of demand for these two periods:

Year	Prices	Elasticities estimated at: Retail	Wholesale	Auction
1973	high	-1.85	-1.31	-1.19
1975	low	-0.90	-0.39	-0.27

A 1973 study (Papadopoulos, 1973) established that the major factors influencing beef cattle prices during the 1960's were beef supplies and export prices. A one cent per kg movement in quoted export prices caused a change of 0.75 cents per kg in saleyard auction prices while a one percent increase in beef supplies moving into the Australian market caused, on average, a 0.4 percent decline in saleyard cattle prices, ceteris paribus. For the N.S.W.

meat market, Australia's largest, a study using 1962-1970 data estimated the following elasticities (Papadopoulos, 1973):

Own-price elasticity of demand		-2.06
income " " "		+0.98
cross-price " " " for:	lamb	-0.23
	mutton	-0.13
	pork	+1.43

The retail own-price elasticities of demand estimated for beef range from -0.76 up to -1.71 with an average of about -1.15. Income elasticities of demand at retail varied from -0.24 to +1.23 with an average of +0.32. Cross-price elasticities with other meats are still tentative (Main, et.al., 1976). The recent review by Richardson (1976) summarizes the estimated demand parameters for the meat group of products (Table 10).

3.1.1 Seasonality of Supplies and Prices

Seasonal patterns are of some importance for the international competition study. If the strong seasonality evident in the Australian beef industry coincides with seasonal patterns of marketings and prices in West Africa, the implications regarding Australian competition in the beef market are quite different than if the seasonal cycles are out of phase. If West African importers are able to consistently purchase Australian beef during the low price period in the major exporting areas (roughly March-June) and land it in West Africa during peak demand periods, then Australia would seem to have a considerable advantage in the trade. Time lags are not crucial on the processing side where smaller export orders, after received, are often filled within a few weeks, but the availability of frequent container ships is more crucial in working out when Australian beef, once contracted for, would reach West African ports.

Table 10.

Estimated Demand Parameters for the Meat Group of Products, Australia

Product and market level	Author(s)	Data(a)	Area	Estimation method (b)	Estimated elasticity (c)		
					Price	Income	Other
Beef-retail	Throsby [48]	1962 to 1972 Q.	Aust.	2.S.L.S.	-1.90	0.59	
Beef-retail	Throsby [49]	1962 to 1972 Q.	Aust.	O.L.S.	-0.76	0.22	0.04(e)
Beef-retail	Taylor [45]	1950-51 to 1959-60 A.	Aust.	O.L.S.	-0.96		0.02(f)
Beef-retail	Taylor [46]	1950-51 to 1959-60 A.	Aust.	O.L.S.	-0.87, -1.03		
Beef-retail	Marceau [25]	1951-1963 Q.	N.S.W.	O.L.S.	-1.33		
Beef-retail	Van der Meulen [55]	1948-49 to 1959-60 A.	Sydney	O.L.S.	-0.71	0.40	0.35, 0.49(e)
Beef-retail	Gruen/McLaren [20]	1949-50 to 1964-65 A.	Aust.	O.L.S.	-0.79, -0.96(g)		
Beef-retail	B.A.E. [8]	1964-65 cross sect.	Sydney	O.L.S.		0.27(h)	-0.30(i), -0.36(j)
Beef-retail	B.A.E. [9]	1967 cross sect.	Melb.	O.L.S.		0.21(h)	-0.50(i), -0.57(j)
Beef-auction	Marceau [25]	1951 to 1963 Q.	N.S.W.	O.L.S.	-0.50		
Beef-auction	Papadopolous [29]	1962-1971 Q.	Various states	O.L.S.	-0.05 to -0.44(F)		
Lamb-retail	Marceau [25]	1951-1963 Q.	N.S.W.	O.L.S.	-2.07		0.92(k)
Lamb-retail	Taylor [46]	1950-51 to 1959-60 A.	Aust.	O.L.S.	-1.82		
Lamb-retail	Taylor [47]	1950-51 to 1959-60 A.	Aust.	O.L.S.	-0.49, -0.68(F)		0.31(F)(f)
Lamb-retail	Gruen/McLaren[20]	1949-50 to 1964-65 A.	Aust.	O.L.S.	-1.88	0.81(m)	0.50(l)
Lamb-retail	Gruen/McLaren[20]	1949-50 to 1964-65 A.	Aust.	O.L.S.	-1.40	0.45	0.51(l)
Lamb-retail	Van der Meulen [55]	1948-49 to 1959-60 A.	Sydney	O.L.S.	-0.75(F)	0.23	0.50(n)
Sheepmeat-retail	B.A.E. [8]	1964-65 cross sect.	Sydney	O.L.S.		0.15(h)	-0.17(i),-0.23(j)
Lamb-wholesale	Van der Meulen[55]	1945-46 to 1959-60 A.	N.S.W.	O.L.S.	-0.62 to -1.0	0.97 to 1.40(F)(o)	
Lamb-auction	Marceau[25]	1951 to 1963 Q.	N.S.W.	O.L.S.	-0.70		
Lamb-auction	Bain [3]	1955 to 1971 (p)	Vic.	O.L.S.	-0.34(F)		1.00(F)(r)
Lamb-auction	Bain [3]	1955 to 1971 (q)	Vic.	O.L.S.	-1.66(F)(r)		-0.28(F)(s)
Lamb-auction	Sault [40]	1955 to 1964 Q.	Various states	O.L.S.			0.45 to 0.72(F)(r)
Lamb-auction	Taplin [44]	1951 to 1964 (t)	N.S.W.	O.L.S.	-1.70		
Lamb-auction	Taplin [44]	1951 to 1964 (t)	Vic.	O.L.S.	-1.40		
Mutton-retail	Marceau[25]	1951 to 1963 Q.	N.S.W.	O.L.S.	-1.09		1.24(l),0.79(e)
Mutton-retail	Taylor [45]	1950-51 to 1959-60 A.	Aust.	O.L.S.	-1.21		0.79(e)
Mutton-retail	Taylor [46]	1950-51 to 1959-60 A.	Aust.	O.L.S.	-0.82(F)		-1.32(F)(l),-0.29(F)(u)
Mutton-retail	Gruen/McLaren[30](g)	1949-50 to 1964-65 A.	Aust.	O.L.S.	-1.38	-1.73(m)	1.20(l)
Mutton-retail	Gruen/McLaren[30](g)	1949-50 to 1964-65 A.	Aust.	O.L.S.	-1.02	-0.59	0.82(l)
Mutton-auction	Marceau [25]	1951 to 1963 Q.	N.S.W.	O.L.S.	-0.25		0.30(l)
Pork-retail	Pender/Erwood[31]	1952-53 to 1968-69 A.	Aust.	I.L.S.	-3.29	1.50(v)	1.85(w)
Pork-retail	Gruen/McLaren [20]	1949-50 to 1959-60 A.	Aust.	O.L.S.	-2.19	2.81(m)	
Pork-retail	Hill [21]	1948-49 to 1961-62 A.	Aust.	O.L.S.	-1.20		
Bacon/ham retail	Hill [21]	1948-49 to 1961-62 A.	Aust.	O.L.S.	-1.30		
Pigs-wholesale	Hill [21]	1948-49 to 1962-63 A.	Aust.	O.L.S.	-1.14		
Pigs-wholesale	Hill [21]	1948-49 to 1962-63 Q.	Aust.	O.L.S.	-0.86 to -1.30		
Chicken-retail	Paton [30]	1954 to 1969 A.	Aust.	O.L.S.	-1.31,-1.63		0.42,0.44(e)
All meat	BAE [8]	1964-65 cross-sect.	Sydney	O.L.S.		0.25(h)	-0.16(i)
All meat	BAE [9]	1967 cross-sect.	Melb.	O.L.S.		0.22(h)	-.20(i),-0.30(j)

