final report

Project code: M.544b

Prepared by: GRM International Pty Ltd, PDP Australia, Centre for International Economics and Total Cattle Systems

Date published: February 1995

ISBN: 9781741917895

PUBLISHED BY
Meat & Livestock Australia Limited
Locked Bag 991
NORTH SYDNEY NSW 2059

Input Requirements for Cattle Feedlot Industry

Volume 2: Base Book

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

VOLUME 2 BASE BOOK

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MODULE 1

TRADING ENVIRONMENT AND SCENARIOS

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1.0 INTRODUCTION

The Meat Research Corporation has commissioned a study into input requirements of the cattle feedlot industry. The research results are presented in two volumes. This is Volume 2, "The Base Book", which aggregates source data and statistics and, documents the specific outcomes the five basic research modules. Summary and an industry strategy is presented in Volume 1.

The purpose of the respective research modules documented in this volume are described below.

- Module 1 reviews the factors thought capable of exerting a significant impact on the production and trade in Australian beef over the coming ten years. These factors have been used to define the scenarios modelled via the Global Meat Industry (GMI) Model. The five modelled scenarios are described, including "base case", "optimistic", "pessimistic", "FMD free South America" and "high wool price in late 1990's".
- Module 2 assesses the prospects for global beef markets to year 2005 through the use of the GMI Model which captures the main demand and supply features of the Industry in an interactive fashion for a number of plausible scenarios (described in Module 1) and sensitivity test key parameters. The analysis distinguishes at an aggregate level grainfed and grassfed beef production as carcase weight equivalents (cwe) in respect of supply and demand in Australia, other competitive supplying countries and major country markets. The present value of Australia's grainfed beef exports is presented.
- Module 3 disaggregates the overall beef demand, described in Module 2, into specified beef products by market. The market disaggregation includes product specification within the domestic grainfed market and product specification for the Japanese and Korean grainfed export markets. Grassfed markets are identified only as either domestic or export. The projected demand by product specification and by market is translated into animal numbers and different types of cattle required.
- Module 4 ascertains cattle supply options to year 2005. Consideration is given to disaggregation of the herd from existing ABS data on a regional basis and according to breed and animal type. Supply shifts, produced by such factors as changing slaughter weights, processing yields, age of turnoff, mortality, productivity, culling, genetics and husbandry practices are considered. Possibilities of substitution between beef activities and the effect of out-of-normal seasonal conditions are analysed. Feedlot operators' specification for feeder cattle and the matching of feeder cattle supply with current and future market requirements is determined.
- Module 5 appraises the Australian feedgrain and other feeds supply picture as it relates to beef feedlot industry demand described in Modules 1 to 4. The demand for specified beef products is translated into demand for feedgrain and other feedstuffs based on achievable feed conversion ratios and feed-on periods. Particular attention is given to where feedlots are currently established and where they are likely to develop in the future.

1. INTRODUCTION

1.1 Overview

Rapid expansion of the lot feeding industry is challenging assumptions regarding the future structure and operation of the beef industry in Australia (eg fed beef accounted for six percent of exports in 1989 and over 18 per cent in 1993).

In its initial stage of establishment the industry could rely on its relatively small size ("price taker" status) to assure supply of key inputs (feeder cattle and feed) at competitive prices. Expansion will propel the industry to a situation where this is no longer the case, not only at the regional level, but nationally. In terms of investment and industry strategies, key questions are:

- Future growth in international demand for fed beef.
- The capacity of the Australian beef cattle industry to respond to increased demand (ie its ability to expand competitively priced supply) from current production systems.
- The potential to hasten changes in the industry which would increase its ability to profit from increased demand for fed beef.

The modelling component of this Project seeks to provide insights into the future global meat trade and Australia's part in that. This is not a forecasting exercise. The intention is to provide order of magnitude estimates of the global trade under given sets of assumptions regarding key (foreseeable) factors. The future will almost certainly be different to any of these Scenarios. Non-forecastable factors (eg weather and drought) and un-foreseen factors (eg military clashes on the Korean Peninsula, a nuclear accident and contamination in the USA) must be expected to play a significant but unpredictable part in future price and production outcomes for the industry.

1.2 This Module

The purpose of this module is to review the factors thought capable of exerting a significant impact on the production and trade in Australian beef over the coming ten years. These will be included in Scenarios to be modelled via the Global Meat Industry Model (GMI).

The definition and modelling of plausible Scenarios will provide an overview of the potential growth in the sector as dictated by the international meat market. Evaluation of possible regional and commercial level consequences of such outcomes may generate new constraints to be included in subsequent runs of the model.

2. PROPOSED SCENARIOS FOR GMI MODELLING

The aim in defining Scenarios is to define consistent sets of assumptions regarding key factors likely to impact on the global meat market over the next ten years. The Scenarios outlined below are based the major demand and supply factors discussed in Sections 3 - 6 of this Report.

2.1 Scenarios Outlined

The TOR called for four Scenarios to be defined, Baseline (Most Likely), Optimistic, Pessimistic and "South American" (ie supplies of FMD free beef from South American countries). In addition to the demand side of the equation, it is felt important to consider the possible changes in supply response within Australian agriculture. In particular, the possibility (toward the end of this decade) of higher prices for competitive products, notable wool and wheat.

Scenarios to be defined are as follows:

- Baseline
- Optimistic Demand/Competing Supply
- Pessimistic Demand/Competing Supply
- Baseline + FMD free exports from South America
- Baseline + High wool and wheat prices in the late 1990s and early 2000s

2.1.1 Starting Values For 1994

The AMLC forecasts for key markets and production will be used for 1994.

2.2 Demand/Competing Supply

The suggested factors to be included in the demand side Scenarios are outlined below.

2.2.1 Baseline

- Base line growth in Real per capita incomes (Section 3.1)
- GATT Round: Beef trade commitments as in the final outcome (Section 3.3)

- Continuation of the Andriessen Assurance to exclude subsidised EU exports from Asian markets.
- United States Of America:
  - From January 1995, global import quota of 657,000 tonnes (Australia allocated 378,000 tonnes).
  - Over quota duty rate of 31 per cent reducing to 27 per cent by 2000.
  - New quota of 20,000 tonnes allocated to both Argentina and Uruguay (access conditional on achieving FMD free status).
- European Union. To cut subsidised exports by 21 per cent and the amount of subsidy paid by 36 per cent compared to the average for 1986 - 1990.
- South Korea. Import quotas to be progressively increased from 106,000 tonne in 1994 to 225,000 tonne in 2000. Full tariffication in 2001, (maximum rate of 41.6 per cent).
- Japan to reduce the current 50 per cent tariff to 38 per cent by 2000.
- Canada. The 20 per cent tariff replaced with a tariff quota; 72,000 duty free and an over quota tariff of 38 per cent.

- Competitiveness with USA (Section 4.2): a gain of 0.6 per cent per annum, based on:
- Real Value of A$ against US$: Maintains its long term average value
- Productivity: A gain of 0.6 per cent per annum in relative efficiency
- No change in marketing margins for beef in Japan. (Section 5.1)
- Population Change as used by the Centre for International Economics (CIE) in recent MRC modelling.
- South America remains affected by FMD and Pacific Rim markets continue to exclude imports from FMD affected regions.

2.2.2 Optimistic

Changes from Baseline Scenario are:

- Optimistic growth in Real per capita incomes (Section 3.1)
- Additional Trade Liberalisation: (Section 3.3)
  - Progressive "implicit tariffication" in South Korea from 1996. That is, quantities will be imported in addition to announced quotas, to ensure that the gap between import

and domestic prices moves toward "target" of the 41.6 per cent duty to be implemented in 2001.

- Tariffs into "Other Asia" cut by a third by 2005.

- Competitiveness with USA, a gain of two per cent per annum, based on

  - Real Value of A$ against US$: Continuation of trend depreciation of A$ (1.4% per annum)
  - Productivity: A gain of 0.6 per cent per annum in relative efficiency

- Marketing margins for beef in Japan reduce to those applying for pork and chicken. (Section 5.1)

2.2.3 Pessimistic

Changes from Baseline Scenario are:

- Pessimistic growth in Real per capita incomes (Section 3.1)

- GATT Round Outcome, but South Korea does not tariffy in 2001, quotas are expanded at rates similar to that to occur from 1994 to 2000.

- Competitiveness with USA, a loss of one per cent per annum base on:

  - Real Value of A$ against US$: Appreciation of A$ at one per cent per annum
  - Productivity: No gain or loss of relative efficiency

2.2.4 "South American"

Baseline Scenario, but South American countries progressively gain FMD free status. For the purposes of this study, the levels of exports estimated under the Early Entry, High Volume Scenario of the MRC Study, *Analysis for increased competition in world beef markets.*

2.3 Supply Competition Within Australia

A key factor for the lot feeding industry is the size of the beef cattle industry. While this will in part be determined by demand, it may also be significantly affected by competition for resources, principally from wool and wheat. For wool, in particular, there is a possibility that prices will surge near the end of the 1990s.

2.3.1 Baseline

The Baseline Scenario will be framed on the basis that:

- Wool prices gradually return to real trend levels by the end of the decade and then remain on trend.
- Wheat prices remain at real trend levels.

2.3.2 Baseline + High Wool & Wheat Prices

A version of the Baseline Scenario but with:

- Wool prices gradually move toward real trend levels and then experience a price surge at the end of the decade and until 2005.
- Wheat prices to be sustained 5 per cent above trend after 1997.

2.4 Model Changes/Adaptations

The following are areas in which adaptations to the current specification of the model would appear to be required.

2.4.1 Vertical Integration.

The high level of vertical integration of Japanese firms with Australian feed lotting has implications for trade flows. At present the model does not incorporate this factor. (Section 5.2)

2.4.2 Possible decline in per capita consumption in South America?

This is not an adaptation of the model and is probably more appropriately considered in the MRC study, *Analysis for increased competition in world beef markets*. However, it is noted that the current modelling of South America presumes high income elasticities of demand in this region. Coupled with high income growth, this implies strong demand increases in this region (and consequently higher prices required for beef diverted to the Pacific Rim).

Given the very high levels of per capita consumption in this region consideration should be given to possibility (and effect) of a negative relationship between income growth and consumption.

2.5 Country/Regional Definition

The following break up of countries and regions is proposed for the simulations for this Project.

Australia	New Zealand	United States Of America
Canada	Japan	South Korea
Taiwan	Other Asia	Ireland
Denmark	Other Europe	Argentina
Paraguay	Uruguay	Brazil
Mexico	Rest of World	

Consideration was given to the inclusion of China in its own right, given its large population, strong income growth and low current consumption rates (and status as a small net exporter). However, available information regarding this market is not considered sufficient to include it in its own right. Instead it is "averaged" into "Other Asia". The need to better understand the likely pattern of change within the Chinese beef market remains but is considered outside the scope of this study.

3. GLOBAL MEAT DEMAND

Income growth, trade liberalisation and population increase have been major shift factors working in the favour of increased export demand for Australian beef. In the main, this is expected to continue.

3.1 Economic Factors

3.1.1 Real Per Capita Incomes[1].

This is a key factor for future demand. Demand for meat is typically highly responsive to growth in per capita incomes, at least before incomes reach "high" levels. At higher levels of income, overall demand response may slow but real incomes will continue to drive preferences for high and reliable quality.

The GMI model captures this income effect via income elasticities and projected rates of growth in real personal expenditure. While both are key components of any simulation, income elasticities are based on best available estimates and generally treated as fixed components of the model (see discussion below regarding Japan and South American countries).

Determining a set of plausible growth rates for real incomes is not easy or straight forward. As instanced in the table below, even in the more developed/stable economies, actual performance is subject to considerable year to year fluctuation. The situation for developing countries is often volatile.

In simulations for the MRC Project, *Analysis for increased competition in world beef markets*, base-line projections for income growth (as listed in Table 1) were relatively optimistic. Compared to the last decade, these projections envisage:

- Stronger growth in real incomes in OECD countries, except Japan.
- Strong growth in real incomes in Korea, but at a slower rate than the previous decade.
- Continuing strong growth in "Other Asia" (dominated by China)
- Much stronger (and more consistent) growth in real incomes South America and Mexico

[1] In the GMI Model, real per capita expenditure is used as an alternative measure of "Incomes". The terms expenditure and income are used inter changeably in this document.

While the optimism for South American economies is shared by many forecasters, history would caution against assuming sound and consistent economic performance in that region. The reverse has been the case for most of the post war period, with some economies (eg Argentina) having negative growth for sustained periods. Depending on the income elasticities used (see below) this is a key assumption, as beef consumption in this region is very large and hence projected changes in this region will significantly effect global demand.

For the Baseline Scenario for this Project it is suggested that, after a period of recovery from recession (eg to 1996) real per capita incomes be projected forward as follows (see Table 1):

- OECD Countries, similar but more conservative levels to the South American Study.
- South Korea and "Other Asia", as for the South American Study.
- Mexico and South America, more conservative projections more in keeping with the experience of the 1980s (particularly for Argentina and Mexico).

Optimistic Demand Scenario: Use the South American Study projections, but with higher rates of growth in South Korea and "Other Asia".

Pessimistic Demand Scenario: Use Baseline rates but with lower long term growth in OECD countries.

3.1.2 Changes In Demand Elasticities: Japan

Demand elasticities (price and income) included in the model are generally treated as fixed components of the model. However, these elasticities have been estimated from historical data and are most relevant in terms of small changes from these levels. For Japan in particular, the extent of change experienced in recent years and that likely to occur in coming years is fundamentally altering the structure of meat consumption.

Such large scale changes are themselves likely to generate changes in demand response. In simple terms, as beef increases as a proportion of total meat consumption, demand is likely to become less responsive to changes in incomes and possibly prices. Consumption will tend to plateau, not in an absolute sense, but relative to the demand response experienced to date.

Table 1.1: REAL PER CAPITA EXPENDITURE (ANNUAL % CHANGE)*

	1984	1985	1986	1987	1988	1989	1990	1991	1992	Average	South	Proposed
USA	3.6	3.8	3.9	2.3	3.3	2.4	-0.9	-1.0	1.7	2.1	2.9	2.5
Japan	2.3	2.9	2.6	3.8	4.0	3.4	3.1	1.2	1.7	2.8	2.6	2.0
Australia	4.0	4.1	-0.5	-0.1	1.9	2.5	-0.5	-0.5	2.6	1.5	2.4	2.5
NZ	-1.5	9.2	3.8	-2.9	2.4	1.2	-2.5	-2.4	1.1	0.9	2.5	2.5
EU	0.6	0.8	1.8	2.2	4.1	3.1	0.7	1.2	0.5	1.7	3.0	2.0
Canada	3.8	4.2	3.2	2.9	2.5	2.4	-0.6	-4.4	-0.8	1.5	3.0	2.0
Korea	7.7	7.1	5.3	6.7	5.9	8.6	8.6	7.8	5.3	7.0	4.2	4.2
Taiwan	8.1	4.8	6.2	10.9	12.2	10.9	5.5	5.9	8.2	8.1	4.6	4.6
Other Asia	10.1	4.9	1.8	4.8	3.4	-1.0	5.7	2.9	na	4.1	4.6	4.6
Mexico	1.0	2.1	-6.7	-0.8	-2.5	7.6	5.5	2.0	na	1.0	3.1	1.5
Argentina	na	-5.7	3.9	-0.5	-7.6	-5.8	-10.5	-0.4	0.4	-2.2	2.9	0.0
Uruguay	-1.2	1.0	4.8	16.2	-1.0	-2.1	-5.5	1.8	7.1	2.3	3.1	2.5
Paraguay	3.1	0.6	-1.1	4.7	8.6	1.0	-2.6	-2.4	na	1.5	1.9	2.0
Brazil	6.7	0.0	9.1	-14.1	-10.9	1.5	-12.1	-3.8	-4.0	-3.1	2.2	0.0

* Source: GMI Database

** Long run rates (after 1996)

While such an outcome is predictable from common sense and economic observation, it is difficult to predict the timing and course of such "taste" changes. In the case of Japan, account must also be taken of:

- The substantial regional variation in per capita consumption.
- The fact that until recently consumption levels and choices (eg of type of beef) were constrained by import quotas and regulation. Consumption patterns post liberalisation may vary in ways not evident from analysis of pre-liberalisation consumption.

For the purposes of this study, no constraints will be imposed on per capita beef consumption unless it rises above 14 kilogram (retail weight). This is approximately the upper rates of consumption for pork and chicken.

3.1.3 Income (Expenditure) Elasticities South America

Modelling of South American demand for the MRC Project, *Analysis for increased competition in world beef markets*, utilises income elasticities for these countries of over one, ie a one per cent increase in income results in demand increasing by more than one per cent.

Given that these countries have unusually large per capita consumption of beef already, it is difficult to accept such elasticities. Higher incomes would suggest more diversity of diet and the potential of lower consumption (eg as suggested for Australia by cross sectional studies).

On the basis that more conservative estimates of income growth are used in this study, this factor may not be of particular importance but consideration might be given to a Scenario of falling demand in South America. However, this would be more appropriately considered in the Corporation's South American study, *Analysis for increased competition in world beef markets*.

3.1.4 Real Exchange Rates

Formation of real exchange rates is not well understood and is influenced by a variety of factors themselves difficult to predict (eg international capital/investment flows and relative inflation rates). Hence it is difficult to project real exchange rates in a meaningful sense, particularly in terms of a consistent set of changes across countries over time.

With the exception of the USA : A$ rate (discussed below) it is not proposed to project changes to real exchange rates in the Scenarios, ie current real rates will be presumed to apply. One currency for which this assumption is notably sensitive is the Yen to US$.

Over the last two decades the real value of the Yen against the US$ has trended strongly upwards. For most of this period quota restrictions operated for imports and hence the appreciation in the Yen did not favour beef consumption. However, since liberalisation in 1992, the rising value of the Yen has resulted in lower prices for imported beef in Japan.

Despite the long run trend, there is reason to believe that the real value of the Yen will not continue to appreciate against the US$. For domestic and international reasons Japan is under pressure to reform its trade policy and liberalise access for goods and services. Failure to do so is likely to result in lower real income growth and higher unemployment (or under-employment). Removal of trade barriers will put downward pressure on the exchange rate, as may the more sluggish economic performance anticipated for Japan over the next few years.

3.2 Population Changes

While important, this is not subject to fluctuation. The projections used by CIE in their recent analyses would be used in all Scenarios modelled in this Project.

3.3 Trade Access

3.3.1 GATT Round Outcome

The beef industry fared relatively well within the GATT Round. Outcomes of relevance to this study include:

- As a "side deal" to the Agreement, continuation of the Andriessen assurances to exclude subsidised EU exports from Asian markets.
- United States Of America:
  - From January 1995, global import quota of 657,000 tonnes, Australia allocated (378,000 tonnes).
  - Over quota duty rate of 31 per cent reducing to 27 per cent by 2000.
  - New quota of 20,000 tonnes allocated to both Argentina and Uruguay (access conditional on achieving FMD free status).
- European Union. To cut subsidised exports by 21 per cent and the amount of subsidy paid by 36 per cent compared to the average for 1986 - 1990.
- South Korea, full tariffication in 2001, with a maximum tariff rate of 41.6 per cent. In the mean time, import quotas to be progressively increased from 106,000 tonne in 1994 to 225,000 tonne in 2000.

- Japan to progressively reduce the current 50 per cent tariff to 38 per cent by 2000.

- Canada. The 20 per cent tariff replaced with a tariff quota; 72,000 duty free and an over quota tariff of 38 per cent.

While US ratification of its Uruguay Round commitments has yet to pass Congress and the Senate, it is assumed that this will happen on time and without side deals deleterious to beef. Likewise it is assumed that the EU will not seek to circumvent the constraint on subsidised exports (eg by decreasing internal price support and increasing use of GATT permitted compensation payments).

The situation for Korea is more problematic. Other GMI simulations have shown that meat demand in South Korea is likely to grow strongly. If announced quota levels are rigidly adhered to, internal beef prices will be greatly increased; for Korea, a negative outcome in its own right and a change in direct contradiction of a smooth transition to tariffication in 2001.

The optimistic view is that imports will exceed announced quotas in the years leading up to tariffication (so that by 2001, internal prices are more in line with the 46.8 per cent tariff to apply). The pessimistic view is that Korea will adhere to its quota levels but fail to "tariffy" (or genuinely "tariffy") in 2001.

Industry and other opinion varies on this issue. It is suggested that the demand Scenarios include Korea as follows:

- Optimistic. Progressive implicit tariffication from 1996. Allow quota volumes to increase to the degree needed to maintain domestic beef prices on a trajectory toward equalling import price plus 46.8 per cent in 2001.

- Baseline. Quota and tariffication as agreed.

- Pessimistic. Quota as agreed but no tariffication in 2001 (continued growth of quota providing in line with earlier years)

In the longer term, the permanency of the Andriessen Assurance should also be questioned. If, in 2001:

- the EU has implemented its GATT Round obligations to reduce the annual volume of subsidised exports to 817,000 tonnes (from approximately 1,300,000 tonnes from 1992 - 1994); and

- the international market is expanded by a larger Japan market and the tariffication in south Korea,

it is likely to argue that circumstances have changed and that it should be free to market its exports to best advantage. Consideration will be given to including the loss of the Andriessen Assurance after 2001. This factor will be evaluated in conjunction with the AMLC.

3.3.2 Regional Bilateral Developments

For all Scenarios, it is assumed that FMD based bans by Pacific Rim countries on imports from South America will remain. The FMD issue will be directly modelled as discussed below.

A number of factors suggest further trade access gains in South East and North Asia. These include:

- The GATT Accession process for China (and subsequently Taiwan). China currently has an import duty of 70 per cent for beef and 30 per cent for cattle for feeding.
- Development and initiatives within the APEC forum.
- A continuation in trade liberalisation trends evident within the region over the last decade or more.

It is proposed that the Optimistic Scenario include an assumption that import duties in "Other Asia" be cut by a third by the year 2005.

4. COMPETITIVE SUPPLY

Within the GMI model, this is captured by way of a Relative Cost of Production Index. Implicitly, this is driven by changes in real exchange rates and by different rates of change in productivity growth and the price of non-traded inputs. For the purposes of this study the key country (with respect to both exchange rate and production competition) is the USA.