(a) For the data A, annual; Q, quarterly; M, monthly, (b) Estimation methods include Ordinary Least Squares(O.L.S.), Two Stage Least Squares (2.S.L.S.) and Indirect Least Squares (I.L.S.). (c) Flexibilities are indicated by (F). (d) Using instrument variables. (e) With respect to lamb price. (f) With respect to price of lamb and mutton loin chops. (g) These results are reported and discussed in three publications [19,20,26]. (h) Elasticity of expenditure with respect to changes in income. (i) Elasticity of quantity purchased per person with respect to change in household size. (j) Elasticity of expenditure with respect to change in household size. (k) With respect to beef price in an equation in which the own-price elasticity is non-significant. (l) With respect to beef price. (m) Expenditure elasticity. (n) With respect to beef quantity. (o) Derived at various points in the data range. (p) Data for the export period October-December. (q) Data for the period January-September. (r) With respect to prices at Smithfield Markets. (s) With respect to mutton supplies. (t) Data for the period June to August. (u) With respect to quantity of lamb. (v) This may be an over-estimate because of the effects of "tastes" on consumption over time. (w) With respect to an index of all other meat prices.

Source: Richardson, 1976, pp. 83-84.

An earlier study by the Bureau of Agricultural Economics (BAE, 1970) concluded that seasonality of production in Australia as a whole is dominated by the patterns in Queensland and Western Australia where the typical pattern is high production in the winter months caused by the very definite pattern of high summer rainfall followed by months of dry conditions during which cattle are sold off to maintain feed supplies. In the States the pattern is opposite since these areas tend to receive most rainfall in the winter but the pattern of marketings is not as distinct as in Queensland and Western Australia so Australia as a whole shows the heaviest marketings and lowest seasonal price indices during the winter months (April-August). In Queensland the seasonal influence has declined somewhat in recent years and the peak has moved to an earlier position (April, May) than has historically been the case. Along with this declining seasonality of marketings has come a decreasing seasonal influence on saleyard prices.

3.1.2 Possible changes in domestic beef marketing

The beef price slump of 1974-1977 has produced calls for marketing "reform" to stabilize prices and improve producer returns. In addition, consumers have felt that retail prices have remained at levels higher than those dictated by the very low saleyard prices for beef. This pressure has resulted in two quite different sets of proposals, one group calling for the various state governments to enter the meat trade in competition with existing operators in an effort to cut marketing margins (de Kantzow, 1973) and another group calling for a nationwide minimum price scheme for all domestic beef. This could operate through a system of posted prices or through levies on domestic and imported beef with a buffer fund scheme to redistribute the levies for income stabilizing purposes.

A number of studies (Report of a Study Group. . ., 1973; de Kantzow, 1973; Parton, 1977) have highlighted the problems faced with these schemes and the

lack of success that would be possible even with the introduction of a comprehensive carcass grading scheme. The differences in elasticities between the domestic market and export market are probably not sufficient to affect a significant transfer of resources through the operation of a two-price scheme for beef. In addition, the stocks of marketable or close to marketable cattle in Australia are so large that any sharp price increase in conjunction with a government guarantee that all cattle delivered to abbatoirs would be accepted for slaughter would (a) overtax abbatoir capacity and (b) force more beef onto the world market than the world market could absorb since less than one-half of world beef traded is purchased by the price-elastic markets (see section 4 below). However, it does appear that a modest scheme based on minimum domestic prices could be in operation next year but will almost certainly be moderate in nature and will not have a great short-term impact on producer prices or marketings. Later in the paper it is argued that other factors will almost certainly have a greater impact on the industry than currently vetted domestic marketing reforms.

3.2 The export markets for Australian beef

There are three principal markets for Australian beef at present: U.S.A., Canada, and Japan. The United Kingdom has ceased to be a major importer as she has adopted the Common Agricultural Policy provisions of the EEC (See Table 11). These are all countries characterized by high incomes, high levels of domestic self-sufficiency in beef, and import quotas on beef. They are also guaranteed high price markets and were the early cause of the export-led growth of the industry. They are classified as price inelastic markets in that a lower offer price for Australian beef to these markets does not serve to increase exports to these markets (due to quotas) and a high offer price likewise has little effect since this offer price, on a c.i.f. basis, is still well under domestic price levels in these countries. For example, July, 1977

Table 11.

Australian Exports of Beef and Veal by Principal Destination (shipped wt.,000 m.t.)

Destination	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77
United Kingdom	40.5	102.9	45.2	16.4	8.7	7.7
EEC(orig.6)	1.1	7.1	4.0	3.2	2.3	2.2
USA	259.0	318.7	299.7	287.4	300.7	251.8
Canada	19.1	26.7	27.0	27.8	38.4	36.9
Japan	47.8	88.6	88.9	15.3	68.2	74.7
USSR	11.4	-	-	5.5	25.0	66.4
Greece	1.1	7.2	5.7	2.4	9.4	1.9
Sweden	1.2	3.1	2.0	5.0	11.4	7.2
Middle East	1.2	2.1	2.6	8.9	15.7	44.5
Taiwan	-	0.4	0.3	12.0	18.0	5.6
Others	18.8	24.9	17.5	31.7	51.2	147.0
Totals	401.2	581.7	492.9	415.6	549.0	645.9

Source: AMB, Annual Reports (various issues)

U.S. domestic processing beef prices in Chicago (for cow meat) was 157¢ per kg while Australian cow meat, c.i.f., New York was 129¢ per kg. The comparable Japanese price for dressed third grade cow in Tokyo was 444¢ per kg. The U.S. market can be price responsive during very high price periods in the U.S.(1973-74) when quotas are relaxed, however (Freebairn and Gruen, 1977). Since these major markets tend to be price unresponsive, the A.M.B. has set up an export diversification scheme which allocates rights to export to the U.S.A. dependent upon the exporters sales to price responsive (i.e., non-quota) markets. This export diversification scheme has been in operation since 1968 when Australia's export potential began to outstrip the requirements of the U.S.A. market following imposition of the U.S.A. quota system. The basic requirements of this scheme are as follows:

(a) Each exporter licensed by the A.M.B. is required to ship beef, veal, and mutton to markets other than the U.S.A. in order to earn the right to ship to the U.S.A. These credits can be drawn upon for shipment to the U.S.A. of either beef, veal or mutton.

(b) Credits are transferable between exporters licensed to export to the U.S.A.

(c) Exporters exceeding their credit entitlements for shipment to the U.S.A. are prohibited from shipping more to the U.S.A. until they have accumulated the required credits.

(d) At the end of the year, each exporter is permitted to carry forward accumulated credits of up to one-third of his total shipment to the U.S.A. during that year.

The "diversification factors" (the proportion of non-U.S.A. exports to U.S.A. exports required to earn a credit) are varied frequently and the credits are bought and sold regularly. The current price is about 13¢ per kg for a credit.

The major developments (January-July, 1977) of recent note on the export market have been large purchases in 1977 by Eastern Europe (59,000 m.t.), the Soviet Union (53,000 m.t.) and Egypt (17,000 m.t.) as well as continued growth of the Middle East Market. These are all competitive, price elastic markets and have contributed to the record levels of exports being made at present. The Eastern European and Soviet Union markets are very unreliable, however, and long-term export contracts have not been feasible for these markets. Further aspects of the international market are considered in the next section.

4.0 Demand and Supply in the World Beef Markets

The world trade in beef is characteristic of many primary commodity markets in that a very small proportion of total world production and consumption is traded, the quantities traded are fairly supply unresponsive in the short run, and imports are subject to numerous restrictions. World trade in beef involves a major proportion of total production for the major exporters (about 50 percent for Australia, 70 percent for New Zealand and 25 percent for Argentina) as well as a major foreign exchange earner (over the 1971-1973 period, beef as a % of total exports was 9.7% for Australia, 14.1% for Argentina and 14.4% for New Zealand [Reeves and Hayman, 1975]). In the major importing countries,

imports represent a small proportion of total consumption, tend to serve specialized areas of the market (e.g. manufacturing grade beef), and are a small proportion of the value of the total imports (generally less than 1%). These factors tend to make the market facing the major exporters inherently unstable. Reeves and Hayman found that a 1 percent change in consumption or production among the major importers had a 7 percent change on the volume of world beef and veal trade. The current depressed prices for beef exports reflect the sustained narrowing of the gap between consumption and domestic production in the major importing countries between 1973 and 1976. Lagged supply responses by the exporters in response to favorable 1972-1973 prices also contributed to the slump as did a partial synchronization of the cattle cycle in a number of the major importing and exporting countries.

World production of beef has increased at about 3 percent per annum over the last two decades. The U.S.A., U.S.S.R., and E.E.C have contributed the most, in absolute terms, to world output expansion although Japan, Canada, New Zealand, Brazil and Australia have also expanded production rapidly. By contrast, the other South American countries, Central America, Asia and Africa have achieved only marginal rates of production increases.

Output increases are composed of rising average slaughter weights and increasing numbers slaughtered. In the main importing countries, the major contribution has been from higher average slaughter weights. This has also been important in New Zealand but in Australia and Argentina the increases in production have been due primarily to increases in numbers slaughtered (a 92 percent increase in Australia and a 100 percent increase in Argentina over the 1951-1955 to 1969-1973 period). Next, the short-term market prospects for both the importing and exporting countries are discussed.

4.1 Importing Countries

The heavy supply situation in the major importing countries is expected to

ease slightly during 1977-78 as the rate of herd liquidation in most major producing countries begins to slow (B.A.E., 1977). Levels of economic activity and the competition from other meats in the major importing countries will be major demand factors. Given the recent sharp upturn in world grain prices, competition from other red meats will be less than originally anticipated. The heavy dependence of Australia on the U.S. market makes developments in the U.S. demand and supply for beef of great importance on Australian export prices and patterns of shipments. Improved conditions in U.S. grazing areas should help stem the tide of U.S. cows to slaughter and lead to a short-term increase (the next 6-12 months) in the demand for lean manufacturing beef. Production and export levels expected for 1977 and 1978 are given below for the major traders in the world beef market. Table 12 summarizes Australia's position in two of these markets over the 1972-1973 to 1975-1977 period while Table 13 gives overseas production trends and export trends for the major traders of beef. The volume of imports allowed into the U.S.A. under the voluntary restraint program was increased by 4 percent (to 581,000 metric tons, product weight) in 1977 but is likely to be slightly lower in 1978 under the currently used formula. Despite the gradual strengthening of prices forecast for 1978 there is unlikely to be any major growth in imports by the major importing countries (B.A.E., 1977b) so the Australian exports will continue to rely heavily on the non-traditional, price elastic markets. The U.S.S.R. market appears to be declining as intensive meat production is expanding. Eastern Europe's meat shortage is expected to continue and imports will be subject to foreign exchange availabilities.