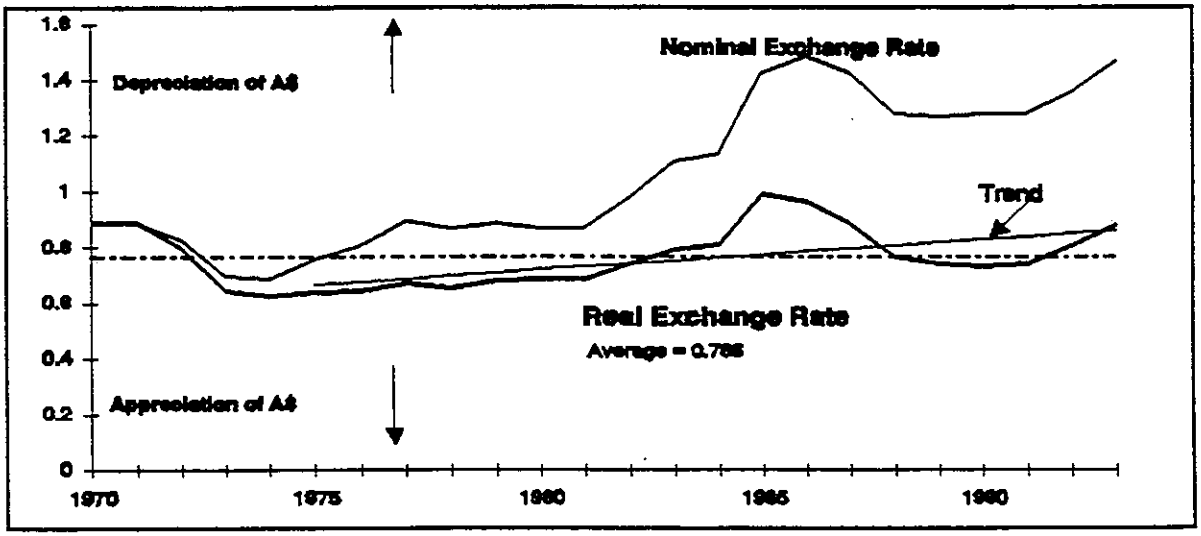
4.1 Real Exchange Rate: USA

The future pattern of real exchange rate between the A$ and the US$ is of vital importance to the Australian industry (ie nominal exchange rates adjusted for differences in rates of inflation). Changes in this rate directly affect returns from our largest market, the USA (378,000 tonnes from 1995) and competition from our major competitor in our other principal export markets. Relative competitiveness is particularly important for the fed beef sector.

While the A$ is a US$ group currency (ie it is more stable against the US$ than other currencies) long term fluctuations in value are significant.

It is important to focus on real exchange rates. Increases in the value of the A$ as a consequence of lower inflation here than the US does not put the industry at a disadvantage (ie the exchange rate gain for the US industry is offset by the greater increase in costs).

Chart 1: REAL AND NOMINAL VALUES OF THE A$ AGAINST THE US$



While there are many forecasts for a higher nominal A$ over the next one to two years, it is not always clear if this is expected on the basis of a stable real dollar (and differential inflation rates) or in consequence of a higher real rate. Overall, it would appear that a plausible case can be made for a higher than average real A$ over the remainder of the decade. Recent history (Chart 1) provides:

- Some comfort, the downward trend in the real value of the A$ since 1975. The real value of the A$ has fallen by around a cent per year, ie an average decline of 1.4 per cent per year.

- Some discomfort, the real rate in 1993 was nearly 15 per cent below its average value since 1970. It appears likely that the real A$ will increase in 1994 but still be below the average since 1970.

It is proposed that the Baseline Scenario have the real value of the $A holding steady at its long run average value and that:

- the Optimistic Scenario include a continuation of the trend rate of depreciation (ie 1.4% per annum)

- the Pessimistic Scenarios include a reversal of the trend rate of depreciation (ie a 1.4% per annum appreciation).

4.2 Sector Productivity and Costs: USA

The Steering Committee believed that this was a potentially important factor which was expected to trend in favour of the Australian industry over the projection period. Factors which were thought likely to result in a higher rate of productivity improvement in Australia included:

- The lot feeding industry in Australia was less mature than in the USA, in terms of technology, skills, economies of scale etc. it was now in a position to "catch up" with USA efficiencies.

- Large new feedlots were state of the art facilities.

- The Australian abattoir sector had room for improvement and would achieve this under competition, whereas the USA plants were already at a high level of efficiency.

There was also the potential in Australia for greater efficiency of services from other key sectors of the economy (eg transport).

Against these factors it must be acknowledged that the USA has a strong ethos and track record in achieving efficiency gains. In addition, the lot feeding and abattoir sectors account for a little over

a half of the value of export fed beef, with the value of feeder cattle accounting for the remainder. It is not clear that the rate of efficiency gain in the farm sector will be any greater than "normal" over the projection period. For the industry as a whole, the rate of productivity gain vis a vis the USA is likely to be less than that for the lot feeding sector itself.

Determining relative rates of productivity improvement is of necessity arbitrary. However, it is felt that the following are reasonable quantifications of the Steering Committee's view on this matter:

- Baseline and Optimistic Scenarios: A relative rate of productivity improvement against the USA of one per cent per annum in the feedlot and processing sector, amounting to around 0.6 per cent per annum for the total production chain.

- Pessimistic Scenario: No relative gain (or loss) in productivity.

4.3 FMD

Scenarios to capture the impact of future FMD free status of South American countries will be based on output from the MRC's study into this matter. It is intended to include a set of Scenarios using the trade flows into the Pacific Rim markets estimated under the Early Entry, High Volume Scenario of that study.

4.4 Feed Grains

The GMI model does not specifically incorporate the grain sector. At this stage it would appear that the linkages of particular interest are at the regional level within Australia and hence outside the scope of the global modelling module.

5. COMMERCIAL FACTORS

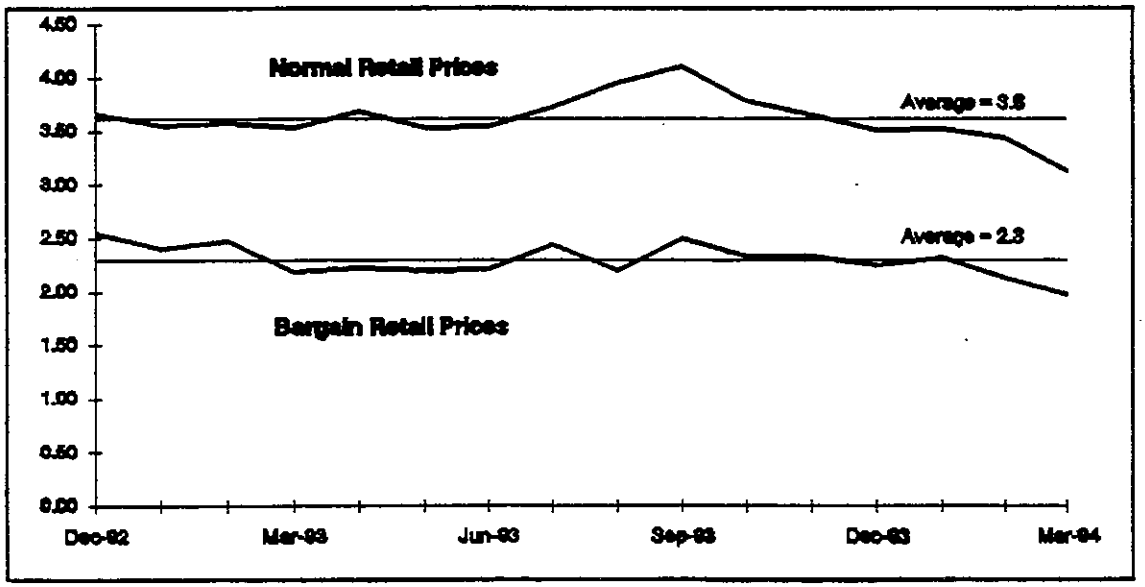
In addition to general economic and competitive issues, there are some "localised" commercial or related issues which would appear important to address in the modelling exercise.

5.1 Japanese Market Channel Reform

The distribution and retailing industries in Japan can be characterised as non-transparent, strongly regulated/administered and high cost. This results in higher prices to consumers and restricts consumption. The "marketing margin" between dock and consumer is illustrated in the chart below.

Chart 2: JAPAN:- RATIO OF RETAIL TO DUTY PAID C&F PRICE

(Fullset, Shortfed)



The ratio of landed duty paid import prices to final retail price provides a broad measure of the impact of the market channel impediments. As illustrated the "normal" retail price is around 3.6 times the importation price. In comparison, using the chilled grassfed fullset price as a base:

- Average retail prices for Sydney are around twice the FAS value of this product.
- Reported retail price in Singapore (1991 and 1992) was approximately twice the C&F value of this product.

It is not suggested that this is a precise comparison but it does give an order of magnitude relativity. The potential for significant reduction in this margin is instanced by the existing differential with "bargain" retail prices and the reported growth in discount meat shops.

Many factors are creating pressure for change in the distribution and retailing system within Japan (eg the recession, strong trade pressure from the USA) and there are indications of change in many areas. The key question for the beef market is whether reform in this sector will lead or lag the general rate of reform and whether the total margin reductions will be smaller or larger than the average for food products.

Following discussion with the AMLC on this issue, it would appear that the proportion of beef being sold at the "bargain" price is already higher than that being sold at the "normal" price. Hence the degree of price reduction possible in this area may be more modest than it would first appear. More analysis of this subject is being conducted/proposed by the MRC and the AMLC.

In the life of this Project, understanding of the potential gains from market channel reform will remain less than ideal. For the purposes of the modelling exercise it is considered that the Scenarios be as follows:

- Pessimistic and Baseline Scenarios: No reduction in the marketing margin relative to that applying in 1994.

- Optimistic Scenario: Over the next five years, the mark up for beef reduces to that applying for chicken and pork.

5.2 Vertical Integration

A feature of the feed lot sector in Australia is its dependence on the Japan market and the degree of vertical integration with that market. Direct investment by Japanese firms in Australian lot feeding is considerable (in terms of the proportion of turnoff).

High levels of vertical integration can be expected to impact on trade flows, as:

- Sourcing into Japan can be expected to be increased and buffered by such the investment, as:

- Total company profit is maximised by directing its fed beef turnoff through the market chain it controls.

    - In the short run production investments are a "sunk cost". Hence, in periods when sourcing from Australia may appear less favourable on the basis of market prices, for the vertically integrated firm, the short run (marginal) cost of supply from tied (Australian) facilities will typically be lower than switching to alternate sources.

- Supply to emerging alternate markets may be constrained. Unless the vertically integrated firm has a strong presence in the alternate market:

- It will not be able to capture profits along the market chain.
- It will not have the same degree of marketing advantage (eg market knowledge and strength).

At present the model does not incorporate this factor (implicitly it assumes the economist's "perfect market"). For this Project it is proposed that "tariff differential" be introduced vis a vis USA supplies into Japan. This "tariff" would be introduced at a sufficient level to ensure that the Australia's market share of fed beef in Japan at the start of the projection period is as currently observed. Market share would not be constrained but would vary from this base.

The above discussion highlights the potential importance of vertically integrated investment by firms with strength in other emerging markets, particularly South Korea. These may modify outcomes from that predicted using a "perfect market" assumption. However, this is considered outside the scope of this study (unless industry has a particular viewpoint it wishes to include in the analysis).

6. AGRICULTURAL COMPETITION IN AUSTRALIA

This is an issue of particular relevance to this Project. More than 40 per cent of the total cattle turn off come from the "Wheat - Sheep" zone and the proportion of the actual/potential feeder cattle turn off would be even higher. Output of cattle from this region will be influenced by the returns from alternate enterprises, as well as those from beef.

The price of competing commodities and their effect on beef supply are external to the GMI Model and in most simulations run to date have been presumed constant. For reasons outlined below, it is considered important to include these supply shift factors in the simulations run for this Project. Beef prices have been relatively favourable (compared to wool and wheat) in recent years. However, this is more related to below trend prices for the alternate products (particularly wool) than it is to above trend prices for beef. The relative prices of alternate products may well change toward the end of the decade, at a time when demand could be expanded by increased access to South Korea.

6.1 Wool

This is the key competing commodity for beef cattle. History has shown its importance, for example, the surge in beef cattle numbers in the late 1960s and early 1970s being in part attributable to falling wool prices over that period. Charts 4 and 5 illustrate the changes in real prices for beef cattle and wool since 1953.

Chart 5 illustrates the depth of the current slump in wool prices. In 1993, real prices were around 30 percent below their (post 1975) trend level. Even allowing for the recent firming in prices, wool prices remain well below trend levels and profitability and farm incomes are poor.

6.1.1 Trade Access Developments

Unlike, other agricultural products, wool has little direct benefit from the Uruguay Round Outcome. International trade in greasy wool is relatively free of trade barriers. International trade in processed wool and textiles is subject to constraints by way or the Multi Fibre Agreement. However, this was excluded from the Round and is being debated separately.

In fact recent trade access developments have probably been to the detriment of wool:

- The USA has imposed a "voluntary" quota on imports of non-silk textile products from China.

- China is reforming its tariff structure and imposing a higher tariff on wool (with a remittance for subsequent exporting. China is now the largest single market for Australian raw wool.

- Russia has imposed a 25 per cent tariff. Although this is relatively less important given the collapse in import demand following the breakdown of the former Soviet Union.

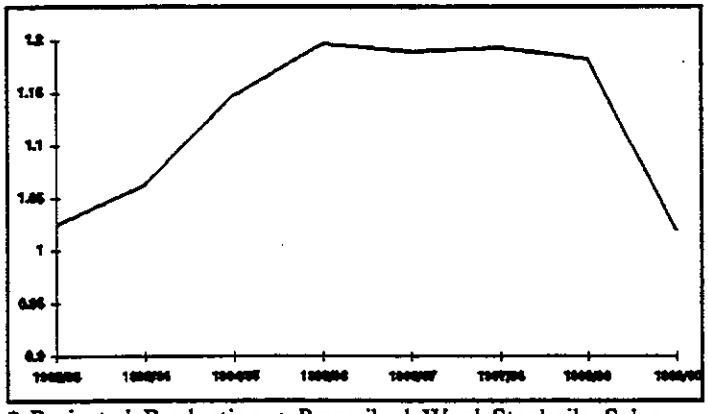
6.1.2 Future Scenario

As is well understood, the key shift factors for wool prices are the strength of economic activity in key consuming countries (about two thirds of final consumption is attributable to the USA, Japan, Germany, UK, Italy and France) and the stock-pile over hang.

It is anticipated that by 1996 all these major economies should have emerged from recession and be operating at higher levels of growth. This can be expected to feed through to higher wool demand later in the decade.

Following the "Garnaut Report" the stockpile is to be reduced by given annual amounts. If the policy is adhered to, the stockpile will have been virtually eliminated by the end of 1998/99. This corresponds with the time that international demand should be benefiting from buoyant economic conditions in the key consuming countries.

Chart 3: RATIO OF AUSTRALIAN WOOL SALES* TO PRODUCTION



* Projected Production + Prescribed Wool Stockpile Sales

Under the fixed sell off plan, Australia's exports in 1998/99 would be nearly 20 per cent above production and stocks would be all but exhausted by the end of that year. The potential for a coincidence of a fall in availability from Australia and high international demand is real. While the trade will be aware of the movement in stocks, the potential for a price surge is clear (Chart 3).

While not drawing parallels, it is worth noting that the so called "Korean War Boom" in wool prices at the start of the 1950s was probably as much related to the end of the World War II wool stockpile (held jointly by Australia and Great Britain) as it was to demand from the Korean War.

It is proposed that one set of Scenarios should include a surge in wool prices (eg 25 per cent above trend) at the end of this decade.

Chart 4: REAL FARM GATE PRICE BEEF CATTLE (1988 $s,C/kg est Dressed Weight)

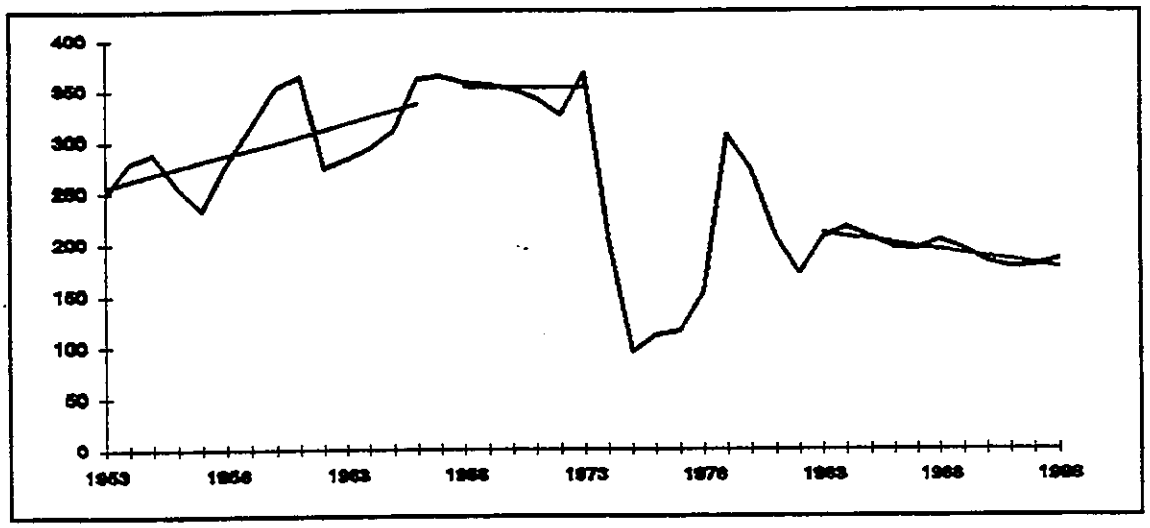


Chart 5: REAL FARM GATE PRICE WOOL (1988 $s, C/Kg Greasy)

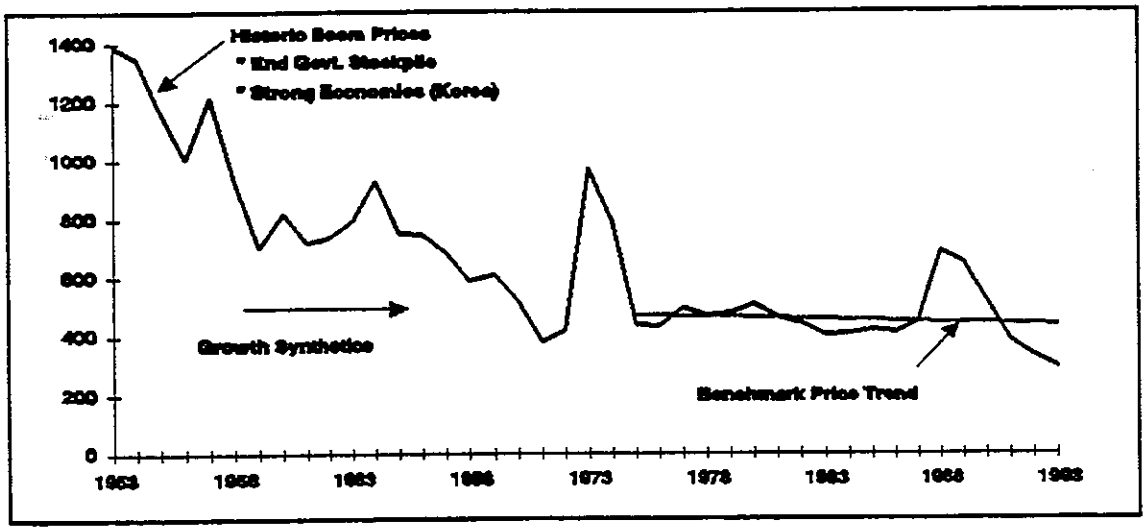
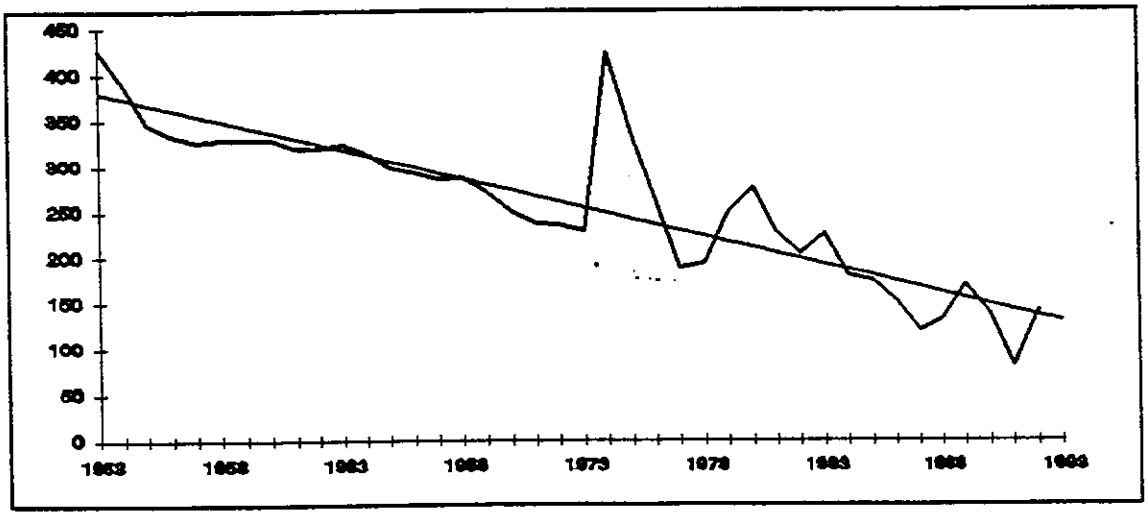


Chart 6: REAL FARM GATE PRICE WHEAT 1988 $s, AWB Net Pool Return $/t)



6.2 Wheat/Cropping

Wheat and grain prices are subject to more short run (weather related) supply factors and prices are more volatile around their long run trends. Not withstanding this, it would appear that since 1984, prices have averaged significantly below trend levels and a significant factor in this has been the level of export subsidies imposed by the USA and to a lesser extent the EU.

It is for this reason that the wheat industry is generally seen as a significant winner from the Uruguay Round. ABARE has estimated that international wheat prices would be increased by approximately eight per cent by the year 2000, other things being equal.