4.2 Exporting Countries

As mentioned earlier, most of the long term output increases in the major exporting countries has been from increased cattle numbers rather than increased slaughter weights. This results from the more favorable climate for year round

Table 12

Selected Data on U.S.A. and Japanese Beef Markets, 1972-1973 to 1976-1977

	1972-73	1973-74	1974-75	1975-76	1976-77
U.S.A.					
Consumption[a]	7274	7199	7672	8200	n.a.
Imports as % consumption	8.5	8.4	6.5	7.0	n.a.
Australian exports[a]	309	293	289	298	250
Aust. exports/total imports	52.3	47.5	56.2	55.0	n.a.
Aust. exp.to US/total Aust.exp.	53.7	61.7	68.3	54.3	38.7
Ave. FAS bull beef price[b]	114.6	117.0	75.3	96.2	
Consumption per capita (kg)[c]	34	36	37	39	n.a.
Japan					
Consumption[a]	213	165	215	236	261
Imports as % consumption	20.6	42.5	19.3	15.4	23.6
Australian exports[a]	87	80	8	66	71
Aust.exports/total imports[%]	100	72	53	83	83
Aust.exp.to Japan/total Aust.imp.[%]	15.1	16.8	1.9	12.0	11.0
Average FAS prices for frozen chucks & blades[b]	117.3	107.0	n.q.	65.9	73.6
Consumption per capita(kg)[c]	2.7	2.0	2.6	2.9	3.1

[a] In '000 m.t. boneless

[b] In Australian cents per kg.

[c] In boneless equivalents.

n.q. = not quoted

Table 13

Production and Export Trends for Beef and Veal in Selected Countries and the EEC

Country	1977 Production level (in million metric) tons	1977 % expected change from 1976 levels	1978 % expected change from 1977 levels
U.S.A.	11.6	-3.0	-6.0
Canada	1.1	-3.0	-9.0
Japan	0.20	+10.0	unsure
EEC	6.15	-5.0	-1.0
USSR	5.95	about 0	about 0
New Zealand	0.54	-12.0	-7.0
Australia	1.93	+5.5	-10.0

Country	1977 export level (in million metric tons)	1977 % expected change from 1976 levels	1978 % expected change from 1977 levels
New Zealand	0.24	0	-.25
Argentina	0.415	+20.0	-
Australia	0.625	+15.7	-10.0

Source: B.A.E. (1977a)

beef production in the Southern Hemisphere, lower cost grass-fed production systems, and reasonably rapid rates of technological progress in extensive beef production areas. These developments have been oriented more towards increased stocking rates and higher turnoff rates than towards larger animal size for slaughter.

New Zealand and Argentina are the major competitors for Australia. New Zealand's short-term export potential has been somewhat reduced due to large cow and heifer slaughterings the past few seasons. In Argentina, the much larger cattle herd (about double the size of the Australian herd) and very high levels of domestic consumption means that an upturn in world prices could produce a large increase in exports at the expense of domestic consumption. Brazil represents a potentially large supplier in the world market with 100 million cattle (behind only the U.S.A. and the U.S.S.R.) and plans to double the national herd to

between 180 million and 200 million by the late 1980's. Given their proximity to West Africa, the progress of Brazil's cattle production program and domestic demand conditions should be watched closely.

5.0 The supply of Australian Beef

Table 14 gives the historical data on Australian production, herd size, and beef prices. Australia is the world's seventh largest producer of beef and veal in the world. Beef production per capita in Australia is the highest in the world and ten times the world average. The huge jump in beef cattle numbers (from 19.2 million in March, 1968 to 31 million in March, 1974) was a reaction both to high beef prices and assured beef markets and the declining relative profitability of wool. In the four years to March, 1972, cattle on sheep properties rose from 5.1 million in 1968 to 10.4 million in 1972 (O'Dwyer and Hussey, 1972).

5.1 Projections of cattle numbers and production.

In forecasting future supply and cattle numbers, the projections are thought to be critically sensitive to the short-term nature of the recovery in the beef market. In making supply projections, the Bureau of Agricultural Economics (B.A.E., 1976) assumed that saleyard prices for beef in Australia would increase in real terms to approximately their past trend by the end of this decade. These projections assume some short-run outflow of resources but towards the end of the decade resources would flow back into the industry. Herd numbers were projected to reach 33 million by March, 1980 and herd growth would be back on its historical growth path of 3 percent per annum. Beef and veal production is estimated to reach 1.7 million metric tons by this time, implying a historically consistent slaughter rate. However, given a continuation

Table 14
Historical Levels of Production, Beef Herd Size and Beef Prices, 1950-51 to 1976-77

Year ending June	Beef & Veal production	Beef herd size(1)	Deflated price of beef(2)
	'000 tonnes	Million head	¢/kg.dressed wt
1951	662.0	9.7	21.83
1952	591.2	10.4	31.31
1953	685.6	10.3	27.56
1954	715.6	10.5	29.76
1955	731.5	10.7	34.08
1956	763.2	10.9	31.09
1957	827.7	11.4	30.20
1958	804.2	12.1	36.82
1959	920.9	11.9	37.92
1960	763.9	11.4	46.96
1961	543.0	11.6	50.49
1962	803.8	12.4	37.70
1963	928.6	13.0	39.84
1964	1,001.3	13.5	39.64
1965	1,026.3	14.1	45.66
1966	946.3	14.0	56.70
1967	878.6	13.2	56.97
1968	903.9	13.7	58.00
1969	934.8	14.7	58.89
1970	1,010.5	16.3	57.81
1971	1,047.2	17.9	61.20
1972	1,167.9	20.3	62.06
1973	1,437.9	23.4	74.56
1974	1,310.0	25.1	80.34
1975	1,533.8	27.1	78.90
1976	1,784.0	29.1	31.70
1977	1,940.0(p)	29.7	48.50

Notes: (p) preliminary, n.a. = not available.
(1) The total number of animals for meat production as of 31 March the previous year
(2) Average annual price at Homebush, N.S.W., steers and heifers, 295-318 kgs dressed weight, first and second export quality.