Of course, other things will not be equal. Leaving aside the potential for the EU to circumvent its obligations to cut export subsidies (by cutting internal prices and providing more "compensation" to farmers) the international market must digest developments in the CIS and in China.

As distinct to the CIS, there is considerable optimism regarding increased demand for feed grains (including feed wheat) in much of South East and North Asia. The potential in China is seen to be considerable, given rising incomes and a preference for chicken and pork, both potentially large users of imported feed grains.

However, the outcome for China remains shrouded in uncertainty regarding its current production/land availability. For example, a 1993 report by the United States Department Of Agriculture estimated that China's corn output in 1985 may have been 30 million tonnes (50 per cent) higher than reported. Depending on the nature and degree of under reporting of cropping land and/or crop output, it was seen as quite possible that China could sustain rapid growth in its fed livestock sector to the year 2000 and remain in surplus for feed grains.

For the purposes of this Project, it is considered that farm gate prices for wheat should be assumed at their long run trend levels for the Baseline Supply Scenario and 5 per cent above trend for the High Wool/Wheat Price Scenario.

MODULE 2

RESULTS OF GLOBAL MEAT INDUSTRY MODEL SIMULATIONS

1. INTRODUCTION

In this module we present the results of the Global Meat Industry (GMI) model simulations and sensitivity tests.

The GMI model distinguishes a range of meat types, including grassfed beef, grainfed beef, pig meat, poultry, lamb, mutton and goat meat. It also identifies seafoods. For each of the seventeen regions used in this version of the model, it provides projections of:

- domestic production of each type of meat;
- consumption of each type of meat;
- price outcomes for each type of meat; and
- trade flows (exports and imports) by each region for each type of meat.

Outcomes for these variables depend on developments throughout the global economy such as income and population growth rates in each region, changes in the relative costs of producing meats between countries and changes in trade barriers for each type of meat.

Five key Scenarios and four other simulations using the GMI model were completed. These were:

- baseline (considered most likely);
- optimistic demand/competing supply;
- pessimistic demand/competing supply;
- baseline plus FMD free exports from South America; and
- baseline plus high wool prices in the late 1990s.
- baseline plus improvement in Australia's grainfed productivity;
- 25% decline in Japan's dairy beef productivity by 2005;
- 10% increase in US grainfed production; and
- 10% decline in US grainfed production.

2. SCENARIOS

The projections are undertaken with a version of the GMI model which divides global meat activity into the regions shown in Table 1. For each region a Scenario is needed on demand conditions, (income and population growth) supply conditions and trade access. The Scenario and the projections cover the period 1994–2005.

Table 2.1: REGIONS DISTINGUISHED IN MODEL PROJECTIONS

Australia	Japan	Ireland & Denmark	Argentina
New Zealand	South Korea	Other Europe	Uruguay
United States	Taiwan	Saudi Arabia	Paraguay
Canada	Other Asia	Mexico	Brazil
			Rest of World

The scenarios involve different assumptions:

- growth in per capita incomes;
- the competitiveness of the Australian beef industry relative to the US industry;
- trade access;
- supply conditions in Australia; and
- the likelihood of South American beef producing countries gaining access to the Pacific Rim markets through their achievement of FMD free status.

Model starting point

The database of the GMI model is being updated on a continuing basis. The projections in this study incorporate, as their starting point, the latest available data on meat production, consumption, prices and trade for each region (data available to June 1994). The projections have been forced to line up with the AMLC's forecasts for the 1994 calendar year for:

- total Australian beef and sheep meat production and exports; and
- Australia's beef and sheep meat exports to major markets — US, Japan, South Korea, Taiwan, Canada, Other Asia, European Community, other.

2.1 The baseline Scenario

2.1.1 Growth in per capita income

Assumed annual growth rates are shown in column 1 of Table 2.2.

Table 2.2: ASSUMED GROWTH IN PER CAPITA INCOMES

Country	*Baseline*	*Optimistic demand/ competing supply*	*Pessimistic demand/ competing supply*
	%	%	%
Australia	2.5	3.0	2.0
New Zealand	2.5	3.0	2.0
Ireland & Denmark	2.0	2.3	1.5
Other Europe	2.0	2.6	1.5
United States	2.5	3.1	2.0
Canada	2.0	3.0	1.5
Japan	2.3	3.5	1.5
South Korea	4.2	4.7	4.2
Taiwan	4.6	5.0	4.6
Other Asia	4.6	5.3	4.6
Saudi Arabia	1.8	2.0	1.8
Mexico	1.5	2.5	1.5
Argentina	0.0	3.1	0.0
Uruguay	2.5	3.6	2.5
Paraguay	2.0	2.3	2.0
Brazil	0.0	2.6	0.0
Rest of World	2.0	3.0	2.0

2.1.2 Growth in Population

Population projections for each region distinguished in the model are shown in Table 3.3. These projections remain unchanged between Scenarios.

Saudi Arabia, Mexico and Brazil are projected to have the highest rates of population growth - exceeding 1.5 per cent per year.

Table 2.3: POPULATION PROJECTIONS

Population	*million*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*	*2010*	*2015*
Australia		17.7	17.9	18.1	18.3	18.5	18.7	18.9	19.8	20.6	21.5
New Zealand		3.5	3.5	3.6	3.6	3.6	3.6	3.7	3.8	3.9	4.0
United States		256.3	258.2	259.7	261.3	262.9	264.5	266.1	273.5	280.9	288.2
Canada		27.3	27.6	27.7	27.9	28.1	28.3	28.5	29.3	30.2	30.9
Japan		125.4	125.9	126.3	126.7	127.2	127.6	128.1	129.8	130.6	130.0
South Korea		44.8	45.2	45.5	45.9	46.2	46.5	46.9	48.3	49.3	49.9
Taiwan		20.5	20.6	20.7	20.8	20.8	20.9	21.0	21.3	21.4	21.3
Other Asia		1552.0	1575.6	1595.1	1614.8	1634.7	1654.9	1675.4	1701.4	1825.6	1897.2
Ireland and Denmark		9.0	9.1	9.1	9.1	9.2	9.2	9.2	9.4	9.6	9.7
Other Europe		318.7	319.3	319.9	320.4	320.9	321.4	322.0	322.9	322.7	321.7
Saudi Arabia		17.0	17.6	18.2	18.8	19.4	20.0	20.7	24.1	27.8	31.8
Mexico		96.0	98.0	99.8	101.6	103.4	105.3	107.2	116.3	125.2	133.8
Argentina		33.9	34.3	34.7	35.0	35.4	35.8	36.2	38.2	40.2	42.1
Uruguay		3.2	3.2	3.2	3.2	3.2	3.3	3.3	3.4	3.5	3.5
Paraguay		4.8	4.9	5.0	5.1	5.3	5.4	5.5	6.2	6.9	7.7
Brazil		162.0	165.1	167.9	170.7	173.6	176.5	179.5	193.6	207.5	221.0

Source: Based on United National Population Division projections.

2.1.3 Trade Access

Key features are as follows:

- FMD based bans on exports from South American countries to Pacific Rim countries are maintained. (This assumption is relaxed in Scenario 4.)
- Andrissen assurances remain.
- The trade reforms announced in the recently concluded GATT Uruguay Round are implemented according to the schedule agreed to in the Round. These reforms are as follows.
  - For the United States, from January 1995, a global import quota of 657 000 tonnes will apply. Australia has been allocated 57.8 per cent of this quota (380 000 tonnes). An above quota tariff o f 31.4 per cent will apply reducing to 27 per cent over six years in equal percentage points until the year 2000.
  - For beef imports to Japan the current tariff of 50 per cent will be reduced at approximately two percentage points per year over six years from 1995 to about 38 per cent by the year 2000.
  - For South Korea the global import quota for boneless beef is increased between 1994 and 2000 as follows: 1994 (106 kt), 1995 (123 kt), 1996 (147 kt), 1997 (167 kt), 1998 (187 kt), 1999 (206 kt), 2000 (225 kt). In 2001 the import quota is removed and a tariff of 41.6 per cent applies. The grain feed share of the quota is assumed to increase by 0.5 per cent annually.
  - European Union (EU) subsided beef exports (which we assume to be all EU exports outside member countries) are assumed to contract over the period 1995 to 2000 such that by the year 2000 they are 21 per cent below their average annual level over the period 1986 to 1990. In the model these exports all go to the Rest of the World region.
- For Canada a quota of 85 000 tonnes (shipped weight) which corresponds to 127 500 tonnes carcass weight equivalent is assumed with a 25 per cent surtax on the above quota imports from Australia.
- Trade barriers elsewhere remain unchanged.

2.1.4 Relative Production Costs

- Relative production costs are unchanged.

2.1.5 Vertical Integration of Australian Feedlots

There is a good deal of vertical integration in the grainfed export trade to Japan - through investment by the Japanese in feedlots located in Australia. There are associated financial incentives for Japanese owned Australia feedlots to direct their product to Japan. (See paper on Module 1 report of 1 July 1994 for details). This is reflected in the model by introducing an import price differential (via a lower effective tariff on the Australian product) between Australian and US grainfed beef exports to Japan. The tariff differential is set at a rate sufficient to ensure that Australia's exports of grainfed beef to Japan through to the mid 1990s increase according to the product volume being targeted for the Japanese market by Japanese owned feedlots in Australia. A tariff preference in the

Australian product relative to the US product of 10 per cent is needed to achieve this. The tariff preference is assumed to remain at this level until the year 2000 before declining gradually to reach zero by 2005.

2.1.6 Domestic cross-supply effects

- In southern Australia beef is often produced on multiproduct farms in competition with wool and crops, especially wheat. An increase in the price of competing products relative to beef can lead to a charge in the farm output mix away from beef (and vice-versa). NO cross-supply effects are assumed to operate in the baseline.

2.2 The optimistic demand/competing supply Scenario

2.2.1 Growth in per capital income

Per capital income growth rates are shown in column 2 of Table 2. These are generally higher than in the baseline especially for the South American countries, South Korea and Other Asia.

2.2.2 Trade access

This differs from the baseline Scenario in the following respects.

- Progressive implicit tariffication is assumed to occur in South Korea from 1996. That is, South Korea's over quota imports are assumed to grow at a rate such that the gap between import and domestic prices for beef in South Korea moves toward the gap determined by the 41.6 per cent import duty which is to be implemented in 2001.

- Tariffs on beef imports by the Other Asia region are cut by one-third between 1995 and 2005.

2.2.3 Relative production costs

- Australia's grainfed beef industry is assumed to become more productive relative to the US grainfed beef industry by 1.4 per cent per year. Otherwise, relative production costs are unchanged.

2.2.4 Other

- All other components remain as for the baseline Scenario.

2.3 Pessimistic demand/competing supply Scenario

2.3.1 Growth in per capita income

Assumed annual growth rates are shown in column 3 of Table 2.2. They differ from the baseline in that annual per capital income growth in OECD countries is reduced by 0.5 per cent (US, Australia, New Zealand, European Union, Canada) and 0.8 per cent (Japan).

2.3.1 Trade access

This differs from the baseline Scenario as follows.

- South Korea does not convert its beef import quota to a tariff in 2001. the import quota is expanded beyond 2000 at an annual rate similar to that in the years 1994 to 2000.

2.3.2 Relative production costs

The costs of producing beef in Australia are assumed to deteriorate by 1 per cent per year relative to US beef production costs.

2.3.3 Other

- All other components remain as for the baseline Scenario.

2.4 Baseline plus FMD free exports from South America Scenario

This Scenario deviates form the baseline Scenario only with respect to FMD bans. In the baseline FMD based bans on exports from South American countries to Pacific Rim markets are assumed to be maintained for the projection period. Here this assumption is abandoned.

In a recent study which it conducted for the MRC the consulting firm AACM made a detailed assessment of potential FMD free exports of beef from South American countries into Pacific Rim markets by the year 2015. Their assessment is based on geographic regions likely to be recognised as FMD free over the next fifteen years. These regions are:

- Uruguay (part of the Rio Plata region);
- Paraguay (part of the Rio Plata region); and
- Brazil (the Rio Grande Du Sol region).

AACM devised seven Scenarios on the volume and time profile of exports from these regions to Pacific Rim markets. The Scenarios differ according to whether entry into Pacific Rim markets is early or late and whether the volume of exports for each of early or late is low, medium or high.

The export volumes in each Scenario were arrived at by assessing:

- the effectiveness of veterinary controls in regions striving for FMD free status;
- the perception of the effectiveness of those programs by importing agencies in Pacific Rim countries; and
- likely acceptance by consumers of the new entrant's product.

Here we simulate the effects of AACM's Scenario 3 (early entry, high volume). This Scenario assumes effective application of controls and a high level of acceptance in Pacific Rim countries. Export volumes to Pacific Rim import countries under this Scenario are shown in Table 2.4.

These exports are assumed to be distributed among Pacific Rim importing countries according to each country's current share of total Pacific Rim beef imports. They are assumed to receive a price discount of 20 per cent relative to the price received by Australian beef in these markets to the year 2000. Thereafter the discount falls to 5 per cent as FMD free product from these countries becomes more acceptable to importers.

Table 2.4: POTENTIAL FMD FREE EXPORT VOLUMES TO PACIFIC RIM MARKETS FROM SOUTH AMERICAN COUNTRIES (kt cwe)

Scenario 3 Early entry, high volume	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Grass fed Argentina	0	20	30	35	50	85
Uruguay	30	55	70	80	90	110
Paraguay	0	0	0	0	0	25
Brazil	0	25	40	50	60	90
Total	30	100	140	165	200	310
Grain fed Argentina	0	0	0	20	30	80
Uruguay	0	0	25	30	40	80
Paraguay	0	0	0	0	0	20
Brazil	0	0	20	30	40	70
Total	0	0	45	80	110	250

2.5 Baseline plus high wool prices in the late 1990s Scenario

In some areas of southern Australia cattle are produced on multienterprise farms - in conjunction with wool/sheep and crops. The size of the cattle enterprise depends in part on the relative prices farmers receive for cattle, wool and crops. For example, an increase in the price of wool relative to cattle will result in farmers increasing their level of wool production relative to cattle. It may also lead to an absolute decline in cattle production.

In all previous Scenarios no change has been assumed in the price relatives between competing farm enterprises. That is, there are no supply shift effects from changes in the prices of competing farm products.

This Scenario differs from the baseline Scenario only in that the price of wool relative to cattle is assumed to increase by 25 per cent for the period 1998-99. As a result the planned output of cattle one year later (1999-2000) is assumed to fall by 2.5 per cent relative to the situation of no increase in wool prices (implied cross price elasticity between cattle and wool of -0.1).

3. RESULTS

Key results for each Scenario are contained in summary Tables 2.5 to 2.9. The grainfed export product in the model is defined according to the Ausmeat definition - more than 100 days continuous on grain. The GMI definition of grassfed includes short term or young grainfed and supplementary grainfed.

Table 2.5: SUMMARY RESULTS FROM BASELINE SCENARIO

		1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Australian beef production	(kt cwe)								
Exports		1141	1213	1247	1282	1313	1348	1380	1538
Domestic utilisation		677	677	680	683	687	690	694	712
Total		1816	1890	1927	1965	1999	2038	2074	2249
Australian beef exports	(kt cwe)								
Grain fed		186	204	209	214	214	219	223	239
Grass fed (GMI model definition)		955	1008	1038	1068	1098	1129	1158	1299
Total		1141	1213	1247	1282	1313	1348	1380	1538
Japanese market	(kt cwe)								
Grass fed imports		321	320	333	348	362	377	391	424
Grain fed imports		478	502	519	538	554	574	595	655
Total imports		799	822	853	885	916	952	986	1079
Total consumption		1498	1524	1558	1595	1629	1667	1705	1814
Consumption per person	(kg cwe)	12	12	12	13	13	13	13	14
Composition of Australia's beef exports	(kt cwe)								
United States		405	427	428	430	430	430	429	411
Canada		76	103	102	102	101	101	100	99
Japan		470	490	505	522	532	550	566	607
South Korea		41	42	50	57	66	72	79	153
Taiwan		50	50	52	54	56	58	59	67
Other		100	101	109	118	127	138	147	201
Total		1141	1213	1247	1282	1313	1348	1380	1538
Composition of Australia's grain fed exports	(kt cwe)								
Japan		168	189	191	193	190	193	195	202
South Korea		19	16	18	20	24	26	28	37
Total		186	204	209	214	214	219	223	239
Present value of Australia's beef production	$m[a]								
Grain fed exports									4960
Grass fed exports									19487
Production consumed on domestic market									12243
Total									36690

[a] Cumulative gross value for the period 1994-2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

Table 2.6: SUMMARY RESULTS FROM OPTIMISTIC DEMAND/COMPETING SUPPLY SCENARIO

		1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Australian beef production	(kt pcw)								
Exports		1141	1223	1270	1319	1368	1422	1472	1656
Domestic utilisation		676	676	677	678	679	6809	682	698
Total		1818	1899	1947	1997	2048	2102	2154	2354
Japanese market	(kt pcw)								
Grass fed imports		321	325	343	361	378	396	413	487
Grain fed imports		478	510	536	564	591	622	650	754
Total imports		799	835	878	924	969	1017	1063	1241
Total consumption		1498	1539	1588	1640	1690	1744	1795	1997
Consumption per person	(kg pcw)	12	12	13	13	13	14	14	15
Composition of Australia's beef exports	(kt pcw)								
United States		405	426	427	426	422	419	414	398
Canada		76	102	101	100	98	97	96	93
Japan		470	498	520	545	567	591	612	684
South Korea		41	42	52	64	80	101	123	168
Taiwan		50	50	52	54	56	58	59	66
Other		100	104	117	130	145	157	168	247
Total		1141	1223	1270	1319	1368	1422	1472	1656
Present value of Australia's beef production	$m*								
Exports									26346
Production consumed on domestic market									12495
Total									388412

* Cumulative gross value for the period 1994-2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

Table 2.7: SUMMARY RESULTS FOR PESSIMISTIC DEMAND/COMPETING SUPPLY SCENARIO

		1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Australian beef production	(kt pcw)								
Exports		1141	1199	1221	1241	1261	1282	1301	1358
Domestic utilisation		677	680	685	691	679	703	709	742
Total		1818	1879	1906	1932	1958	1985	2009	2100
Japanese market	(kt pcw)								
Grass fed imports		321	314	321	330	337	345	353	366
Grain fed imports		478	497	509	552	535	549	563	581
Total imports		799	811	830	851	872	894	917	947
Total consumption		1498	1512	1534	1557	1580	1605	1629	1670
Consumption per person	(kg pcw)	12	12	12	12	12	13	13	13
Composition of Australia's beef exports	(kt pcw)								
United States		405	422	419	417	413	409	404	381
Canada		76	102	101	100	99	98	97	95
Japan		470	482	490	499	507	516	524	508
South Korea		41	42	50	57	63	69	76	118
Taiwan		50	50	52	54	55	57	58	65
Other		100	100	108	116	124	133	142	192
Total		1141	1199	1221	1241	1261	1282	1301	1358
Present value of Australia's beef production	$m*								
Exports									23216
Production consumed on domestic market									12492
Total									35707

* Cumulative gross value for the period 1994-2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

Table 2.8: SUMMARY OF RESULTS FOR BASELINE PLUS FMD FREE EXPORTS FROM SOUTH AMERICA SCENARIO

		1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Australian beef production	(kt pcw)								
Exports		1141	1213	1244	1272	1301	1331	1360	1490
Domestic utilisation		677	677	681	685	689	693	698	719
Total		1818	1890	1925	1957	1991	2025	2058	2209
Japanese market	(kt pcw)								
Grass fed imports		321	320	338	361	381	403	422	468
Grain fed imports		478	502	520	538	560	610	641	757
Total imports		799	822	857	900	941	1013	1064	1224
Total consumption		1498	1524	1563	1608	1652	1727	1781	1956
Consumption per person	(kg pcw)	12	12	12	13	13	14	14	15
Composition of Australia's beef exports	(kt pcw)								
United States		405	427	427	424	423	423	421	403
Canada		76	103	102	101	100	99	98	96
Japan		470	490	505	521	537	552	567	575
South Korea		41	42	50	55	61	65	70	155
Taiwan		50	50	52	54	55	56	58	64
Other		100	101	109	116	125	136	145	197
Total		1141	1213	1244	1272	1301	1331	1360	1490
Present value of Australia's beef production	$m*								
Exports									23862
Production consumed on domestic market									12164
Total									36026