Sources: Australian Bureau of Statistics, "Livestock slaughtered and Meat Produced", Australian Meat Board Annual Review (various issues) Australian Meat Board Statistical Review of Livestock and Meat Industries (various issues).

of the present depressed state of the market for the next 1 - 2 years, the projections would change quite drastically given the heavy slaughterings of cows and heifers which this would entail. These projections are summarized in the next section when changes in herd composition under various assumptions are considered. The B.A.E. projections are given below for the set of assumptions discussed above (Table 15).

Table 15
Indexes of Meat Produced and Exported (1972-73 to 1974-75 = 100)

Item	Average 1962-63 to 1964-65	Average, 1972-73 to 1974-75	1973-1974	1974-1975	Previous projections, 1978-79	Previous projections 1979-80
Meat Production	74	100	91	102	129	118
Export availability	64	100	94	81	155	125

Source: Bureau of Agricultural Economics 1976

The choice of a base period affects projections such as this and in the above case a "normal" period was chosen as the base although the choice of the 1972-73 to 1974-75 base period assumes the large increases in cattle numbers which preceded this period was a permanent, once and for all type of jump.

5.2 Changes in herd composition and beef production projections

The above projections use essentially trend-based procedures. Recent studies by Tarlington (1975) and Reynolds (1977) attempt to account for changes in herd composition brought about by patterns of slaughtering and to examine the effect this has on beef projections. One factor underlying the fairly moderate projections of cattle numbers for 1979-80 is the jump in heifer and cow slaughterings during 1976-77 from the normal level of 35 to 40 percent up to a figure of 50 percent. Calf slaughterings in 1976-77 also rose to a record 2.34 million head, 12.5 percent above the 1975-76 record. This also affects the short to medium term potential of the national herd. In addition, widespread spaying of cows has been carried out in the major Queensland beef areas. The Tarlington study carried out an analysis of herd growth factors through a demographic routine. Herd numbers, based on March, 1975 estimates, were

projected three years forward. Total slaughter was projected at 10 million for the year ended March, 1978. These models show that there is little impact on total herd numbers as a result of any short term measures taken by producers to reduce herd size. However, the very large slaughterings in 1975-76 of 10.6 million and in 1976-77 of 11.6 million (compared with Tarlington's estimates of 8.85 million and 9.9 million, respectively) have certainly reduced the short-term production potential of the national herd. These large slaughterings also illustrate how localized drought conditions and severe liquidity pressures on producers can upset even the most carefully constructed demographic models.

5.3 Inventory and supply response studies: a summary

In most major producing countries, cattle numbers and beef production have fluctuated considerably about longer term trends (Figure 1). The long term variations aften show a definite cyclical nature, especially if foreign trade is a minor part of the industry although Argentina shows a fairly definite 7 year cycle. When cattle producers plan to increase production in the future, they must begin to withhold a greater proportion of cows and heifers for breeding. This tends to lower production in the short term which resulted in the very rapid build up in herd numbers that occurred during the early 1970's in Australia. The result is the characteristic short-run negative supply elasticity for beef production. This is described by Reeves and Hayman (1975) as follows: As prices begin to rise in response to a short term reduction in supply or increased demand, producers' expectations are for further price increases and herd build-up begins at the expense of slaughterings. This strengthens further the price rise. Supplies build up and unless demand has increased further during this period, the price begins to fall. Producers react to the price drop by increasing turnoff rates and further depressing prices. This pattern is particularly evident for the major exporters.

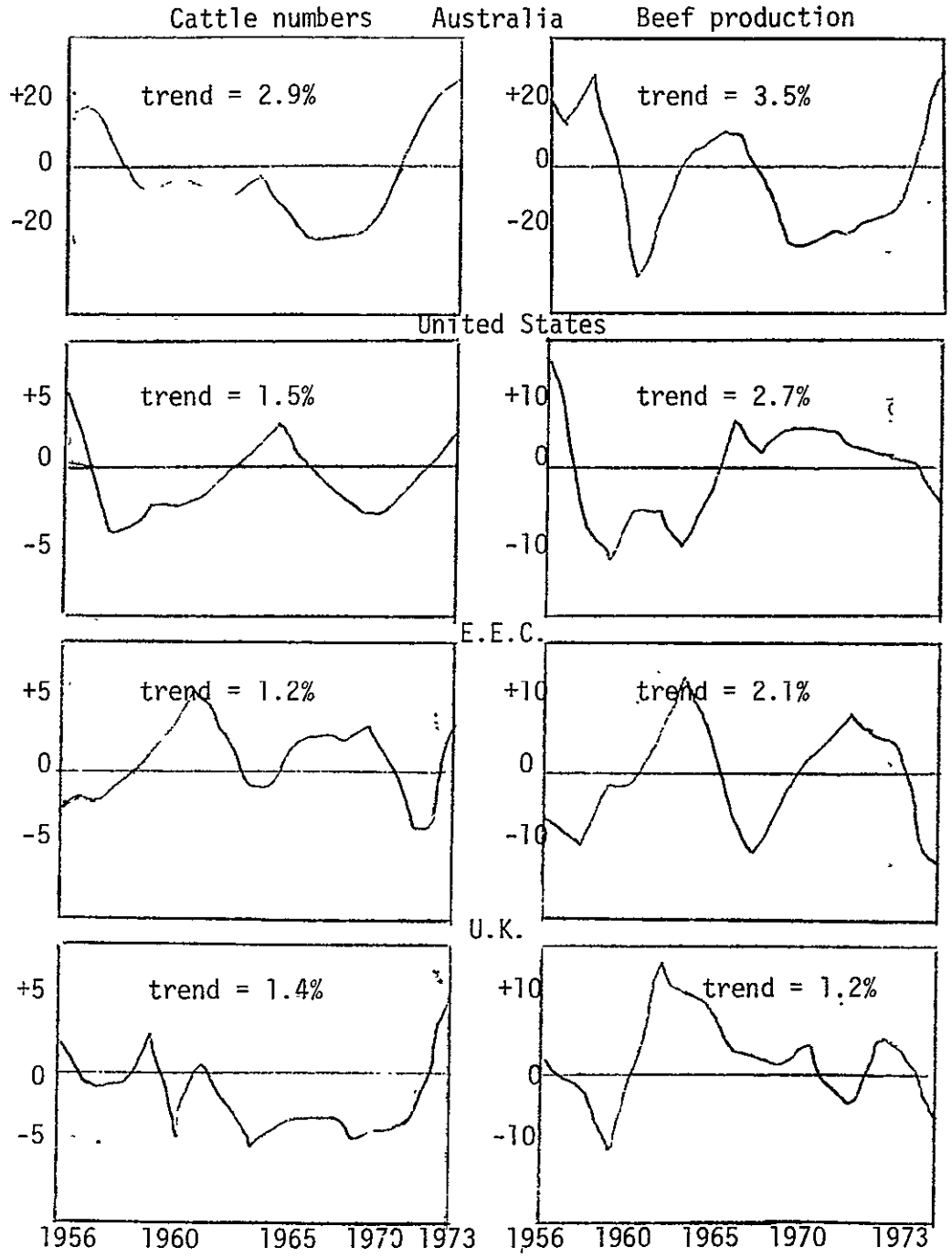
The supply projections for beef based on the current situation must consider carefully the liquidity position of producers as well as the traditional factors such as weather, prices, and technical change. The current B.A.E. projections (1976) are critically sensitive to the timing and extent of recovery in the beef market. Should prices stay depressed, slaughterings would be much below the projections given in Table 15 because of the forced selling of a large proportion of the currently productive breeding herd. On the other hand, if beef prices are one percent higher than those assumed (the long term trend line for beef prices), cattle numbers by March, 1979 would be about 1.3 percent above the herd size projected in Table 15. These projections are also sensitive to productivity changes which are caused by a change in herd composition as well as favorable or unfavorable weather conditions. If productivity was 10 percent lower than that assumed in the projections, production in 1979-80 would fall by an estimated 200,000 metric tons.

Beef and veal production in 1979-80 is projected to be 1.7 million metric tons (slightly under the 1975-76 figure of 1.84 million metric tons and well under the 1976-77 record production of 1.93 million metric tons) of which 960,000 metric tons would be available for export,

Over the next five years, world supply and demand for beef is expected to trend towards a more balanced situation with a moderate upward trend in prices being evident. Large fluctuations are to be expected around the trend, however, given the high dependence of beef demand on income changes in the major consuming regions and the erratic purchases by markets such as Japan, U.S.S.R., Eastern Europe and Egypt. If Australia's forced liquidation of the cattle herd continues for the next 12 - 18 months then a further destabilizing factor would be present since the export availability and stocks of beef would be reduced and supplies would not be present to meet any short-term jumps in demand.

Figure 1

Percentage Deviations from Trend in Cattle Numbers and Beef Production, Selected Countries, 1956-1971.



The B.A.E. supply projections assume a gradual improvement in prices but real prices are not expected to reach the trend level of 54 cents per kilogram (carcass weight) by 1979-80. Instead, a real price of 50 cents per kilogram is forecast for 1979-80. The actual price is forecast at 86 cents per kilogram for 1979-80, the difference reflecting the currently projected inflation rates in Australia over this period.

The cattle numbers equation used by the B.A.E. was of the following form:

$$\log N_t = -0.841 + 1.09 \log N_{t-1} + 0.29 \log\left[\frac{PB^*}{PWLM}\right]_t \quad \bar{R}^2 = 0.98$$

where N = total cattle numbers in Australia ('000) at 31 March

t = time period

$\frac{PB^*}{PWLM}$ = a measure of the expected ratio of beef prices to wool, lamb and manufacturing milk prices weighted by the gross value of production. The variable is weighted over 3 time periods by these weights: t-1 = 0.5; t-2 = 0.33 and t-3 = 0.17.

The assumptions were that the historical ratio of the last variable would rise from 0.6 in 1974-75 to 0.8 in 1979-80 and that there would be no significant increase in the productivity of the national cattle herd.

Herd projections based on this model gave 31 million head in March, 1979 and 32.75 million in March, 1980. Slaughterings are derived from the model by the following equation:

$$N_t = N_{t-1} + K N_{t-1} - S_t$$

or, alternatively

$$S_t = K N_{t-1} - (N_t - N_{t-1})$$

where N and t are as above,

S = cattle and calves slaughtered in the fiscal year, and

K = an index which incorporates the combined effects of natural increase, deaths, and cattle killed on properties. The value of K has fluctuated

around an increasing trend over the past forty years. The value of K was assumed equal to 0.36 over the next decade, the value during the 1964-65 to 1973-74 period (excluding the drought years 1964-65).

Next, slaughterings must be converted to output. The combined slaughtering weight of calves and mature cattle varies in proportion to the weight of each group in the total. A high proportion of calves slaughtered in Australia are derived from dairy herds and thus calves available for slaughter are projected to decline in line with the gradual decline in dairying evident in Australia. Calf slaughterings from beef herds are also influenced by expected beef prices. When expectations are for continued low prices, calves are slaughtered (e.g. 1.9 million in 1964-65 caused, in part, by drought conditions) but expectations of higher prices lead to retention of calves for herd build up and for sales as fat stock (only 1.03 million calves slaughtered in 1970-71). The projected 1979-80 slaughtering figure of 9.4 million is composed of 8 million mature animals and 1.4 million calves, reflecting a long term view of the price situation where the proportion of calves slaughtered is on a long-term trend. Average dressed weights are assumed at 207 kg for adult cattle and 34 kg for calves, equal to the ten year average for 1964-65 to 1974-75. The weighted average slaughter weight is 180 kg per head.