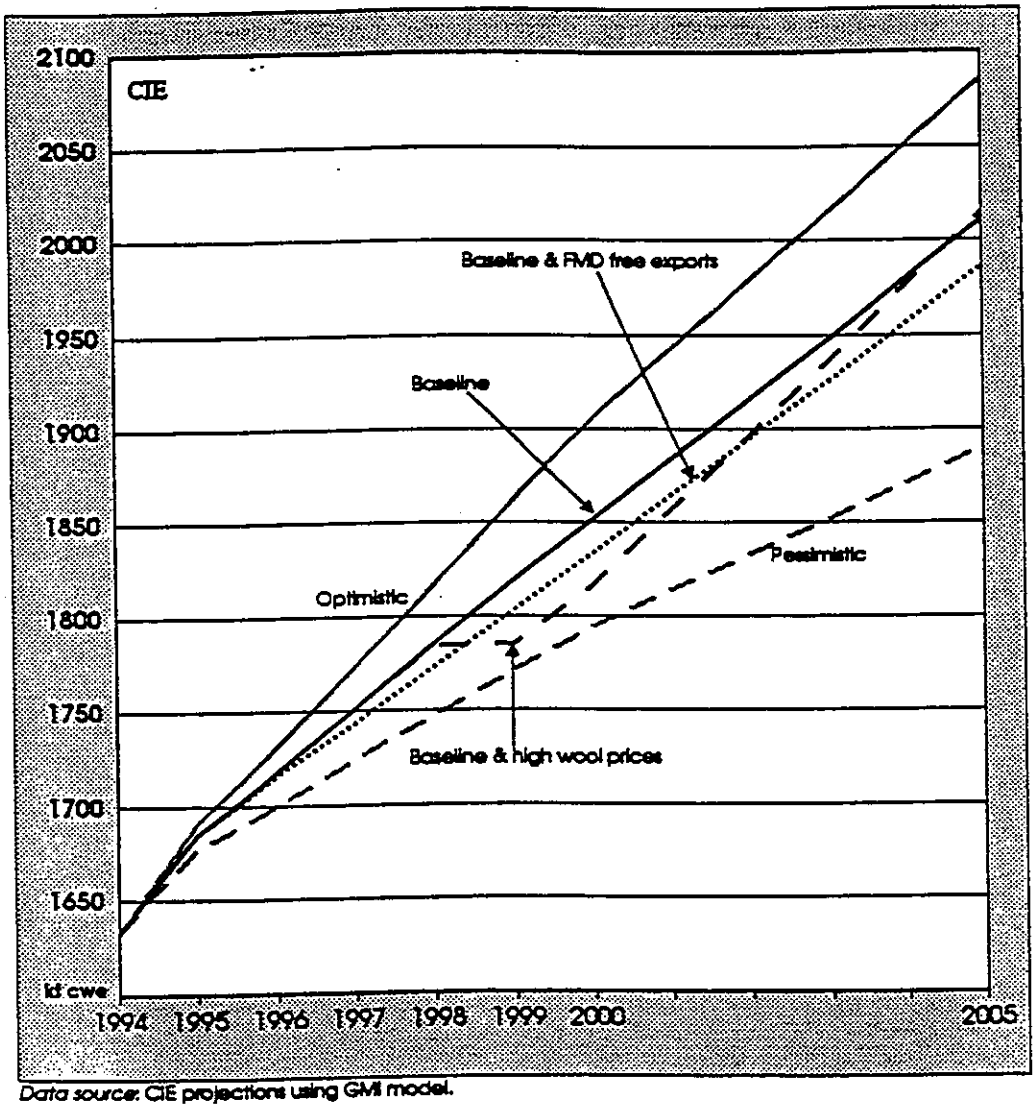
* Cumulative gross value for the period 1994-2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

Table 2.9: SUMMARY RESULTS FOR BASELINE PLUS HIGH WOOL PRICES IN THE LATE 1990s SCENARIO

		1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Australian beef production	(kt pcw)								
Exports		1141	1213	1247	1282	1315	1316	1348	1531
Domestic utilisation		677	677	680	683	687	687	691	712
Total		1818	1890	1927	1965	2002	2003	2038	2242
Japanese market	(kt pcw)								
Grass fed imports		321	320	333	343	362	379	384	425
Grain fed imports		478	502	519	538	557	575	596	647
Total imports		799	822	853	885	918	945	980	1072
Total consumption		1498	1524	1558	1595	1630	1661	1699	1808
Consumption per person	(kg pcw)	12	12	12	13	13	13	13	14
Composition of Australia's beef exports	(kt pcw)								
United States		405	427	428	430	430	415	414	413
Canada		76	103	102	102	101	98	98	99
Japan		470	490	505	522	538	544	560	588
South Korea		41	42	50	57	64	69	75	163
Taiwan		50	50	52	54	56	57	59	67
Other		100	101	109	118	127	133	142	202
Total		1141	1213	1247	1282	1315	1316	1348	1531
Present value of Australia's beef production	$m*								
Exports									24311
Production consumed on domestic market									12273
Total									36584

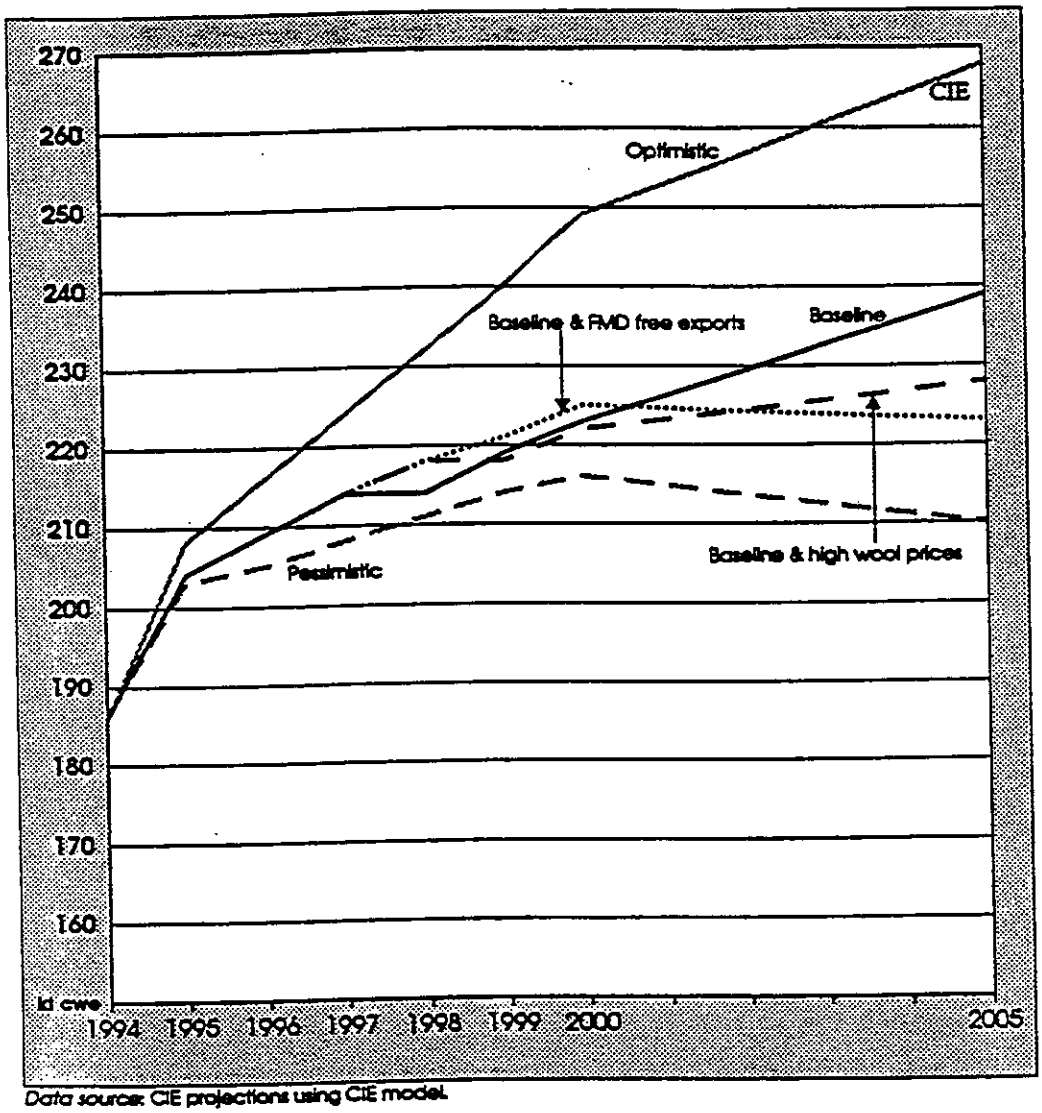
* Cumulative gross value for the period 1994-2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

Chart 2.1: AUSTRALIAN GRASSFED BEEF PRODUCTION



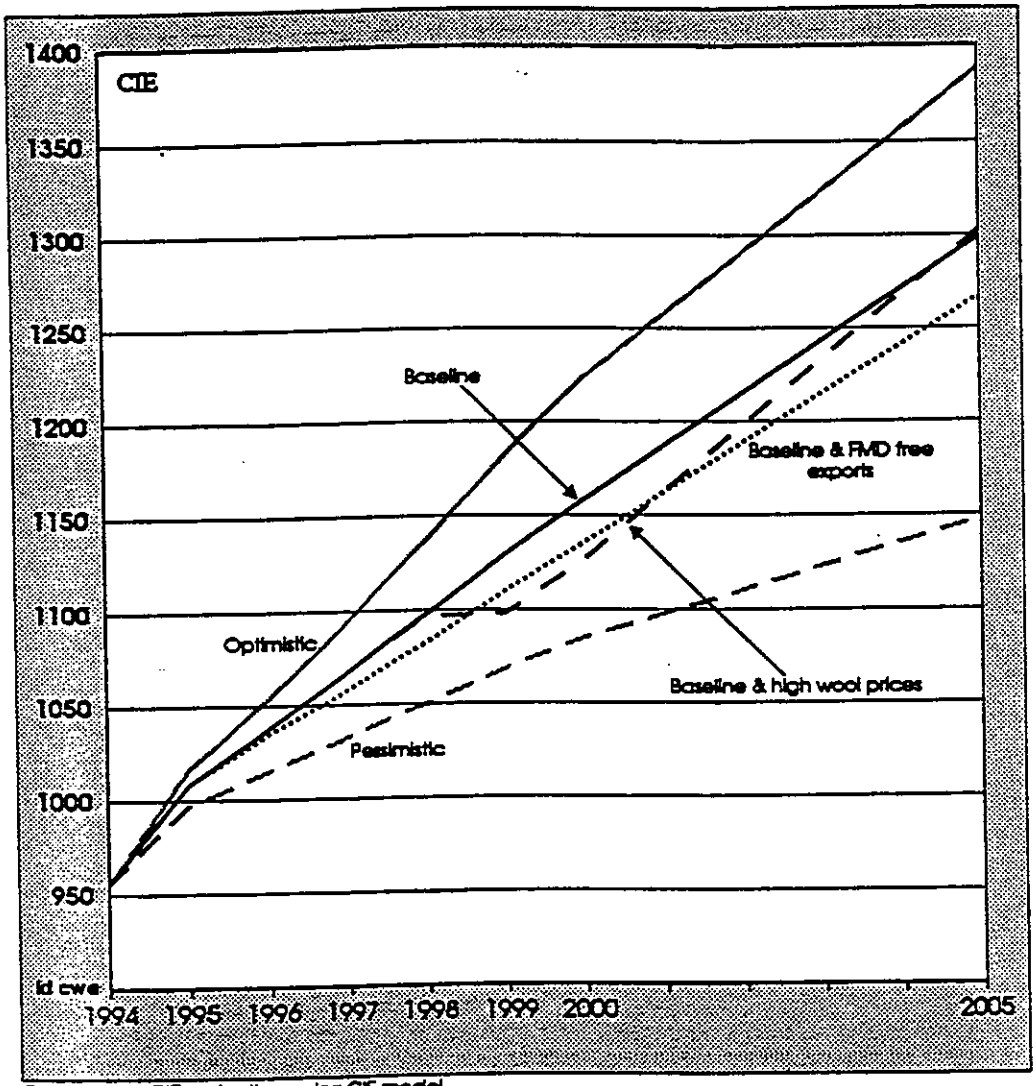
Data source: CIE projections using GMI model.

Chart 2.2: AUSTRALIAN GRAINFED BEEF PRODUCTION



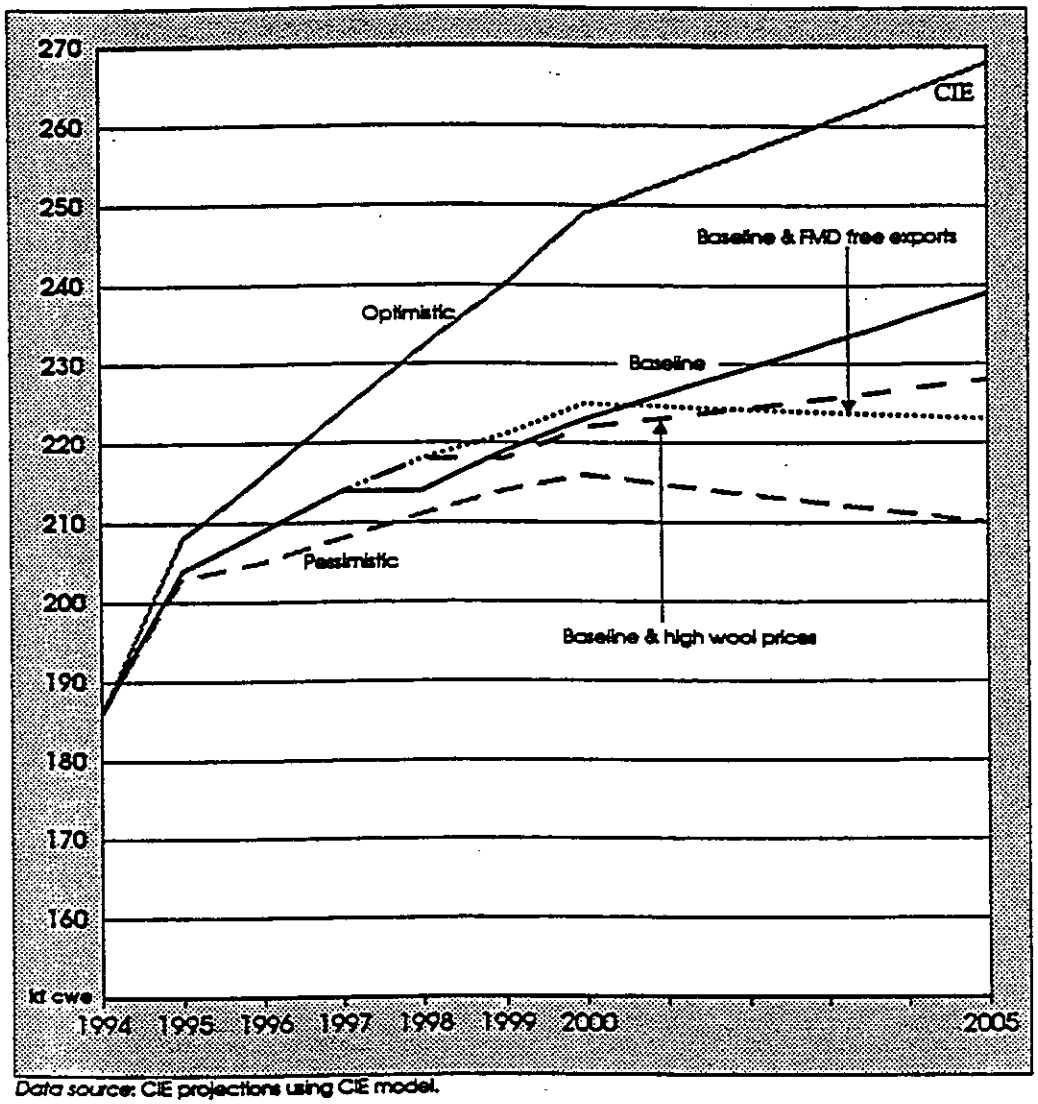
Data source: CIE projections using CIE model.

Chart 2.3: AUSTRALIAN GRASSFED BEEF EXPORTS



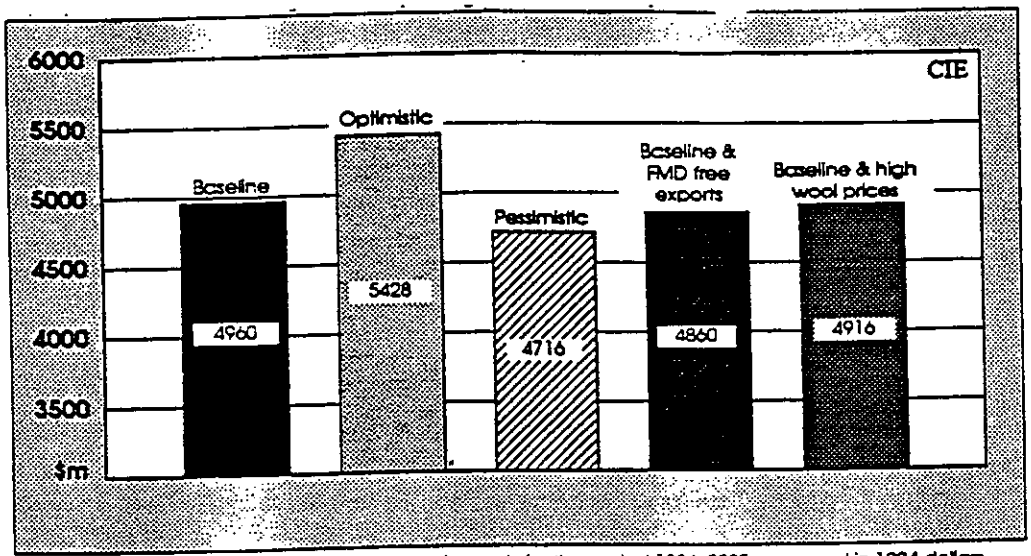
Data source: CIE projections using CIE model.

Chart 2.4: AUSTRALIAN GRAINFED BEEF EXPORTS



Data source: CIE projections using CIE model.

Chart 2.5: PRESENT VALUE OF AUSTRALIA'S GRAINFED BEEF EXPORTS [a]



[a] Calculated as the cumulative gross value of exports for the period 1994–2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

Data source: CIE projections using GMI model.

4. ADDITIONAL SENSITIVITY ANALYSIS

4.1 Japanese Dairy Beef and US Grainfed Beef Production

A key factor determining prospects for Australia to expand its grainfed beef production is what happens to Japanese imports of beef and where those imports are sourced from.

Projections from the GMI model baseline show a small expansion in Japanese beef production between 1994 and 2005 - average annual increase of 0.4 per cent per year. this is made up of an average 0.1 per cent per year increase in dairy beef and veal production. Some commentators expect Japanese dairy beef and veal production to fall over the next decade - perhaps by as much as 25 per cent. While this will lead to greater beef imports by Japan, Australia must compete with other suppliers, particularly the United States, for share of these additional imports.

Australia's exports of grainfed beef to Japan are curtailed by competition from the United States. The GMI model baseline Projects that expansion in US grainfed beef production over the period will exceed the expansion in US demand leading to a growth in exports from 617 kt in 1994 to 1137 kt in 2005. Over this period US grainfed exports to Japan are projected to increase by 140 kt (from 308 kt in 1994 to 448 kt in 2005). Results are summarised in Tables 10, 11 and 12. The increase in Australia's grainfed exports to Japan over the period is 34 kt (from 168 kt in 1994 to 202 kt in 2005).

We have simulated the effects of:

- reducing Japanese production of dairy beef and veal, commencing in 1994, such that by 2005 production is 25 per cent below its current level.
- a 10 per cent increase in US grainfed beef production each year relative to the baseline; and
- and 10 per cent reduction in US grainfed beef production each year relative to the baseline.

Results are summarised in Tables 2.10, 2.11 and 2.12.

Table 2.10: SUMMARY RESULTS: 25 PER CENT DECLINE IN JAPANESE DAIRY BEEF PRODUCTION BY 2005

		1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Australian beef production	(kt pcw)								
Exports		0	4	8	12	20	25	30	42
Domestic utilisation		0	-1	-1	-2	-3	-4	-5	-8
Total		0	3	6	10	16	21	25	35
Japanese market	(kt pcw)								
Grass fed imports		0	9	18	28	39	50	63	121
Grain fed imports		0	3	7	11	18	23	29	45
Total imports		0	12	25	40	57	74	92	166
Total consumption		0	3	7	12	20	27	36	72
Consumption per person	(kg pcw)	0	0	0	0	0	0	0	1
Composition of Australia's beef exports	(kt pcw)								
United States		0	-3	-6	-10	-14	-17	-21	-31
Canada		0	-1	-1	-2	-2	-3	-3	-5
Japan		0	9	18	28	43	55	67	99
South Korea		0	0	0	-1	-3	-4	-4	-1
Taiwan		0	0	0	0	-1	-1	-1	-2
Other		0	-1	-2	-3	-4	-6	-8	-17
Total		0	4	8	12	20	25	30	42
Present value of Australia's beef production	$m[a]								
Exports									707
Production consumed on domestic market									119
Total									826

[a] Cumulative gross value for the period 1994-2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

Table 2.11: SUMMARY RESULTS: 10 PERCENT INCREASE IN US GRAINFED PRODUCTION Deviation from Baseline

		1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Australian beef production	(kt pcw)								
Exports		0	-58	-58	-59	-57	-57	-57	-64
Domestic utilisation		0	9	9	9	9	9	9	8
Total		0	-48	-49	-50	-48	-48	-49	-55
Japanese market	(kt pcw)								
Grass fed imports		0	8	7	7	6	5	5	4
Grain fed imports		0	93	96	99	105	108	111	105
Total imports		0	101	104	106	111	113	116	109
Total consumption		0	90	93	95	100	102	105	99
Consumption per person	(kg pcw)	0	1	1	1	1	1	1	1
Composition of Australia's beef exports	(kt pcw)								
United States		0	-59	-59	-60	-61	-61	-61	-58
Canada		0	-1	-1	-1	-1	-1	-1	-1
Japan		0	-3	-3	-3	2	1	1	-27
South Korea		0	-5	-5	-6	-8	-9	-9	6
Taiwan		0	1	1	1	1	1	1	1
Other		0	9	9	10	11	11	12	15
Total		0	-58	-58	-59	-57	-57	-57	-64
Present value of Australia's beef production	$m[a]								
Exports									
Production consumed on domestic market									-1956
Total									-258
									-2214

[a] Cumulative gross value for the period 1994-2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

Table 2.12: SUMMARY RESULTS: 10 PERCENT DECLINE IN US GRAINFED PRODUCTION Deviations from Baseline

		1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Australian beef production	(kt pcw)								
Exports		0	65	66	66	69	70	70	56
Domestic utilisation		0	-10	-10	-10	-10	-10	-10	-9
Total		0	55	55	56	59	60	60	48
Japanese market	(kt pcw)								
Grass fed imports		0	-11	-10	-10	-10	-10	-9	-3
Grain fed imports		0	-83	-86	-89	-89	-92	-95	-112
Total imports		0	-93	-96	-99	-99	-102	-105	-115
Total consumption		0	-82	-85	-87	-88	-90	-93	-103
Consumption per person	(kg pcw)	0	-1	-1	-1	-1	-1	-1	-1
Composition of Australia's beef exports	(kt pcw)								
United States		0	68	68	69	69	70	70	71
Canada		0	1	1	1	1	1	1	1
Japan		0	0	0	0	5	6	7	-12
South Korea		0	6	7	8	7	7	7	13
Taiwan		0	-1	-1	-1	-1	-1	-1	-1
Other		0	-9	-10	-11	-12	-12	-13	-15
Total		0	65	66	66	69	70	70	56

Present value of Australia's beef production	$m[a]	
Exports		2296
Production consumed on domestic market		299
Total		2595

[a] Cumulative gross value for the period 1994-2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

4.2 Baseline plus an improvement in Australia's Grainfed Beef Productivity

- Baseline shows the following:

	1994	2000
Australia's grainfed exports to Japan (kt cwe)	168	195
Australia's total exports to Japan (kt cwe)	470	566
Share of exports to Japan that are grainfed (%)	35.7	34.4

4.2.1 Scenario

- We stipulate the effects of an improvement in the productivity of Australian grainfed beef so that by the year 2000 the share of Australia's exports to Japan that are grainfed reaches 43.3 per cent.