Austin (1977), in a USDA study, also found the negative short-term supply response put forward by Reeves and Hayman. He also was concerned with beef-sheep competition. This study found that a proxy variable for technology, the size of the beef herd and the price of wool lagged two years were directly related to beef production while the price of beef and input prices lagged three years were inversely related. Projections were made on the ex ante model and these were found to be highly dependent on weather and beef prices. Although the

liquidity position of producers should conceptually be incorporated into the relationship between output and lagged prices, this would assume that during previous low price periods, the liquidity position of producers would give rise to a particular form of selling behavior. In reality, over the period the model was estimated, previous downturns in the beef market have never caused the financial problems that are currently being felt and a far greater number of cattle are currently being supplied than the number estimated by the model. It appears to be the "fixed commitments" case where the lower the price goes, the larger the number of animals which must be sold to pay a given yearly fixed commitment. A number of different equations were estimated by Austin but they were very similar in terms of model structure and R^2 results. Table 16 compares the actual and predicted results of the model over recent years. The continuation of the depressed prices first felt during 1974-75 has obviously not been adequately incorporated into the model since weather conditions overall have not been such as to lead to these very large forced marketings.

A rigorous treatment of supply and inventory responses was carried out by Freebairn (1973). He calculated direct and cross-price elasticities of supply for beef, lamb, mutton and wool using ten exogenous variables in a system of independent equations. His results were consistent with models mentioned earlier in that a rise in the price of beef relative to wool and lamb prices reduced beef production in the current period but increased beef production in subsequent periods.

Davidson (1973) projected the size of both the beef and sheep herds assuming constant real beef prices. His results, extrapolated to 1975, put the Australian beef herd at 34 million compared to an actual figure of about 29 million.

Table 16
Australia using an ex ante model, 1974-75 to 1976-77.

Equations	Beef Produced		
	Projected ('000 m.t.)	Actual ('ooo m.t.)	Error % (projected-actual)
Equation 1			
1974-75	1515	1534	-1.3
1975-76	1500	1784	-18.9
1976-77	1458	1900(a)	-30.3
Equation 2			
1975-76	1507	1784	-18.4
1976-77	1465	1900(a)	-29.7
Equation 3			
1976-77	1370	1900(a)	-38.7
Mean, 3 models			
1974-75	1515	1534	-1.3
1975-76	1498	1784	-19.1
1976-77	1431	1900(a)	-32.8

(a) = preliminary estimate

Source: Austin, 1977

McCarron (1975) looked at the underlying reasons for the growth of beef production on properties whose major source of income was from sheep. No projections were made, however, which would be of direct relevance for this study.

5.4 Weather based models

Given the highly unstable rainfall conditions which prevail over much of the beef producing zones, the incorporation of a climatically based variable in herd projection models is highly desirable. This is particularly crucial since areas with high export propensities also tend to be areas of the greatest climatic variability. The regular seasonal patterns of marketing and slaughter have already been mentioned (Section 3.1.1). Here we are more concerned with stochastic effects of weather on beef cattle numbers and slaughterings.

On a more micro level, models based on soil moisture variables (Easter, 1975; Reid and Thomas, 1973) have been applied to sheep and wool production and are currently being developed for beef production. Patterson (1957) showed

that cattle production fluctuations in Queensland were partially explained by rainfall patterns while White and Mawson (1971) found that a decile approach to rainfall gave a good prediction of beef cattle numbers as well as mortalities. Annual rainfalls at 40 stations were expressed as deciles of their historic distribution. The model used 16 regions and 8 livestock categories per region. The model took the following form:

$$Y_t = bo + b, T_t + b_2 T_2^2 + b_3 D_t + b_4 D_{t-1}$$

where Y_t = cattle numbers or mortalities in year t

T_t = time, T = 1 for t = 1953

T_t^2 = time^2

D_t = rainfall decile in calendar year (t-1)

D_{t-1} = rainfall decile in calendar year (t-2)

Inter-regional comparisons of mean mortalities for the 1953-1968 period showed that mortalities were highly related to both overall rainfall variability and the winter rainfall component as a percentage of annual rainfall.

Turning to the current weather situation, Queensland has just experienced a very dry year in most areas and unless the winter rains are normal or above normal a drought situation could develop which would maintain larger than normal supplies during the summer (November-February) and autumn (March-May period. This could mitigate, to some extent, the strengthening of prices (about a 20 percent increase) expected to occur during this period and lead to further liquidity pressures on producers. If seasonal conditions improve, producers will be able to hold cattle back as prices firm in anticipation of even higher prices and start the cycle again.

6.0 Reconciliation of Current and Predicted Situation

The position at present is delicately poised in terms of what may be expected in the short-term (12-18 months) and the longer term (1979-1980 or longer). Expectations in industry circles are for a modest (20-25 percent)

increase in beef prices over the next 4-5 months due primarily to increase demand from the U.S. market coupled with the normal pattern of reduced slaughterings during this period. This has been reflected in somewhat higher prices on the Sydney beef futures market (26.0 for December, 1977; 28.2 for March, 1978; 33.5 for October, 1978 on a per kg liveweight basis). This factor, coupled with normal seasonal conditions, would allow most producers to maintain desired herd levels and maintain the strong supply position of Australia in the export market for the next 3-4 years. If prices trend upwards strongly later in the period, there seems little doubt that production in particular would pick up strongly due to investment and technological change. During the past 4 years, the beef industry has stagnated in terms of investment and the adoption of improved technology while the backlog of technology has continued to accumulate. There seems little doubt that, faced with assured markets at prices 30 to 50 percent greater than present levels, a very large production potential exists. This would be in terms of increased cattle numbers but more importantly in terms of increased turnoff rates.

Therefore, if the industry can weather the current storm with no further depletion of the national breeding herd and no further rundown of the production plant, the potential supplies of exportable meat should remain strong in the medium to long term, particularly since domestic consumption is so sensitive to price increases.

The world market for beef and veal seems to be entering a more stable period for a variety of reasons. First, the large supplies of Australian cattle hanging over the market has tended to quickly cancel out any short-term demand increases (through large, single orders such as the recent U.S.S.R. order of 20,000 m.t.'s) which would be reflected in higher prices during a short supply period. Second, during low price periods the presence of opportunistic buyers (the price elastic segment of the market) has tended to support

the market. Third, a sharp rise in prices would quickly reduce demand as these buyers left the market. Finally, the quota situation in the EEC and Japan seems to have stabilized and industry expectations of large, expanding markets in these areas have ceased. Thus the BAE (1976) supply projections based on a fairly stable market trending slightly upwards seems quite reasonable given that a severe drought in the major producing areas does not eventuate during 1978.

7.0 Summary and Implications for the West African Red Meats Study

This study has covered most aspects on the supply side in Australia and also presented a reasonably complete set of costs for getting beef from Australia to the United Kingdom, the nearest area for which freight rates on export meat were quoted. The next step would be to carry out a fairly comprehensive study of world beef markets to try and estimate short and long term prices for the major types of red meat traded internationally. This study has considered only beef and veal while neglecting lamb and mutton exports which are also substantial and also of considerable relevance for the West African study. Estimated 1976-77 exports of mutton were 269,000 m.t. (87 percent of total Australian production) and for lamb were 43,000 m.t. (18 percent of production). The demand and supply conditions in the lamb and mutton market are somewhat different to those of beef and have been heavily influenced recently by the expansion of the Middle East market.

Second, the specific details of the West African markets must be ascertained and detail paid to facets such as type of meat required (chilled, bone-in, bone-out, cow beef, bull beef, ox beef, etc.), local port facilities, local chilling and freezing capacity, the shipment of the beef from the port areas to other demand areas and seasonal patterns of demand and supply in local markets. Also relevant are import duties on beef, mutton, and lamb and possible political reactions to a sharp increase in imported beef.

Finally, the situation in Australia should be closely monitored for the next year since short term developments in Australia will have a major impact on the world beef market over the next 3 - 5 years.

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ANNEX I.

AUSTRALIAN EXPORT GRADING

BEEF GRADING

Summary of official schedule of grade standards of the Export Meat Regulations of the Commonwealth of Australia.

The primary grading of beef is made in the quarter form according to the following characteristics:

- Sex
- Weight of dressed carcass from which quarter is derived.
- Age of animal from which carcass is derived.
- Conformation.
- Fat cover and colour.
- Presence or absence of blemishes.

Export grades are:

Ox (Steer) Beef

Derived from castrated male animals not less than 201 lb. (91.17 kilos) dressed carcass weight. (Stags are classed as bulls. For veal carcasses over 200 lb. (90.7 kilos) see VEAL).
1st quality 2nd quality 3rd quality
Other qualities outside these three include: "Plain" quality steer beef of a quality grading at the lowest end of the range of exportable beef, below 3rd quality.

Heifer Beef

Derived from youthful female animals with no evidence of milk secretion, and weighing not less than 201 lb. (91.17 kilos) dressed carcass weight. (For veal carcases 200 lb. (90.7 kilos) see VEAL.).
1st quality 2nd quality

Cow Beef

Derived from adult female animals.
1st quality 2nd quality 3rd quality
Other qualities outside these three include: "Plain" quality cow beef of a quality grading at the lowest end of the range of exportable beef below 3rd quality.

Yearling Beef

Derived from steer or heifer which has not cut a permanent incisor tooth, not less than 201 lb. (91.17 kilos) and not more than 400 lb. (181.4 kilos) dressed carcass weight, of age exceeding classification as veal. Available for use at buyers' and sellers' request. Otherwise it is included as 1st quality steer or heifer beef.
1st quality only.

Baby Beef

Derived from steer or heifer which has not cut more than the second pair of permanent incisor teeth and within weight range 400-720 lb. (181.4-326.5 kilos) dressed carcass weight, of age exceeding classification as veal. Available for use at buyers' and sellers' request. Otherwise

it is included as 1st and 2nd quality steer or heifer beef.

1st quality	2nd quality	3rd quality

Bull Beef

Derived from uncastrated male animals, and stags showing bull characteristics. One quality only - equivalent to 3rd or manufacturing qualities.

CUTS - Bone-in and Boneless

In general, cuts of beef are graded in accordance with the grade of the quarter from which they are derived, except for boneless shins which are all graded 3rd quality.

Cuts of beef or 1st and 2nd grades may be mixed in one package, in which case they are classified as 2nd quality and the trade descriptions are shown in red.

VEAL GRADING

The official schedule of grade standards of the Exports (Meat) Regulations of the Commonwealth of Australia are summarized below:

1. General Grading
Veal is graded in accordance with the following characteristics:

Age:

- distinct separation of the sacral vertebrae;
- only slight signs of ossification of the cartilaginous tips of the spinous processes of the sacral vertebrae;
- no ossification of the cartilaginous tips of the spinous processing of lumbar and thoracic vertebrae;
- only a slight tendency to flatness and some redness of the ribs.

Weight
There is no maximum dressed weight, providing the characteristics of age outlined above are indicative of veal. Certain minimum weight requirements of each grade are specified below.

Conformation - - is taken into consideration when determining grades.

Note: There is no grading for sex.

Export Grades
for carcasses and piece veal (Bone-in or Boneless) are:
1st Quality) Minimum carcass weight 50 lb. (22.6 kilos).
2nd Quality)
3rd Quality: Minimum carcass weight: 42 lb. (19.0 kilos)

Boneless Veal: Derived from Carcasses of animals not less than 14 days old when slaughtered and yielding a boneless full side of 10 lb. (4.5 kilos) minimum weight.

NOTE: Bobby Veal and Stirk Veal. Carcasses, piece veal and boneless veal may be classified as "bobby veal" if derived from carcasses not exceeding 70 lb (31.7 kilos) in weight. The use of the term "bobby veal" is optional.

Veal if derived from carcasses over 70 lb. (31.7 kilos) in weight is sometimes referred to as "stirk".

2. Veal Cut Grading (Bone-in and Boneless)

Cuts of veal are graded in accordance with the grade of the carcass, side or quarter from which they are derived.

3. Boneless Veal Grading (Manufacturing Type Packs)

This type of veal is graded in accordance with the grade of the carcass from which it is derived.

NOTE: Cuts of veal of 1st and 2nd grades may be mixed in one package in which case trade descriptions are shown in red (2nd quality).

Source: N.S.W. Meat Industry Study, Aust. Farm Management Journal, 9(2), June 1973, pp. 102-104.