- This also implies an improvement in grainfed beef productivity in Australia relative to grass fed beef productivity in Australian and relative to grainfed beef productivity in the United States.

4.2.2 Results

- Table 2.13 summarises the projections. Table 2 compares outcomes with and without the productivity improvement.

- To achieve an increase in the grainfed share of Australia's beef exports to Japan such that this share reaches 43.5 per cent by 2005, a phased improvement in the productivity of grainfed beef production of 8 per cent in 1995 rising to 40 per cent by 2000 is required. That is, in the year 2000 the same quantity of grainfed beef must be produced with 40 per cent less inputs.

- If this productivity improvement can be achieved the results show that:

  - Australia's grainfed beef production will be 84 kt higher in the year 2000;

  - Australia's share of Japanese grainfed beef imports will have risen from 33 per cent in the year 2000 under the Baseline to 44 per cent;

Table 2.13: SUMMARY RESULTS FROM BASELINE WITH GRAINFED PRODUCTIVITY IMPROVEMENT

		1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2005*
Australian beef production	(kt pcw)								
Exports		1141	1225	1272	1320	1367	1417	1473	1621
Domestic utilisation		677	677	680	683	687	690	694	713
Total		1818	1902	1952	2003	2054	2107	2167	2334
Japanese market	(kt pcw)								
Grass fed imports		321	319	332	346	360	374	388	423
Grain fed imports		478	508	530	554	579	605	634	677
Total imports		799	827	863	901	938	979	1022	1100
Total consumption		1498	1529	1568	1609	1650	1693	1739	1833
Consumption per person	(kg pcw)	12	12	12	13	13	13	14	14
Composition of Australia's beef exports	(kt pcw)								
United States		405	427	428	430	430	430	428	412
Canada		76	103	102	102	101	101	100	99
Japan		470	501	527	555	582	612	649	657
South Korea		41	44	53	61	70	78	88	182
Taiwan		50	51	52	54	56	58	60	67
Other		100	99	110	118	128	138	148	204
Total		1141	1225	1272	1320	1367	1417	1473	1621
Present value of Australia's beef production	$m*								
Exports									27475
Production consumed on domestic market									12229
Total									37408

* Cumulative gross value for the period 1994-2005 expressed in 1994 dollars using a nominal discount rate of 10 per cent.

- The US grainfed share will have fallen in the year 2000 from 67 per cent (Baseline) to 56 per cent;

- Japanese imports of beef (and Japanese beef consumption) will be 3.7 per cent higher in 2000 - because of the reduction in the producer price of grass fed beef in Australia and hence lower retain price in Japan;

- Australia's grain feed beef exports to Korea will be 9 kt higher in 2000 compared with the Baseline; and

- the present value of Australia's grainfed beef exports over the period 1994 to 2005 would increase by $785m relative to the Baseline.

Table 2.14: COMPARISON OF BASELINE WITH BASELINE PLUS GRAINFED PRODUCTIVITY IMPROVEMENT

	1994	Base case 2000	Base case with grain fed productivity improvement, 2000
Japanese beef Imports			
Grain Australia	168	195	279
Grain US	310	400	355
Total Grain	**478**	**595**	**634**
Australian Grain fed share (%)	35.1	32.8	44.0
US grain fed share (%)	64.9	67.2	56.0
Grass Australia	302	371	369
Total Grass	**321**	**391**	**388**
Total Imports	**799**	**986**	**1022**

Source: GMI Model.

MODULE 3

DETAILED DEMAND AND CATTLE TRANSFORMATION

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1. INTRODUCTION

1.1 Purpose of Module 3

Module 3 disaggregates the overall beef demand (simulated in the GMI model) into beef market segments. The market disaggregation includes product specifications within the domestic grainfed market and product specifications for the Japanese and Korean grainfed export markets. Grassfed markets are identified as either domestic or export only. These data are transformed into the number of feeder, or, slaughter cattle required to meet the specified beef products by market for the 1994 base year. Using the GMI Model projections for each Scenario developed in Modules 1 and 2, future requirements of feeder and slaughter cattle through to year 2005 are determined. Possible future changes in the grainfed market mix are discussed and an additional Scenario based on possible shifts in the market mix, proposed.

1.2 Approach and Data Availability

Our approach has been to disaggregate Australian beef production for 1994 base year (using AMLC forecast in June 1994) by market segment and match cattle supply to each market segment. Projections of cattle supply and feedgrain requirements for the export market beyond 1994 were based on the GMI Model definition of grainfed. For the domestic grainfed market (not recognised in the GMI model because all cattle are grainfed for less than 100 days) we have dissected the GMI domestic grassfed category into a grassfed plus two grainfed categories, each less than 100 days. In summary, disaggregation into the following market segments was undertaken:

(i) *Export*

Grainfed
- Japanese B3 - fed in Australia for 230 days or more
- Japanese B2 - fed in Australia for 150 days
- Japanese B1 - shortfed, fed in Australia for 100 days
- Japanese grainfed yearling - fed in Australia for 100 days
- Korea K1 - fed in Australia for 100 days
- Korean Fullsets - B1 equivalent

Grassfed

(ii) *Domestic*

Grainfed
- 70 days or more
- Supplemented at pasture in opportunistic feedlots

Grassfed

The starting point for disaggregation of overall Australian beef production into specified beef product by market destination for the base year of 1994 was the AMLC published beef industry statistics

available in June,1994. The key data used were total number slaughtered (8.244 million head), total shipped weight (768 kt), shipped weight to Japan and to Korea of grainfed beef (112.6 and 14.7 kt respectively), carcase weight equivalent of total Australian production (1818 kt) and carcase weight equivalent of total beef export and domestic disappearance (1141 and 677 kt respectively). Since June, 1994, when this study started, the AMLC numbers have been revised slightly for 1994 but for this study the June, 1994 numbers are assumed to represent the base year. AMLC export data is further disaggregated into chilled and frozen but does not identify product mix.

Statistics on beef consumption by market segment or product specification in Japan, Korea and Australia for the purpose of this research is not adequate. In some cases we have imputed beef disappearance by market segment from feedlot production and from marketing surveys.

The availability of data by market segment in Japan is limited to pricing data published by LIPC according to grade and wholesale. The JMGA (Japanese Meat Grading Association) prints information with respect to the numbers of carcases graded including the numbers that fall within the various grades. This information has made it possible, along with the LIPC data to establish the current three main market groupings ie Wagyu (top end market), the Middle Market and the manufacturing market. Further Japanese disaggregation was based on retail information from the ASI-Intech survey, in conjunction with Japanese meat company projections. To validate Australian grainfed export to the Japanese market, we have used feedlot production data in the absence of detailed export statistics. Unfortunately the lack of a grading system in Australia has meant that Australian grainfed is in fact recorded as longfed (B3), medium fed (B2) or shortfed (B1) or grainfed yearling. Booz Allen-Hamilton in their report "Defining the Strategic Options for Japan" were critical of the information available to Australian beef processors and producers in terms of market category.

The Korean beef consumption data is derived from the still regulated import tender system which will remain in place until year 2001. What will happen beyond year 2001 is speculation.

Data on domestic grainfed cattle production is very scant. We have disaggregated domestic grainfed production into two categories, >70 days and grain supplemented. Total domestic grainfed production is derived from numbers of grainfed cattle slaughtered by major retailers and factored up by their estimated market share vis-a-vis the butchers. The >70 day domestic grainfed is assumed to equal the throughput of major feedlots servicing the domestic grainfed market and the residual assumed to be grain supplemented. These are obviously soft numbers but essential to an estimation of Australia's resource input into grainfed cattle production.

The AMLC has commissioned Nielsen who reports on the amount of beef that enters the butcher shops and supermarkets. The information is able to indicate the current boxed trade at retail and the main retail cuts. There is no information in this report as to how much grainfed beef is being retailed domestically, likewise there is no way of establishing preferences or trends for various grades or

specifications. Australia has no domestic grading system which exacerbates the dearth of useful data for the purpose of this study.

2. EXPORT AND DOMESTIC MARKET SEGMENTS

2.1 Present Export

Japan and Korea are the major export grainfed markets for Australia with Japan being the dominant destination of Australian grainfed beef, at least until year 2005. The Japanese middle market, into which about 70 percent of Australian export to Japan is destined, has four grainfed sub-sets (B3, B2, B1 and grainfed yearling) as well as two grassfed sub-sets (yearling grassfed, high quality grass fed). The breakdown of Australian beef shipped into the middle market is shown in Table 3.1.

Table 3.1 PROPORTION OF AUSTRALIAN BEEF INTO RESPECTIVE CATEGORIES OF THE JAPANESE MIDDLE MARKET

Middle Market Category	Proportion of Australian Supply
Japanese B3	13.0%
Japanese B2	26.0%
Japanese B1	24.0%
Grainfed Yearling	8.0%
Grassfed Yearling	7.0%
High quality pasture fed	22.0%
Total	100.0%

2.1.1 Japanese B3

Japanese grainfed B3 has the following specification:

Carcase Weight	:	380 - 420 kg
Age	:	24 - 28 Months (4 teeth)
Fat Depth p8	:	17 - 27 mm
Meat Colour	:	1B - 3
Fat Colour	:	0 - 2
Marble Score	:	3 & 4
Texture	:	3 - needs better definition
Sex	:	Steers

At present, Angus, Murray Grey and Shorthorns are the preferred breeds in producing this specification. Currently these breeds are having problems fulfilling the growth rate parameters and saleable yields at the required marble scores. At present only about 50 percent achieve the required marble score nationally. There is a real need to improve the growth rate, the saleable yields and the percentage of these cattle that achieve the marble score required within the specification.

2.1.2 Japanese B2

The Japanese grainfed B2 has the following specification:

Carcase Weight	:	340 - 380 kg
Age	:	24 - 28 Months (4 teeth)
Fat Depth p8	:	12 - 22 mm
Meat Colour	:	1B - 3
Fat Colour	:	0 - 2
Marble Score	:	2
Texture	:	3 - needs better definition
Sex	:	Steers

There is a stipulation by most feedlotters for a maximum of 50 percent Bos indicus in producing the B2 specification. The production of B2s is being encouraged across a vast range of breeding country in Australia, the exclusion zones being those areas with high Bos indicus contents. Currently the B2 acceptance rate is mostly controlled by the ability to marble, about 65 percent of these cattle being targeted for this specification achieve the marble score.

2.1.3 Japanese B1

The Japanese grainfed B1 has the following specification:

Carcase Weight	:	330 - 360 kg
Age	:	26 - 30 Months (4 teeth)
Fat Depth p8	:	12 - 20 mm
Meat Colour	:	1B - 3
Fat Colour	:	0 - 2
Marble Score	:	1
Texture	:	4 and 5
Sex	:	Steers

The B1 specification is the shortfed and is characterised by a 100 day feeding period which in effect converts the grassfed beef into an "acceptable" (more acceptable) product. That is, the grain feeding

enables supply as scheduled thereby guaranteeing consistent turn-off. Further it ensures a more consistent quality by reducing the fat colours within the acceptable range and by changing the odour to a grainfed rather than pasture of grassfed odour.

2.1.4 Grainfed Yearling

The Japanese grainfed yearling has the following specification:

Carcase Weight	:	240 - 260 kg
Age	:	16 - 18 months (0 teeth)
Fat Depth p8	:	6 - 12 mm
Meat Colour	:	1B - 2
Fat Colour	:	0 - 2
Marble Score	:	1
Texture	:	3 - needs better definition
Sex	:	Steers

The grainfed yearling is an attractive specification, the carcase weight enables the Japanese to use this specification for the preparation of the 150 - 200 gms steaks. The yearling, by virtue of its age, is inherently tender and as tenderness is the most significant contributor to "eating value" amongst Japanese consumers, this specification is destined to become more popular. There is a real need to ensure that texture is watched carefully amongst the yearlings. Firmness is a requirement of the Japanese and some yearling beef, due to the high free water of youthful beef (70 percent plus), can become "mushy" exhibiting droplets of moisture at the cut surfaces.

2.1.5 Korean K1

The Korean K1 has the following specification:

Carcase Weight	:	220 - 320 kg
Age	:	30 - 36 months (6 teeth)
Fat Depth p8	:	10 mm
Meat Colour	:	No dark cutters
Fat Colour	:	No yellow fat
Yield	:	Butt Shape C or better
Sex	:	Steers and heifers

Currently Australia exports frozen grainfed quarter beef to Korea in accordance with the K1 specification and some grainfed fullsets into the SBS system.

There are no breeds excluded from this specification although it is difficult to achieve a "C" or better butt shape with a straight bred dairy steer or heifer and with some straight bred British breed and Bos indicus heifers.

This production system is very achievable, it really does suit the coastal regions where the growth rates at pasture are not all that high. It is expected that the K1 specification will decline in popularity between now and 2001 (liberalisation in Korea). Further given that Korea is a tender market it is difficult to advise producers and feedlotters to actively seek out this specification.

2.1.6 Korean Fullset

The Korean fullset has the following specification:

Carcase Weight	:	280 - 350 kg
Age	:	24 to 36 months (6 teeth maximum)
Fat Depth p8	:	7 - 17 mm
Meat Colour	:	1C - 3
Fat Colour	:	0 - 3
Marble Score	:	1
Texture	:	3 - needs better definition
Sex	:	Steers, perhaps some heifers.

The Korean fullset specification is very similar to the Japanese B1, the preference at this stage would be for the 6-teeth cattle prepared for the Japanese market to be transferred to the Korean fullset market at least until liberalisation. The Australian grainfed industry should continue to strive to ensure that the maximum age of slaughter from the feedlots is 30 months. The Korean fullset specifications from now until 2001 (liberalisation) will provide a further buffer zone, so that genetics and production systems in Australia can be further streamlined to ensure a maximum age of turn-off that will result in the product having optimal eating qualities.

The Korean's currently do not have a problem with heifers in their P1 and K1 specification. There would appear to be no reason to exclude heifers from the fullset specification provided they can achieve the growth rate and fat (saleable yield) requirements.

The significant difference between the current Japanese B1 and the Korean fullset specification is the size tolerance. This tolerance does allow producers some latitude in their growth rates at the farm level up to weaning and then during the backgrounding phase. A growth rate of 0.4 kg/day for the backgrounding phase is slow and in future may well be uneconomical. As well as the age tolerance it is suggested there is a carcase weight tolerance (ie 280 - 350 kg). However it might be that the carcase weights need reducing for Korea given the fact that the cuisine is different to that of Japan. Prior to liberalisation in Korea it would be essential to determine the required portion and sub-

primate sizes and weights so that the carcase weights and then the production sub-systems adjusted accordingly.

2.2 Present Domestic

Droughts, increased competition from chicken and pork plus the desire from retailers (in particular the supermarkets) and food service to supply consumers with a consistent quality product day-in-day-out for 365 days of the year, has seen a major increase in the amount of grainfed beef being produced domestically. This study has identified that there are about twice as many cattle being grain supplemented at pasture and fed in opportunistic feedlots (varying degrees of professionalism) than in being grainfed for 70 days in the major feedlots for domestic consumption.

The Australian consumer appears to have a preference for yearling beef and the specification for that grainfed yearling is almost identical to that being prepared for export to Japan. Currently there are two differences, the first being that heifers are acceptable in Australia. Importantly the heifers must be able to achieve the target growth rates and specified fat depth requirements. The second difference is that the Australian domestic grainfed slaughter weights are 200 - 220 kg as against the 240 kg weight for the Japanese yearling.

2.3 Possible Future Market Shifts

Here we analyse future possible shifts in market segment mix and inclusion, or otherwise, in Scenario simulations.

2.3.1 Japanese B3

Since 1989 (liberalisation) in Japan the number of dairy steers achieving the B3 grade has dropped from 563,100 or 44 percent of the number graded (1.27 million) to 358,500 or 37 percent of the number graded (969,000). During that time the wholesale carcase price for B3 dairy steer has dropped from 1,250 Yen/kg to 950 Yen/kg, under pressure from imports and concurrently the cost of production has increased. To the year 2000 the wholesale price for B3's is expected to drop another 20 percent and be at 750 Yen/kg. Over the corresponding period, costs of production will increase even further making the B3 an unlikely target for Japanese feeders of dairy steer. As a consequence, more dairy farmers are using Wagyu semen and embryos in the cows from which they don't wish to breed replacement milk cows (Holsteins) taking them into the top, higher value market and away from the B3 market.

On the other hand the USA is unlikely to target this market in the future. The Americans are driven by their domestic market, they still only export about 8 - 9 percent of total production. The major problem confronting the US domestic market is declining consumption which has been blamed on price in relation to pork and chicken and the excessive fats in red meat an argument fuelled by the

human nutrition debate. To counteract both these negatives the US is focussed on reducing age at slaughter (maintain inherent tenderness with little or no marbling) and reducing the amount of excess fat produced through the beef production system. As a result, it will be almost impossible for the US to produce any significant quantities of B3 type produce. Optimum marbling is achieved between 24 - 28 months in most breeds of beef cattle, one reason the Japanese slaughter their dairy steers at 22 - 26 months and their Wagyus at 30 months. If the Americans reduce their age of slaughter by another two months (from 17 - 18 months to 15 - 16 months) it simply means the task of them achieving any marble score 3 product is highly unlikely.

This move in Japan and USA leaves a gap at the top end of the middle market, that is the B3, which could be exploited by Australia. However to take full advantage of the niche that appears to be developing in the B3 market, Australian producers will have to reduce the percentage downgraded from those cattle currently targeting the B3 specification by improving both marbling and saleable yield. It is no longer good enough to have 45 - 50 percent of those cattle targeting the B3 specifications and put on feed for 250 days only to achieve a grossly over fat B2.

2.3.2 Japanese B2

Since 1989 (liberalisation in Japan), the percentage of B2's graded has increased from 49 percent to 58 percent. In actual numbers of B2's that represents a decrease from 637,000 to 562,000. The B2 is becoming the "stock standard" product of the middle market and the price per kilogram carcase weight at wholesale and dropped from 1,000 Yen to 750 Yen.

The middle market as defined by McKinsey will continue to occupy about 75 percent of the total Japanese market through until 2000 - 2005. The B2 currently comprises some 50 percent of the middle market (estimate based on gradings and retail information) and by the year 2000 - 2005 will probably increase to 55 percent of that share.

Due to rising costs of production it is likely a higher proportion of the declining Japanese dairy steer production will be B2. This coupled with a vigorous export push from the USA of younger, and therefore less marbled product, will make the B2 segment very price competitive. Australia will have to improve current efficiencies of production to maintain and improve share of the B2 segment. Australia's competitive position as a supplier into this market segment will depend on the streamlining of the Queensland B2 production system utilising cheap tracts of land to bred and background calves on endowed country enabling them to reach 24 - 28 months at slaughter. This will enhance marbling considerably. In addition the downgradings on marbling will need to be reduced. A goal of reducing downgrades from 35 percent to 15 percent and reducing the days-on-feed from 150 to 120 days by year 2000 would help to keep Australia price competitive in this market segment.

2.3.3 Japanese B1/Grainfed Yearling

It is likely that the current B1 grainfed market segment will decline in Japan and the grainfed yearling increase. The reasons for increased popularity of the grainfed yearling are the emphasis on tenderness, the younger and health conscious consumers wanting leaner beef and yearling beef making it more attractive for retailers wishing to promote sales of steaks in 150-200 gm portions; the steaks cut from the primals of the heavier carcases being too large. On the other hand, the current B1 grainfed specification is expected to decline in Japan because the B1 is normally fed 100 - 120 days and does not achieve adequate marbling to achieve the 20 percent price premium paid at wholesale for B2's, making the economics of grainfed B1 marginal.

Competition in the grainfed yearling market segment will also be fierce. The major competitor in this market will be the US select product produced from the higher yielding younger, faster growing, more efficient cattle with the youthfulness to essentially satisfy tenderness requirements. Other products vying for this market include some Japanese dairy steer, Australian yearling grassfed and Australian high quality pasture fed. It is likely that Australia will supply more grainfed yearling into this segment and this will replace a proportion of the pasture fed older cattle currently supplied by Australia into this market segment. Efforts need directing toward gaining acceptance of heifers in the Japanese grainfed market.

2.3.4 Korea

The product mix into Korea will definitely change. Past the year 2001, it is highly unlikely that any grainfed quarter beef will be supplied. This Scenario of a changed product preference to either chilled and/or frozen primals does depend on the development within South Korea of an infrastructure/distribution system through to retail to handle large volumes of chilled/frozen primals.

The grainfed product mix in Korea is expected to comprise B1 type product, B2 type product and grainfed yearling past 2001. The Korean grainfed market will follow a similar pathway during its development to that of the Japanese market. However, there won't be the same emphasis on B3 type product. The stock standard product will most likely be the grainfed yearling with the B2 representing the quality product. Imported beef will be competing with domestically produced Hanwoo cattle in this segment. The fact that B2 is common to both Japan and Korea will be a negotiating plus from the Australian industry's perspective.

In the interim period, B1 type grainfed will be supplied through the SBS system. This will provide a home for the downgrades from the B2 production for Japan and so provide an outlet for that product while progress in the areas of genetics and production system modifications is implemented.

The fact that the B2 specification will become the stock standard product in both Japan and Korea will be of benefit to Australia as a supplying nation as it will promote the valued element of

competition. The B2 for Korea may have a slightly lighter carcase weight than the Japan B2. This will depend on outcomes of research into primal cut size needs for Korean cuisine.

2.3.5 Australian Domestic Grainfed

Two future developments are expected to occur on the Australian domestic beef market. Firstly, the volume of grainfed beef will increase and the volume of grassfed will corresponding decline. Secondly, the average carcase weight will increase.

A push from the supermarket chains, which currently command 42 percent of the domestic market, to increase grainfed supply will be a major factor influencing this shift. Already in Queensland 100 percent of the Queensland's domestic market serviced by the supermarkets is grainfed (see Table 3.6) and the objective is to emulate this as far as possible in the southern states. This push from the supermarkets is partly because a grain feeding base will enable the beef industry to supply consistent quality product day-in-day out for 365 days of the year. The argument should not be that grain feeding is better than pasture feeding or that it produces a better product; the fact is it provides an in-built safety valve, in the form of consistency of quality and regularity of supply. It is also a considered opinion that an increased grainfeeding base is going to be an essential element in the fight to arrest declining domestic beef consumption. The introduction of ALFA's tender choice and gourmet choice product will see the introduction of marbling, albeit at reasonably low levels, into the grainfed specifications for the domestic market. Significantly the marbling levels will correlate to a total lipid content in the range of 3 - 9 percent. The fact that the fat content is maintained at below 10 percent will ensure the product is still eligible for the National Heart Foundation tick.

Within the domestic grainfed specification an increase in carcase weights is also expected to occur. This will primarily occur because of increased efficiency in the processing and production side of the industry and because of the major supermarkets push for increased slaughter weights.
There are two issues that may well further improve the position of grainfed beef domestically. They are:

Grading
Boxed Beef

Grading will enable the grainfed beef to be labelled into categories of consumer acceptance eg. the ALFA tender choice and gourmet choice. Grading will give beef a much needed boost in the eyes of the consumers, who will be guaranteed a consistent product at a price day-in-day-out for 365 days of the year. Not all beef will need to be gourmet choice (i.e. top grade) to attract beef consumers; lesser grades are acceptable and can be marketed as such at a price such that the consumer can trade price off against quality. The price quality mixture must satisfy expectations and education programs will need implementing to provide that concept.

Boxed beef will ensure tenderness can be further enhanced and guaranteed. The ageing process generally promotes tenderness and a minimum of 14 days ageing will assist (provided the inventory/infrastructure can be funded) provide consumers with additional guarantees as to eating quality of beef. Boxed beef will also assist the production industry distribute beef from the proposed improved beef production systems.

2.4 Future Market Shifts as Scenarios

Expected future shifts in the market segments for Australian beef are summarised in Table 3.2.

Table 3.2 EXPECTED RELATIVE SHIFTS IN MARKET SEGMENTS SUPPLIED BY AUSTRALIA

Existing Market Segment	By Year 2000		By Year 2005	
	Expected segment change	Complementary segment change	Expected segment change	Complementary segment change
Japanese B3	increase slightly	decrease B2	steady	nil
Japanese B2	increase	decrease B1	steady	nil
Japanese B1	decrease	increase B2 & grainfed yearling	steady	nil
Japanese grainfed yearling	increase	decrease B1 & grassfed yearling	steady	nil
Korean K1	steady	nil	decrease	increase Korean grainfed yearling
Korean fullsets	steady	nil	decrease	increase Korean "B2"
Domestic >70 day grainfed	increase	decrease domestic grassfed	steady	nil
Domestic grain supplemented	increase	decrease domestic grassfed	steady	nil

We have sensitivity tested the GMI Baseline Scenario with an aggregation of relative market segment shifts. We have assumed:

Japanese B3	10% increase by year 2000
Japanese B1	20% decrease by year 2000 with 10% going to B2 and 10% to grainfed yearling
Japanese B2	residual of move in B3 and B1
Japanese grainfed yearling	residual from move in B1 & a 5% decrease in the grassfed yearling
Korean K1	not sensitivity tested - volumes not high
Korean fullsets	not sensitivity tested - volumes not high
Domestic >70 days & grain supplemented	increase total grainfed beef from 37% to 50% by year 2000

3. EXPORT BEEF CONVERSION TO CATTLE INPUT REQUIREMENTS - 1994 BASE YEAR

The conversion of shipped weights by market segment to actual cattle numbers required is not a simple task. It involves several steps as follows:

Step 1 total grainfed shipped weight disaggregated by market segment;

Step 2 shipped weight by market segment converted to "production carcase weight" (pcw);

Step 3 "production carcase weight" by market segment converted to number slaughtered;

Step 4 number of cattle slaughtered by market segment converted to number of feedlot entry cattle.

Step 5 derivation of residual grassfed export by reconciliation with total shipped weight (grass & grainfed), total number Australian cattle slaughtered, total Australian cwe exported.

It is noteworthy that the transformation starts with shipped weight, a statistic which can be obtained with some reliability. Also we have used the term "production carcase weight" (pcw) which is the carcase weight of animals slaughtered to yield both the shipped weight into the specified market segment plus trim. Production carcase weight may, or may not, be different from carcase weight

equivalent (cwe) depending upon the shipped yield. For example, pcw is the same as cwe for bone-in quarter beef where 100% of the carcase is shipped and is the same where the full bone-out yield of say 67 percent from the average carcase is shipped. Production carcase weight is more than cwe when less than the average potential bone-out yield of 67 percent is shipped, that is when the carcase has been trimmed.

It is also noteworthy that we focus on grainfed shipped beef. Grassfed is treated as the residual and reconciled with the total Australian export statistics as collected by AMLC. Appendix A, Table 1 reconciles total Australian beef production in 1994 with the disaggregated export and domestic market segments and with the number of cattle required to supply each market segment.

Step 1: Total Grainfed Shipped Weight Disaggregated by Market Segment

From ASI-INTECH retail survey in Japan and Australian industry interviews we know the Australian share of the middle market in Japan is approximately 70 percent grainfed and 30 percent grassfed. The grainfed component disaggregated as follows:

	Market Segment	Share
-	B3 Grainfed	18.0%
-	B2 Grainfed	37.0%
-	B1 Grainfed	34.0%
-	Yearling Grainfed	11.0%
-	**Total**	**100.0%**

From AMLC data, total grainfed beef exports to Japan in 1994 was expected to be 112.6 kt which, when apportioned according to the above market share, provides the shipped weights by market segment as follows:

	Market Segment	Shipped Weight(kt)
-	B3 Grainfed	22.2
-	B2 Grainfed	42.1
-	B1 Grainfed	35.4
-	Yearling Grainfed	12.8
-	**Total**	**112.6**

The Korean market disaggregation between quarter beef and fullsets is derived directly from AMLC data. Quarter beef export was expected to amount to 14.0 kt and fullsets 0.7 kt for 1994.

Step 2: Shipped Weight by Market Segment converted to "Production Carcase Weight"

Shipped yield by market segment was derived from interview with leading feedlotters and processors. This varies between 42 and 50 percent for grainfed cattle into Japan depending upon the carcase fabrication procedures. These data are not readily available and could change in the future as meat fabrication practices change. It is significant that for the higher valued B2/B3 type carcase, changes to the fabrication has resulted higher yields of 47 to 50 percent compared to the old 42 percent fullset yield. Shipped weight divided by the shipped yield provides the pcw by market segment. Trim weight is the difference between the nominal carcase weight based on a yield of 67 percent and the pcw. Table 3.3 refers.

Table 3.3 GRAINFED SHIPPED WEIGHT TO PRODUCTION CARCASE WEIGHT

Specification	Shipped Weight (kt)	Shipped Yield (%cw)	Production Carcase Weight (kt)	Trim (kt)
Japan B3	22.2	50%	44.5	7.6
Japan B2	42.1	47%	89.6	17.9
Japan B1	35.4	43%	82.4	19.8
Japan Yearling	12.8	47%	27.2	5.4
Total Japan	112.6	46%	243.7	50.7
Korean Quarter Beef	14.0	100%	14.0	
Korean Fullsets	0.7	42%	1.7	0.4
TOTAL	**127.3**	49%	259.4	**51.1**

Step 3: Production Carcase Weight by Market Segment converted to Slaughter Cattle Number

Average unit carcase weight for animals slaughtered for each market segment were derived from interview with processors and feedlotters. The conversion of pcw to slaughter numbers for export grainfed cattle are shown in Table 3.4.

Table 3.4 PRODUCTION CARCASE WEIGHT OF EXPORT GRAINFED CATTLE CONVERTED TO SLAUGHTER CATTLE NUMBERS

Specification	Average Carcase Weight (kg)	Production Carcase Weight (kt)	Number Slaughter Cattle Required ('000)
Japan B3	400	44.5	111
Japan B2	350	89.6	256
Japan B1	330	82.4	250
Japan Yearling	250	27.2	109
Sub-Total Japan		**243.7**	**726**
Korean Quarter Beef	280	14.0	50
Korean Fullsets	280	1.7	6
Total Export Grainfed		**259.4**	**782**

Step 4: Number of Export Grainfed Cattle Slaughtered Converted to Feedlot Entry Cattle Number

The number of feeder cattle required has been derived from slaughter numbers after factoring in:

i) the likely downgradings (particularly important for the B3/B2 production);
ii) the anticipated feedlot mortality;
iii) the likely ratio of steers to heifers by specification.

Table 3.5 shows the conversion of grainfed slaughter cattle to feedlot entry cattle

Downgradings

For the purposes of these calculations it has been assumed that for:

i) B3 Production the downgradings will be 55 percent. Although we expect the downgrading to reduce after 1998, for our cattle number transformation we have maintained a constant 55 percent downgrading. Our expectation is that from 1998 to 2000 they will drop to 50 percent and from 2001 until 2005 the B3 downgradings will be at 45 percent.

ii) B2 Production the downgradings will be 35 percent until 1997. Our expectation is that from 1998 to 2000 they will drop to 25 percent and from 2001 - 2005 they will be 20 percent.

Mortalities

The feedlot mortality rates have been calculated as 1.0 percent for all categories.

Ratio of Steers to Heifers

Although it is to be hoped that Australia will be able to export heifer beef to Japan in the grainfed yearling specification, no heifers have been included for these calculations for any of the Japanese specifications.

A ratio of 30 percent heifers has been used in calculating the Korean requirement of feeder cattle for both specifications.

Table 3.5 CONVERSION CATTLE SLAUGHTER NUMBERS TO FEEDLOT ENTRY NUMBERS ('000 head)

Specification	Steers into abattoir	Heifers into abattoir	Steer loss from down-grading	Steer gain from down-grading	Cattle into feedlot net of down-grading & mortality
Japan B3	111		61		174
Japan B2	256		90	61	287
Japan B1	250			90	162
Japan yearling	109				110
Total Japan	726				733
Korean quarter	30	20			50
Korean fullset	4	2			6
Total grainfed export	760	22	151	151	789

Step 5: Derivation of Residual Grassfed Export

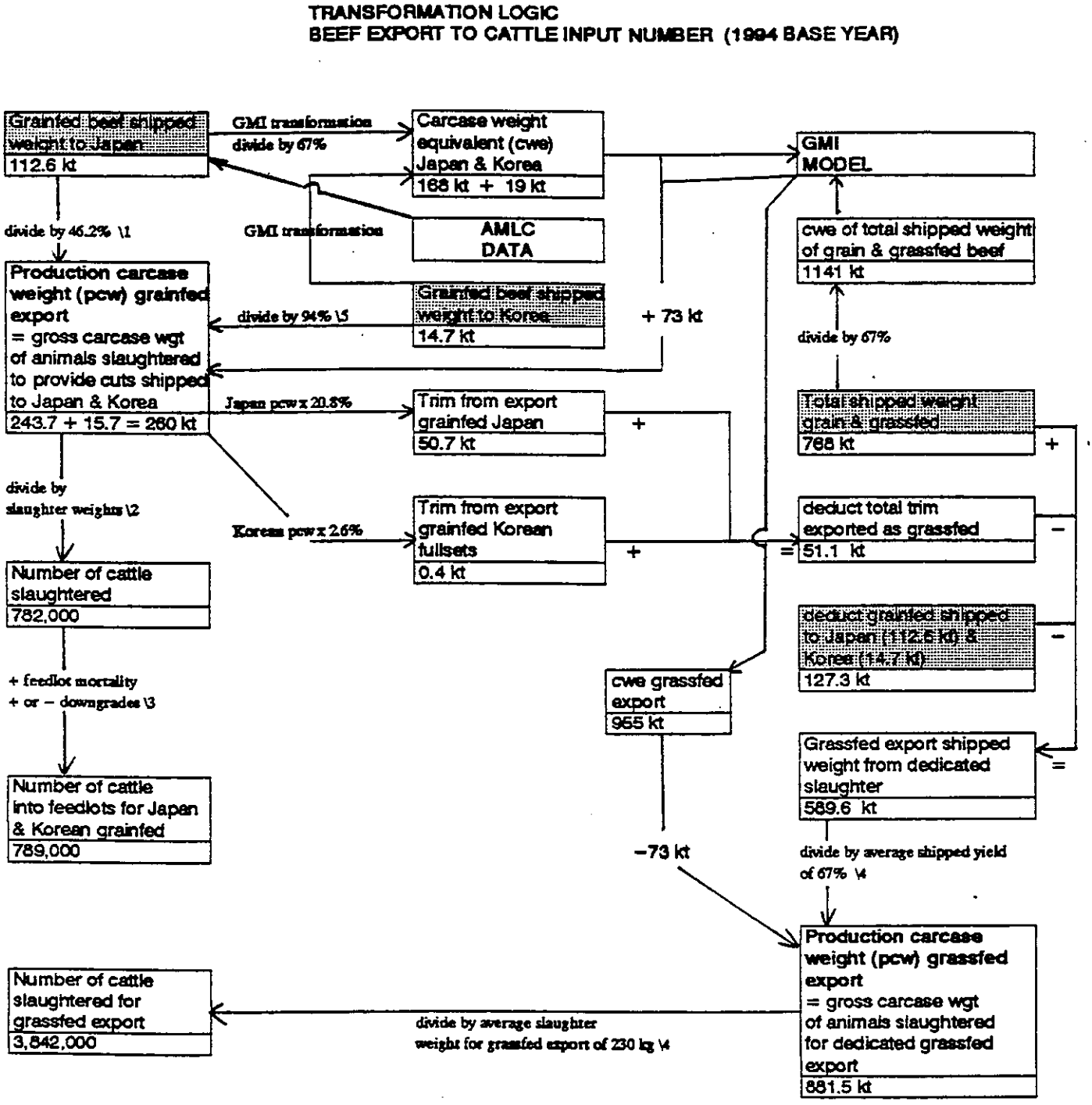
The total cattle slaughtered for dedicated grassfed export is derived from the grassfed shipped weight which is, in turn, derived from the total shipped weight less grainfed shipped weight less grainfed trim which is assumed to be totally exported as grassfed beef. From Appendix A, Table 1, the following calculation applies:

Total beef shipped from Australia	768.0 kt
less grainfed shipped weight	127.3 kt
less grainfed trim	51.1 kt
Shipped weight of dedicated grassfed export	589.6 kt (A)
cwe of beef export total	1140.9 kt
less pcw grainfed export	259.4 kt
cwe of dedicated grassfed export	881.5 kt (B)
shipped yield of grassfed export (A/B)	67%

From the above calculation the shipped yield of grassfed export is the rounding figure and is lower than we would expect as much of the grassfed export goes as quarter beef suggesting that the average shipped yield should be between 67 and 100 percent. This may suggest that all the grainfed trim may not be exported. However where the trim disappears in the meat market is not critical to this research and has not been rigorously investigated.

A summary of the transformation logic of beef export to cattle input numbers is shown in Chart 3.1.

Chart 3.1



\1 weighted average yield for B3(50%), B2(47%), B1(43%) and yearling (47%)
\2 Average weights used: Japanese B3 400 kg, B2 350 kg, B1 330 kg, yearling 250 kg; Korean 280 kg
\3 55% downgrade from B3 to B2; 35% downgrade from B2 to B1
\4 Consultants' estimates
\5 weighted average yield quarter beef 100%; fullsets 42%

4. DOMESTIC BEEF CONVERSION TO CATTLE INPUT REQUIREMENTS - 1994 BASE YEAR

Within the domestic grainfed market there are two main specifications to consider:

(i) the grainfed > 70 days, which is that product fed through major feedlot; and

(ii) the grainfed supplement which is that product fed in the opportunistic feedlots or supplemented at pasture.

The latter is a much larger segment than was originally believed. Because this market competes for resources (grain and cattle), an appreciation of the size of domestic grainfed market is important to the objective of this study. From discussions with the national beef retail managers of Woolworths and Coles, discussions with a major Sydney retailer, from the Nielsen Survey, LMAQ and NSW saleyard reports we believe the total number of domestic grainfed cattle is in the order of 1.2 million head of which 390,000 head are fed for more than 70 days in major feedlots and the residual of 811,000 head grain supplemented. These data are supported by the estimated grainfed beef sold through the major supermarkets in Australia as shown in Table 3.6. At present the supermarkets hold about 42 percent of the domestic beef market but definition of grainfed is not precise.

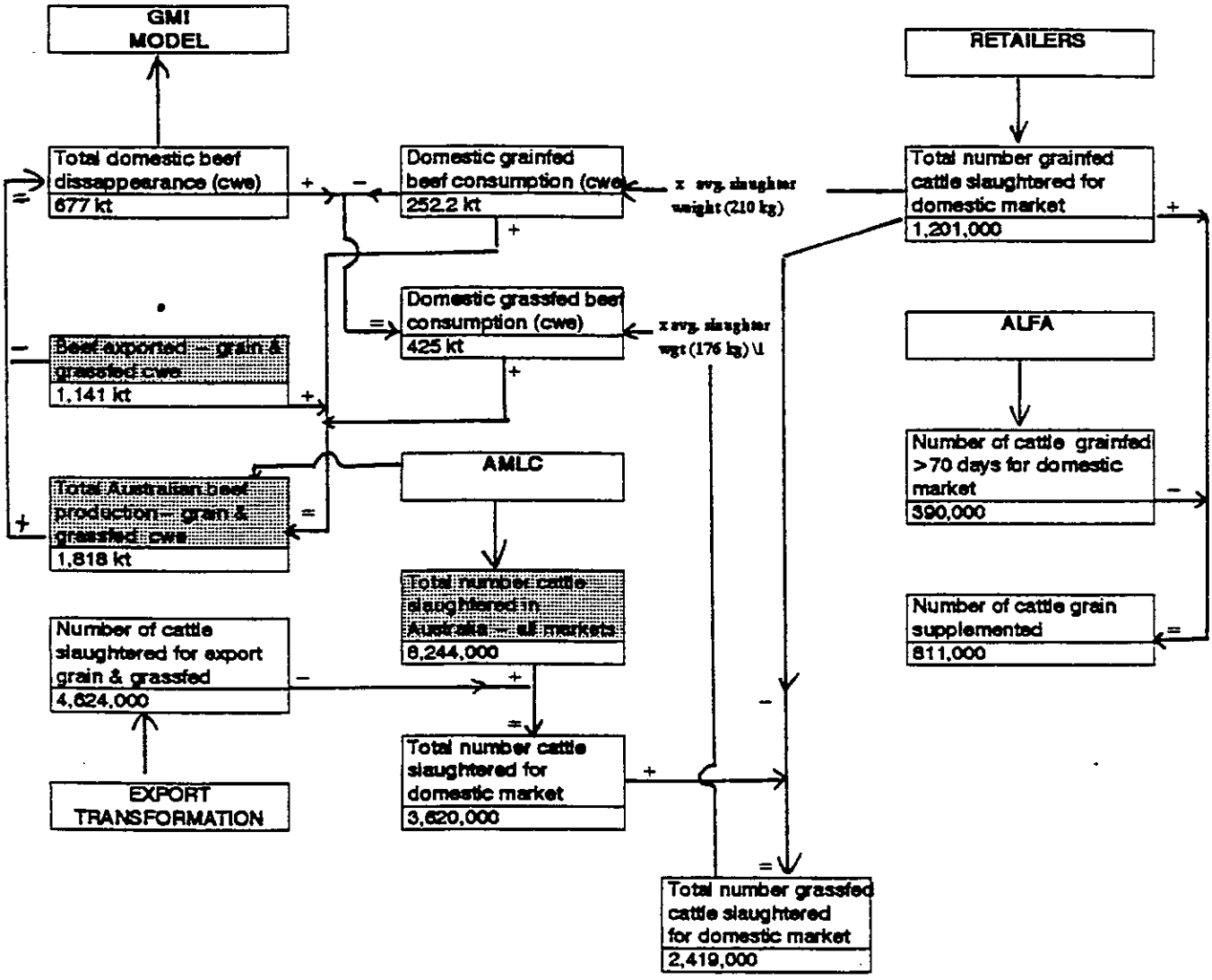
Table 3.6 PERCENTAGE OF GRAINFED BEEF SOLD BY SUPERMARKET BY STATE ON DOMESTIC MARKET

STATE	Chain A	Chain B
Queensland	100	100
New South Wales	50	50
Victoria	30	25
South Australia	50	12
Western Australia	40	12
Tasmania	10	0

Chart 3.2 is a summary of the transformation logic used to derive the number of cattle grainfed for domestic consumption.

Chart 3.2

TRANSFORMATION LOGIC
DOMESTIC BEEF DISSAPPEARANCE TO CATTLE INPUT NUMBER (1994 BASE YEAR)



\l balancing figure to close transformation

5. TRANSFORMING GMI MODEL BEEF DEMAND INTO CATTLE INPUT REQUIREMENTS

The GMI Model has, for a number of Scenarios, projected beef demand in cwe for grainfed and grassfed beef in Australia's major target markets and in Australia's domestic market. Two problems in transforming the GMI Model grainfed beef demand into input requirements (in terms of feeder cattle and attendant feedgrain) emerge. These are:

(i) The GMI model presents all projections as cwe by converting shipped weight to cwe by dividing by 0.67 for markets receiving bone-out beef. For market segments not receiving the full bone-out yield, such as the Japanese B3, B2, B1, Japanese yearling and Korean fullsets, this conversion under estimates the number of carcases, and therefore the number of feeder cattle required, to supply these specific market segments. Because the trim from the carcases supplying the specific grainfed market segments is assumed to disappear in the grassfed market, the corollary is that the use of the cwe figure in the GMI model over-estimates the number of carcases required to supply the grassfed market.

(ii) The GMI model defines grainfed as being more than 100 days and therefore, because the majority of domestic grainfed beef is fed for less than 100 days, classifies all Australian domestic beef consumption as grassfed with a consequent underestimation of cattle inputs, but particularly an underestimation of competition for the grain resource. This is not a problem with export grainfed beef all of which is fed for 100 days or more.

For the purpose of matching the feed-on cattle requirements to the export grainfed beef demand projections in the GMI model we have converted the cwe data to "production carcase weights" (pcw) as an intermediate step and to distinguish from the cwe. The total shipped beef to Japan is unaltered by this transformation but the number of cattle slaughtered to supply the grainfed beef increases and the number of cattle slaughtered to supply the grassfed is decreased. All this says is that the nominal cwe used in the GMI model is an inappropriate unit from which to derive cattle input requirements. This transformation is made for all GMI Scenarios for which cattle supply is determined.

To reflect the domestic grainfed beef consumption, and therefore cattle and grain input requirements, the total domestic grassfed beef consumption of 677 kt cwe according to the GMI model in 1994 has been transformed into 252 kt cwe grainfed (albeit less that 100 days) and 425 kt cwe grassfed. By this definition the grainfed beef consumption in Australia in 1994 amounted to 37 percent. For all GMI model Scenarios we have kept this grainfed proportion constant and used it to reflect cattle and grain input requirements.

MODULE 4

CATTLE SUPPLY

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1.0 INTRODUCTION

1.1 The Task

Module 4 considers the Australian cattle supply implications of projected major market demand to year 2005 determined in antecedent Modules 1, 2 & 3.

Module 4 develops alternative supply options to year 2000 and, in so doing, considers:

- disaggregation of the herd from existing ABS and other Industry information on breed and animal type;
- cyclical supply behaviour over the period as evidenced through slaughterings and inventory;
- measurement of supply changes or shifts produced by such factors as changing slaughter weights, processing yields, age of turnoff, mortality, productivity, culling, genetics and husbandry practices;
- effect of out-of-normal seasonal conditions, and discussion of any techniques which may be particularly helpful in forecasting and measuring the impact of such conditions;
- possibilities of substitution between activities and mixed activities for beef enterprise;
- analysis of the cattle herd on a regional within state basis;
- analysis of interregional or interstate movements of cattle;
- identification of specifications by feedlot operators for feeder cattle; and
- matching of feeder cattle with general and specific current and future market requirements.
- availability and sourcing of data relating to the above.

1.2 Data Availability and Quality

National Beef Herd Statistics The cattle supply analysis in this research is based on the Australian Bureau of Statistics (ABS) agricultural census carried out in March each year. The latest data available is for 1992/93. Regional supply analyses are based on ABARE's zones (pastoral, wheat/sheep and high rainfall) by State with the exclusion of an aggregated northern zone (see Appendix B, Chart 1). It is noted that the ABS data cover establishments in which the estimated value of agricultural operation (EVAO) was above a threshold of $20,000 in 1990/91 and $22,500 from 1991/92. An EVAO weighted correction factor has been applied to our regional analysis based on farm population.

For the purpose of this research the latest ABS and ABARE data do not adequately handle cattle breed and age profiles. A one-off breed profile was collected by ABS in 1986/87 but was not consistent in form across States. Breed sample surveys conducted by ABARE from 1989/90 to 1991/92 disaggregated only into breed groups (British, European, tropical and cross-bred) by State and zone. A survey of the northern beef industry conducted by the QDPI in 1990, with financial support from MRC, analysed the breed profiles according to the percentage of brahman blood. This survey sampled cattle establishments in Queensland, Northern Territory and NW Western Australia and located sampled properties by LGAs but provided no data on southern States.

A one-off age composition survey in 1992/93 by ABARE was an improvement on the ABS data set insofar as it disaggregated castrated cattle by age groups (1-3 years, 4 - 6 years and 7 years or more). From the viewpoint of the feedlot industry these age groupings would be more useful if steers were grouped in the 1-2 years category as most feed-on steers are in this age category and at 3 years are too old.

Cattle Movements Information on inter-regional cattle movements is limited. The NSW Department of Agriculture keeps records of cattle flows on a 6-monthly basis between Queensland and NSW. The Qld->NSW movement is broken down by destination (abattoir, property or saleyard). The NSW->Qld flow is only recorded as total head. Cattle movements from NT->Qld are available on an annual basis disaggregated by class of stock (bulls, cows, steers, calves), condition (fat or store) and by region of origin (Alice Springs District or Barkly Tablelands and north). Qld->NT cattle movements are not officially recorded but the Stock Inspector in Cloncurry was able to provide an estimate for past two years for by class of stock (steers, spayed heifers).

Obviously cattle move long distances to feedlot (e.g. Stockyard feedlot in Queensland employ cattle buyers at Wodonga in Victoria). A precise breakdown of cattle on-feed by point of origin is not possible from the data bases available.

Supply Model Coefficients To develop regional supply projections, we used the BREEDCOW steady state herd model applying estimates of average regional production coefficients (branding rate, calf

and adult mortality, age first calf, cow culling age, bull pressure and bull replacement frequency). The coefficients applied for the respective regions were a consensus of local expert opinion, past reports (e.g. DAN 061 economic study) and consultants' records. Applying these models to ABS female cattle population at 31 March,1993, with correction for small farms below the EVAO of $22,500, we generated regional supply models. While the national slaughter figures for 1994 reconcile reasonably well with the aggregated model projection (Appendix A, Table 33), the coefficients used in each model require more rigorous validation.

1.3 Approach & Methodology

The research on Module 4 (cattle input supply) comprised five phases:

Phase 1: review of primary data and publications. This involved:

- collection and analysis of ABS statistics and ABARE survey data, including, cattle population, breed, age and sex profiles by States, zones, and statistical divisions;
- review of publications and reports, mainly from AMLC, MRC and State Departments of Agriculture;
- confer with ALFA and State Departments on feedlot capacity and the quality assurance programme.
- confer with State Departments of Agriculture on inter-state cattle movements.

Phase 2: review cattle supply issues as perceived by feedlotters. This involved:

- personal and telephone interviews with feedlotters in Queensland, NSW, Victoria, South Australia and Western Australia.

Phase 3: review feedlot cattle supply issues as perceived by cattle breeder. This involved:

- personal and telephone interviews with corporate and owner/operator cattle breeders in Northern Territory, Queensland, NSW, Victoria, South Australia and Western Australia;
- mapping beef cattle breeding, backgrounding & finishing enterprises by property for a sample of corporate suppliers in Northern Territory, Queensland and South Australia and identifying cattle flows and present and future role of feedlots in strategic planning.

Phase 4: GMIM beef demand projections, disaggregated by product specification and transformed into cattle numbers matched to regional cattle supply potential. This involved:

- postulating and testing with feedlotters supply patterns to the existing and future feedlot landscape;
- postulating and testing with cattle suppliers, productivity changes to meet disaggregated demand projections.

Phase 5: Design, test and report on potential cattle supply strategies. This involved:

- analysis of findings from previous phases of Module 4 and antecedent modules;
- testing potential strategies with key industry sources;
- preparation and presentation of written report.

2.0 AUSTRALIAN CATTLE HERD PROFILE AND SUPPLY REGIONS

2.1 Cattle Population Historical Movement & Distribution

The total number of cattle in Australia, according to the ABS Agricultural Census at 31 March,1993 was 24.1 million[1], comprising 21.6 million beef cattle and 2.5 million dairy cattle. This is less than the Australian beef cattle population in the early 1970's when the national herd rose steeply to more than 32 million. The increase in the early 1970's was a response to the opening up of the US and later the Japanese market, as well as other factors such as the decline in profitability of wool growing in the period. By the early 1980's the national beef cattle herd had declined sharply and since then growth has returned to its long term trend of around 1.4% per annum. Chart 2.1 illustrates the movement in the Australian beef cattle population for the period 1947 to 1992.

[1] ABS data excludes small farms with an estimated value of agricultural operation (EVAO) of $22,500 and under. AMLC estimated the total cattle population to be 26.204 million in 1993, amounting to 8.9% increase on ABS data.

Chart 2.1

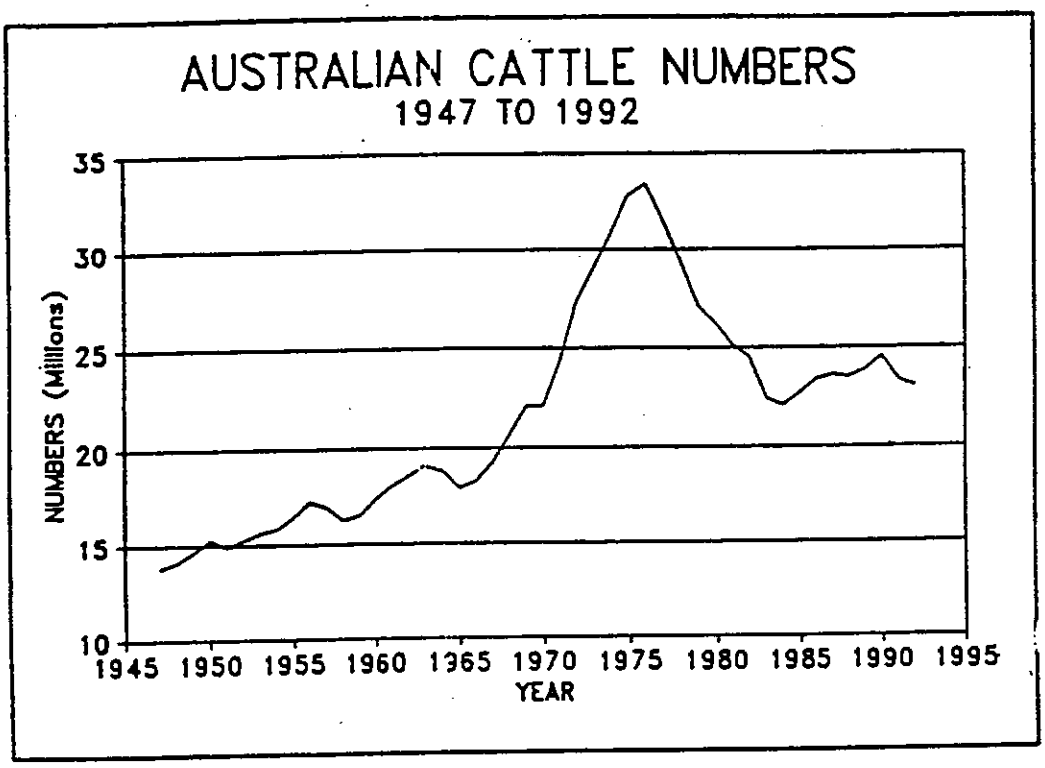


Chart 2.2 shows that two-thirds of the Australian beef herd are located in two states, Queensland and NSW and consequently are the principal suppliers of cattle to the feedlot industry. Live cattle exports to SE Asia are mainly sourced from the northern part of Queensland, Northern Territory and Western Australia (see Appendix B, Map 1 for delineation), an area, which although arbitrarily defined, accounts for 5.2% of the national herd and which is unlikely ever to supply the Australian feedlot industry. Chart 2.3 shows that 70 percent of meat cattle on 31 March 1993 were located in the sheep/wheat and high rainfall zones and less than 30 percent in the pastoral zone[2] . However the pastoral zone as a calf factory is relatively more important in Queensland than in NSW (Chart 2.5). As these are the big cattle number states, this has implications for how Australian beef calf supply might increase in response to a feedlot driven demand for more feeder cattle.

Of the total dairy herd of 2.5 million, 58 percent is located in Victoria (Chart 2.4) and it is in this state that the most significant potential for dairy beef expansion lies and productivity increase through increased slaughter weights.

[2] Three broadacre zones as defined by ABARE: Pastoral, Sheep/Wheat and High Rainfall. See Appendix D, Map 1 for delineation

Chart 2.2

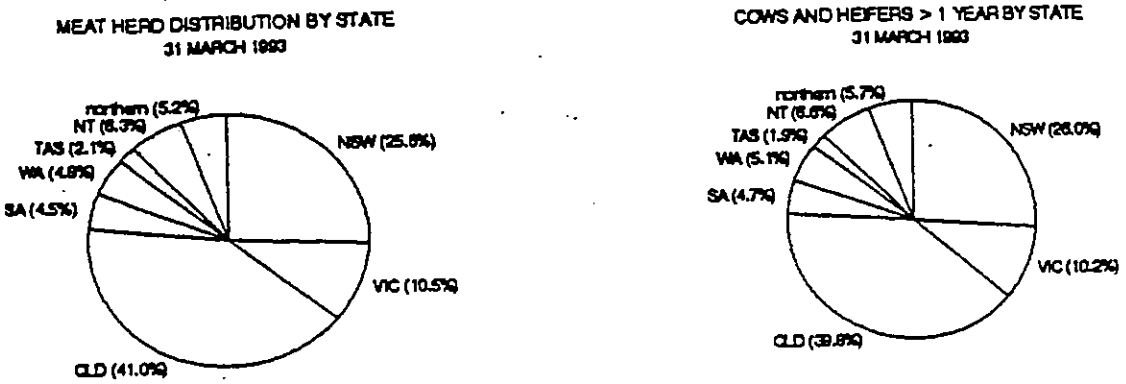


Chart 2.3

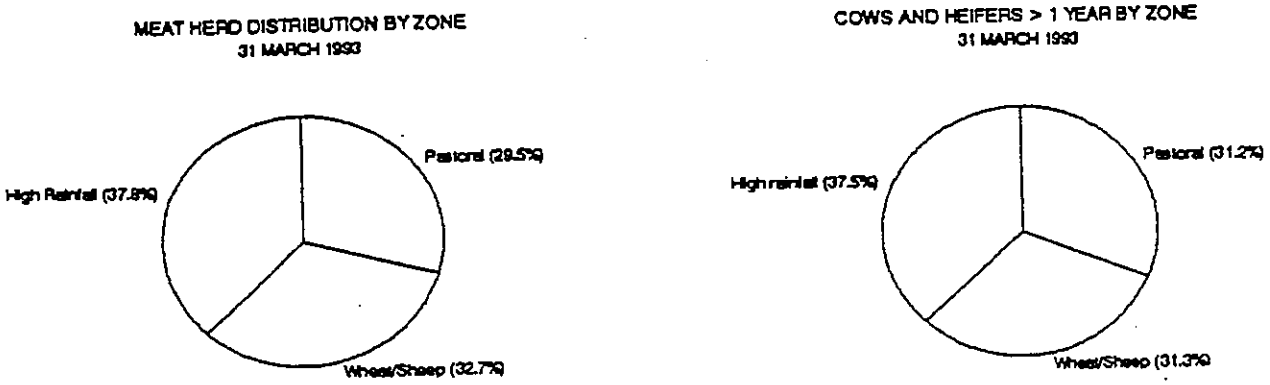


Chart 2.4

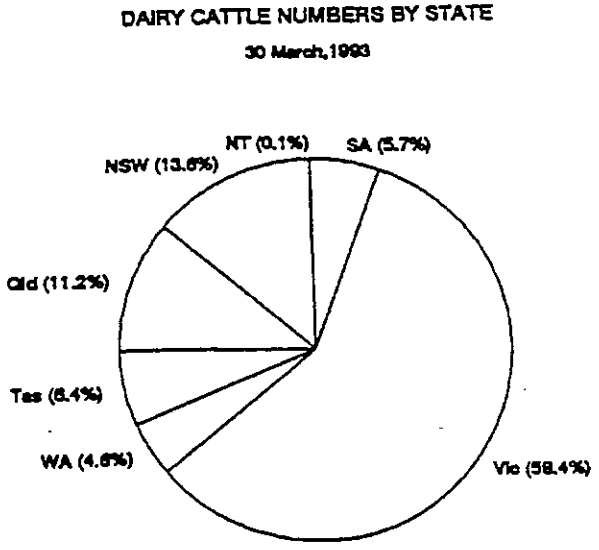
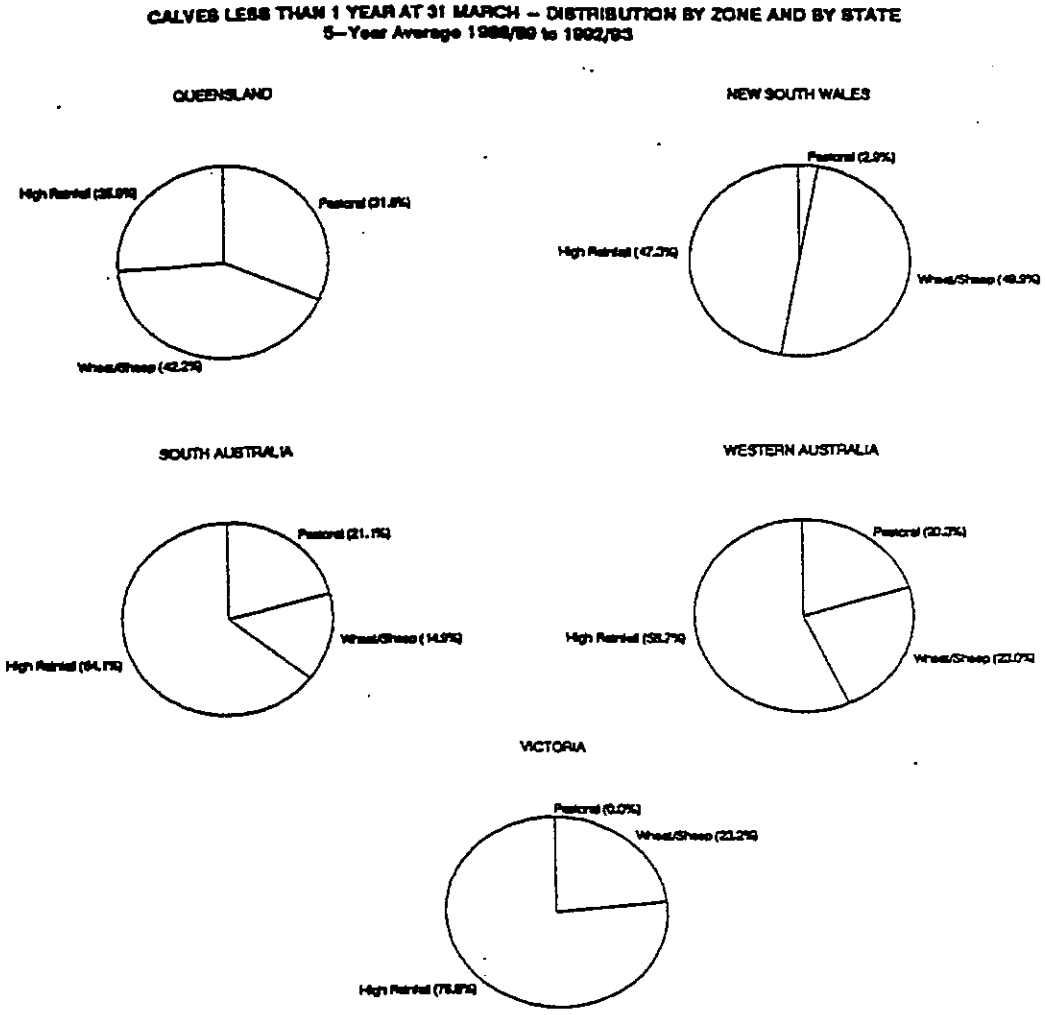


Chart 2.5



2.2 Beef and Veal Production & Herd Productivity

By comparison with the USA and the EC, Australia is a relatively small producer of beef and veal although in the 7-year period, 1985 to 1992, it increased production and productivity more rapidly than other exporting countries. Table 4.1 shows that during this period beef and veal production, in terms of carcass weight equivalents, increased at 4.2% per annum in Australia while in USA, EC and Argentina production decreased. Production increase in Australia was primarily a function of productivity increase[3](3.5% per annum) and a small increase in cattle population (0.71% per annum). In terms of productivity per head, Australia at 75 kg cwe/head, remained significantly behind Japan, USA and EC in 1992.

[3] Productivity measured as kg carcass weight equivalent per head of cattle in the national herd

Table 4.1 BEEF AND VEAL PRODUCTION AND PRODUCTIVITY IN 1992 AND CHANGE SINCE 1985

Country	Beef & Veal Production 1992 (kt cwe)	% Change per annum 1985/92	Productivity 1992 (kg cwe/hd)	% Change per annum 1985/92
Australia	1,782	+4.2	75	+3.5
USA	10,607	-0.5	106	-1.5
Argentina	2,555	-1.0	45	+1.5
EC	8,182	-0.2	101	+0.1
New Zealand	517	+0.9	64	+0.5
Japan	579	+0.6	116	-0.2

Source: Commodity Statistical Bulletin 1993

1 Productivity measured as kg carcass weight equivalent per head of cattle in the national herd

2.3 Cattle Breeds and Distribution

The latest ABS breed census data was collected in 1987 (Appendix A, Table 19). Over the 3 years, 1989/90 to 1991/92, ABARE have profiled Australian cattle breeds on a breed group basis, which categorises cattle into British, European, tropical and crossbred (Appendix A, Table 20). The ABARE surveys show little movement in the national breed mix over the surveyed three year period. Notwithstanding these survey results, there is increasing evidence of European bulls being used over highly Brahman infused herds in parts of southern Queensland specifically to target the feed-on steer market. Also the Angus bred society claims that in 1991 that breed represented 7 percent of the Australia herd, not around 6 percent as the 1987 ABS census suggests (Appendix A, Table 19)

These data show a significant variation in breed composition by State and by regions within States which obviously has supply implications for feedlots targeting specific markets. Chart 2.6 shows the 1992 breed composition by State based on the ABARE survey and Chart 2.7 shows a further breakdown of the British cattle group into the major breeds. Appendix B, Maps 2,3,4 & 5 and 8 illustrate the population of major breeds in 1987 by statistical divisions.

These data highlight:

- British cattle make up 47 percent of the National herd and remain the dominant breed with tropical cattle constituting 43 percent; Crossbreed cattle make up a further 8 percent and European cattle 2 percent;

- Angus and Murray Grey cattle make up a relative small 6 percent of the national herd with these breeds being concentrated in Victoria (32%) and southern NSW (32%) and in the high rainfall zone of Western Australia (16%);

each run more than 1 million Herefords with the Darling Downs and South West being the regions of concentration in Queensland; Herefords are the dominant breed in South Australia amounting to 39 percent of the States herd but amount to only about 6 percent of the National Hereford herd;

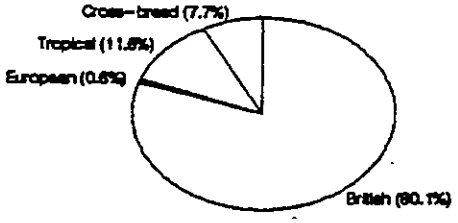
- Bos indicus and Bos indicus cross cattle amount to 36 percent of the National herd with over 5 million (76%) occurring in Queensland being concentrated in the northern and coastal part of the State; 78 percent of the cattle in the Northern Territory are Bos indicus type;

- Dairy/beef crosses comprise 3 percent of the National herd but occur only in significant numbers in Victoria where they amount to 11 percent of the State herd.

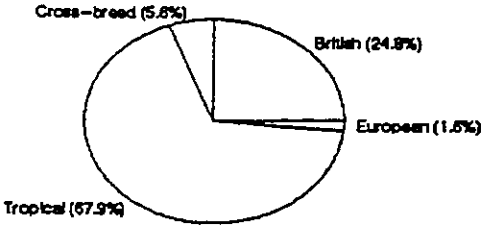
Chart 2.6

BREED COMPOSITION BY STATE 1992
(Source: ABARE)

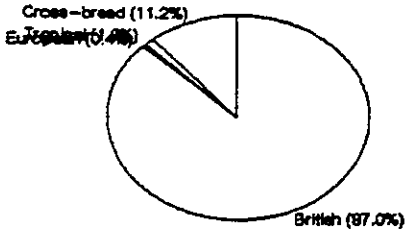
NEW SOUTH WALES



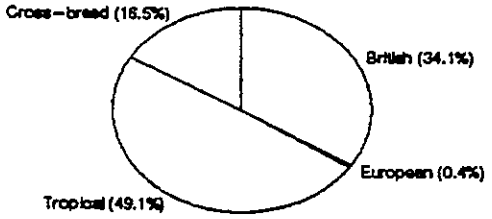
QUEENSLAND



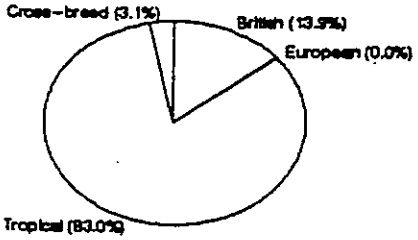
VICTORIA



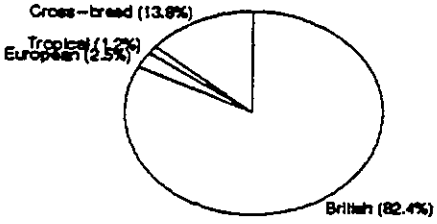
WESTERN AUSTRALIA



NORTHERN TERRITORY



SOUTH AUSTRALIA



TASMANIA

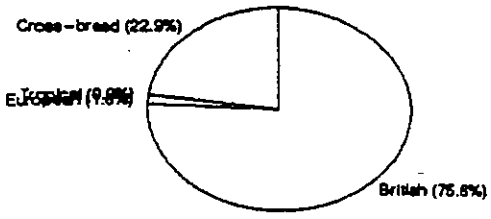
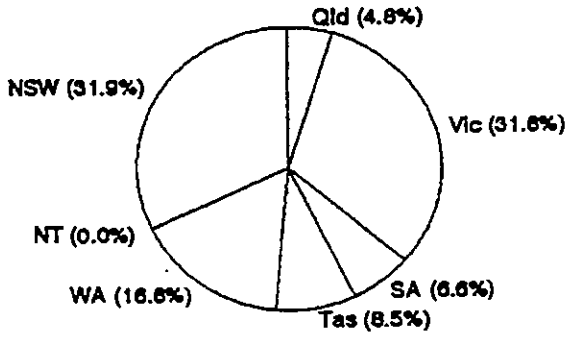


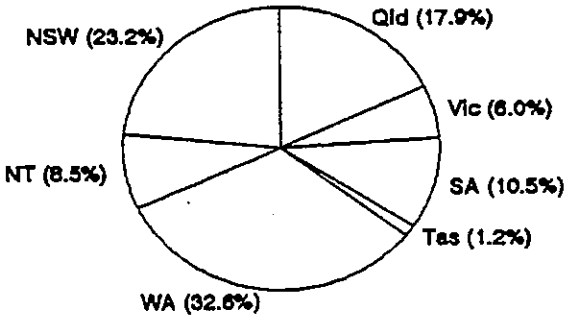
Chart 2.7

PROFILE OF BRITISH BREED CATTLE BY STATE
(Source: ABS Census 1987)

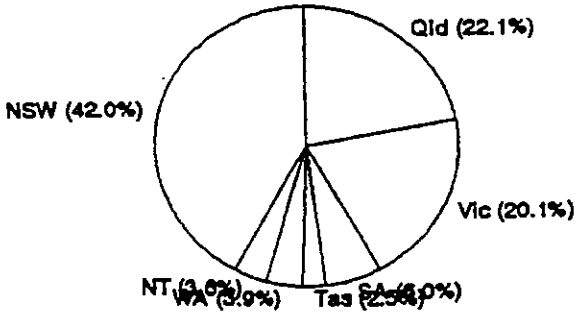
ANGUS AND MURRAY GREY



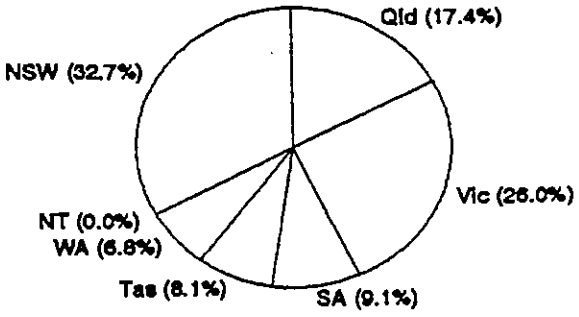
SHORTHORN & OTHER BRITISH



HEREFORD



BRITISH X BRITISH CROSS



2.4 Cattle Supply and Supply Regions

Base on our regional supply models and the cattle population according to the 1993 ABS agricultural census corrected for the EVAO factor, Australia's annual calf crop, in terms of steers and surplus heifers amounts to 6.58 million head (Tables 4.5 and 4.9). These are supplied from two broad regions:

- the **Northern** region which is characterised, in the main, by an extensive beef monoculture, producing about 2.69 million steers and surplus heifer calves, and
- the **Southern** region which produces about 3.89 million steers and surplus heifer calves and which is characterised by intensive production often as a part of a diversified farm with the beef activity competing with other farm activities, and rural enterprises, for land.

Cattle from both regions are drawn into feedlots. Such a geographic classification is loose in the sense that some intensive cattle operations occur in the north and a few extensive operations are found in southern Australia. Also a number of subsidiary production system exist in each region. From the point of view of future Australia-wide supply patterns to the feedlot industry, consideration of the broad production regions is an appropriate starting point.

2.4.1 The Northern Supply Region

The Northern region covers Queensland, the Northern Territory and the Kimberley region of Western Australia with a cattle population of more than 11.0 million (5.78 million females) run on about 17,000 rural holdings covering an area of 2.2 million square kilometres.[4]

We have dissected the Northern region into three sub-regions which are, more or less, delineated along the ABARE broadacre survey zones of: (1) pastoral, (2) sheep/wheat and (3) high rainfall. In this research the pastoral zone is further delineated into a live market export zone, labelled 'the north'. (see Appendix B, Map 1).

The key characteristics of these three zones are shown in Table 4.2.

[4] Source: Preparation Report: Northern Australian Program - 2 (1991)

Table 4.2 NORTHERN SUPPLY REGION

Zone *Other zone name\1*	**Pastoral (North)** *Harsh*	**Pastoral (Other)** *Harsh*	**Wheat/Sheep** *Endowed*	**High Rainfall** *Intermediate*
Total no.cattle\2 (31 March,1993)	1,115,126	4,638,962	3,280,555	2,149,040
No. cows and heifers 1 year and older \2 (31 March,1993)	633,323 (57%)	2,443,913 (53%)	1,538,636 (47%)	1,168,512 (54%)
No. calves under 1 year \2 (30 March,1993)	229,550	941,568	743,357	450,875
Calves under 1 yr as % of cows and heifers 1 yr plus in the preceding year	36%	38%	47%	39%
No. properties with cattle	3,586		5,469	8,170
Area cropped (ha) \1	114,000		1,791,500	653,000
Cattle growth \1 rate on pasture (kg LWG/year)	70 to 140		160 to 190	70 to 190
Dominant Land Ownership	corporate		owner/operator	owner/operator
Offtake seasonality	strongly seasonal		continuous	continuous
Potential for pasture improvement	generally poor		good (2.8 mil ha now)	good
Supplementary feed supply	poor		good	good
No. abattoirs: - export - domestic	 3 1		 4 1	 16 7
Feedlot capacity: - now - future (2000)	 0 0		 280,000 419,000	 43,000 68,000

\1 Source: NAP2 Preparation Report (1991)
\2 Source: ABS Agricultural Census

The disposition of the northern cattle breeders to supply cattle to the feedlot sector or, finish on feedlot rather than on grass, will be tempered by three main factors:

(a) alternative market opportunities (e.g. live export market), and

(b) imperatives of the regional environment (e.g.the need for high Brahman infused cattle, seasonal offtake etc).

(c) price offered by feedlotters for feeder cattle or, in the case of custom feeders, the relative whole-enterprise profitability achieved grain finishing versus grass finishing.

Herds Supplying the Live Export

The live export market to SE Asia has expanded rapidly over recent years and has moderated any fledging move to target the feeder steer market in SE Queensland. The live export market is supplied, almost exclusively, from properties in the top end of the northern pastoral zone (the Kimberleys, and the northern part of the Northern Territory and Queensland) which are in close proximity to the northern ports of Darwin, Wyndham, Broome and now Karumba.
Major growth markets in this trade are Indonesia and Philippines, with Malaysia and Thailand taking significant numbers. Live cattle exports are expected to reach 250,000 head in 1994 and there is much bullishness in the northern industry about the future of live export. The best estimate is that the market will stabilise between 200,000 to 300,000 head per year.

Historically this market has favoured Brahman steers 12 to 22 months weighing 240 to 280 kg liveweight. Some heifers are now being exported but the market is primarily for feed-on steers going into the Asian feedlots. The balance of the offtake from northern herds supplying this export market would be slaughtered in Australia for the US manufacturing market. Typically spayed heifers at 3 years and culls cows and bulls would be slaughtered in Australia.

A steady state herd model (Appendix A, Table 27) for typical properties supplying the live export market shows that 250,000 steers per year requires a female herd of 1.14 million head, 37 percent of the female herd [5] in the pastoral zone of the northern supply region. Table 4.3 sensitivity tests this effect of different levels of steer exports on females herd numbers required for its supply.

[5] The northern female herd on 31 March,1993, according to ABS Agricultural Census was 5,788,685 head comprising cows and heifers 1 year and older of which 3,081,537 were in the pastoral zone.

Table 4.3 SIZE OF FEMALE CATTLE HERD TO SUPPLY VARIOUS NUMBER LIVE EXPORT STEERS

Number of steers exported	Size of herd (cows & heifers more than 1 year) required to supply \1 (million)	Percent of cows and heifers more than 1 year at 31 March,1993 in the pastoral zone of the northern supply region
150,000	0.684	22%
200,000	0.912	30%
250,000	1.140	37%
300,000	1.368	44%

\1 Source: Consultants' herd model Appendix A, Table 27

This market is most strongly serviced from the Kimberleys and the northern end of the Northern Territory. For example, 49 percent of the corporate owned properties surveyed in the Northern Territory (Appendix A, Table 26) have live export as their major market whereas in Queensland none of the surveyed properties were exporting. However Queensland does contribute significant numbers of cattle to the export market, presumably from owner/operators, with 10,000 head expected to be exported out of Karumba in the Gulf of Carpentaria in 1994 and 80,000 head (mainly steers) moving from Queensland into the NT destined for the live export markets.

During early 1994, when live cattle prices reached A$1.30 per kg (live weight FOB Darwin) and at the prevailing exchange rate, buyer resistance was beginning to emerge but strong demand was still shown in the Cloncurry store sale in September when export steers were bringing up to $1.20 per kg.

Northern breeders prefer this market because it can be supplied from the preferred breed, namely high content Brahmans, and is one in which the feed-on steer buyer is unlikely to be competitive, at prevailing prices, nor particularly appealing due to the breed of cattle on offer.
The live export market is totally supplied out of the pastoral zone and the residual breeder herd to supply the feed-on steer market in SE Queensland would be as follows:

No. cows & heifers 1 year & older in northern region	
Total (31 March,1993)	5.784 mil.
Less required to supply 250,000 live export steers	1.140 mil.
Residual to supply domestic slaughter	4.644 mil.
Less Alice Springs herd supplying mainly into SA	0.168 mil.
Residual to supply feedlot sector in SE Qld	4.476 mil.

It is noted that the live export market represents a younger age of turnoff for many suppliers leaving unutilised carrying capacity which was previously taken up by bullocks. When the drought breaks, it is likely that cow numbers will marginally increase in the live export catchment area.

The Residual Northern Cattle Supply Region

In theory the residual breeding herd in the northern supply region (i.e. after the live export has been satisfied), which amounts 4.476 million cows and heifers more than 1 year, is available to supply feeder cattle to the feedlot sector, as well as for grass finishing. However the residual herd comprises a range of breed types and the sub regions from which they come are characterised by production imperatives which dictate the present, and future, suitability for supplying feedlot entry cattle.

Five steady state herd models (Appendix A, Tables 28,29,30) are used to generate output of steer calves (surplus to bull replacements) and heifer calves (surplus to cow replacements) for each of five sub regions of the northern supply region which are not presently supplying the live export market. Key production coefficients used in the models are shown in Table 4.4. Demarcation of the sub regions is shown in Appendix B, Map 1 (b).

A breed profile for each sub region has also been determined and offtake and breed data are summarised in Table 4.5.

Table 4.4 PRODUCTION COEFFICIENTS FOR NORTHERN HERD MODELS

Sub Region	Branding %	Mortality < 1 year %	Mortality adult %	Maximum cow cull age (years)	Age at first calf (years)	Bull Pressure %
Pastoral live export	60	6	9	9	3	6
Pastoral not live export	65	5	5	9	3	6
Sheep/Wheat north	75	2.5	2.5	9	3	3
Sheep/Wheat south	80	2	2	9	3	3
High rainfall north	65	2.5	2.5	9	3	3
High rainfall south	78	2	2	9	3	3

Source: Local QDPI opinion & consultant's records

Table 4.5 PRODUCTION OF WEANER STEERS AND SURPLUS HEIFERS AT STEADY STATE FOR NORTHERN REGION BASED ON BREEDER HERD SIZE ON 31 MARCH,1993

Sub Region	Breeder herd (no.) \1	EVAO factor (%)	Steer calf output (no.) \2	Surplus heifer calf output (no.) \2	Breed Profile \3		
					Brahman (%)	Indicus composites (%)	Taurus and taurus crosses(%)
Pastoral live export	1140070	0.0%	250000	192447	17	80	3
Pastoral not live export	1937166	0.0%	513782	233134	9	64	27
Sheep/Wheat north	722972	11.0%	255293	147733	16	73	11
Sheep/Wheat south	815663	11.0%	290588	178771	2	31	67
High rainfall north	608789	14.1%	191091	97707	32	64	4
High rainfall south	559724	14.1%	212327	128338	10	58	32
Total	5784384		1713081	978130			

\1 Cows & heifers more than 1 year on 31 March,1993 from Agricultural Census
\2 From consultants' models (Appendix A, Tables 27,28,29,30) - Increased by EVAO factor
\3 From ABS 1987 Agricultural Census. 'Brahman' = brahman, red sindhi,sahiwal; 'indicus composites' = braford, brangus, santa gertrudis, charbray, droughtmaster & crosses of brahman/British, tropical/British & tropical/tropical; 'Taurus' = British, european & their inter crosses, africander, belmont red & unspecified & dairy crosses

These data highlight:

- 1.463 million (85%) steer calves produced in the northern supply region and are available for grain or grass finishing in Australia after live exports of 0.250 million; in addition there are 0.880 million surplus heifer calves being produced annually in excess to that required to keep the northern herd in steady state;

- the steer output (net of live export) of 1.463 million from the northern supply region amounts to 36 percent of Australian animal steer production and heifer production of 0.978 million, 39 percent of Australian surplus heifers;

- cull cows amounting to 0.549 million and cull bulls 0.030 million amount to 43 percent of the Australian production.

- of the 1.463 million steer calf output, 0.443 million (30 %) are straight taurus, or taurus crossbreds, 0.846 million (58%) are indicus composites, and 0.174 million (12 %) are straight brahman types.

- the annual steer calf crop of Angus and Shorthorns, suitable for B3 production, from the Darling Downs and South West Queensland is comparatively low amounting to 0.031 million head, or 2 percent of the northern steer supply.

- if high grade brahman cattle need to be avoided in feedlots, the priority regions for sourcing cattle in the north (see Appendix B, Map 1c) are:

Priority	Sub region	Number steers/heifers not high grade brahman
1	southern wheat/sheep	0.460 mil.
2	pastoral not export	0.680 mil.
3	southern high rainfall	0.307 mil.

2.4.2 The Southern Supply Region

The southern supply region covers New South Wales, Victoria, South Australia, Tasmania and the southern regions of Western Australia. Based on the ABS census of 31 March 1993 the combined cattle population in the southern region was 10.1 million, including 5.3 million females. This amounted to 47.4 percent of the national herd.

We have divided the Southern region into three sub-regions which coincide with the ABARE survey zones (see Appendix B, Map 1(a) as follows: the Pastoral, Sheep/Wheat and High Rainfall zones, . The key features of these zones are shown in Table 4.6. For the purpose of modelling supply, zone data was aggregated into whole states for Victoria, South Australia and Tasmania. In Western Australia the southern supply region included all the State except the Kimberleys. Table 4.8, derived from Appendix A, Table 31, shows a breed profile and the production of weaner steers and surplus heifers at steady state for various sub-regions of the southern supply region based on the cattle

Table 4.6 SOUTHERN SUPPLY REGION

Zone	Pastoral	Wheat/Sheep	High Rainfall
Total no.cattle\2 (31 March,1993)	561,878	3,630,644	5,895,258
No. cows and heifers 1 year and older \2 (31 March,1993)	318,508	1,852,271	3,136,465
No. calves under 1 year \2 (30 March,1993)	140,056	1,031,478	1,649,265
Calves under 1 yr as % of cows and heifers 1 yr plus in the preceding year	52%	61%	56%
Dominant Land Ownership	Owner/Operator	Owner/Operator	Owner/Operator
Offtake seasonality	Strongly Seasonal	Continuous	Continuous
Potential for pasture improvement	Low	High	High
Supplementary feed supply	Poor	Good	Good

population of 31 March 1993. These models show that the southern region produces 2.35 million steers (64 percent of Australian total net of live export) and 1.54 million surplus heifers 66 percent of Australian total. In addition the southern region produces 0.710 million cull cow and 0.035 million cull bulls which represents 56 percent and 44 percent respectively of the Australian total.

Table 4.7 PRODUCTION COEFFICIENTS FOR SOUTHERN HERD MODELS

Sub Region	Branding %	Mortality < 1 year %	Mortality adult %	Maximum cow cull age (years)	Age at first calf (years)	Bull Pressure %
NSW Coast	82	2	2	9	2	3
NSW sheep/wheat	82	2	2	9	2	3
NSW pastoral	75	2	2	9	2	3
SA	82	2	2	9	2	3
VIC	85	2	2	9	2	3
TAS	80	3	3	9	2	3
WA	82	2	2	9	2	3

Source: Economic Analysis of Aust. Beef Production Systems (DAN)061 & consultants' views

Table 4.8 PRODUCTION OF WEANER STEERS AND SURPLUS HEIFERS AT STEADY STATE FOR SOUTHERN SUPPLY REGION BASED ON BREEDER HERD SIZE ON 31 MARCH,1993

Sub Region	Breeder herd (no.) \1	EVAO factor (%)	Steer calf output (no.) \2	Surplus heifer calf output (no.) \2	Breed Profile		
					Taurus & taurus crosses (%)	Brahman & indicus composites (%)	Other & unspecified (%)
NSW coast	1368645	14.1%	608836	413880			
NSW sheep/wheat	1422116	11.0%	632622	430049	70%	8%	22%
NSW pastoral	97893	0.0%	36052	23374			
SA	516674	10.9%	233394	140528	81%	2%	17%
VIC	1129132	13.5%	517493	352155	79%	1%	20%
TAS	210091	14.1%	91031	62932	78%	0%	22%
WA \3	562693	10.4%	242194	117952	75%	0%	25%
Total	5307244		2351621	1540870			

\1 Cows & heifers more than 1 year on 31 March, 1993
\2 From consultants' models (Appendix A Table 31) - after EVAO correction
\3 excludes Kimberleys

2.5 Seasonal Supply Patterns

Seasonality of feeder supply, dictated ultimately by the seasonality of calving in breeding herds, is postulated as an issue for beef markets demanding continuity of supply. From a national perspective, the spring calving pattern of northern Australian cattle herds is offset by the dominance of Autumn calving in southern Australia. Strategically located feedlots in northern NSW and southern Queensland can, to some extent, exploit this complementary seasonality to achieve continuity of intake.

In northern Australia (Qld, NT and NW WA) calving generally occurs in the late dry, early wet season. In the 43% of herds which control joining in northern Australia [6] the joining period ranged from 6.0 to 7.7 months with bulls first entering the herd, depending upon the location, over 3 months from October to December. This in effect gives a calving spread for northern Australia as a whole of 9 months in control-mated herds. In the more harsh environments in those herds where mating was controlled, bulls tended to be in herds from December to July and in the southern endowed region of Queensland bulls were generally in the breeding herd from October to April. For practical reasons, bulls remained continuously in most herds in the more extensive northern areas but were seasonally mated (up to 75% of herds) in southern Queensland. In the high rainfall zone 63% of herds continuously mated with a higher probability of year round calving.

These data suggest that, in a national sense, seasonality of calving may not be a problem but due to the seasonal selling imperatives, particularly of northern producers, seasonality of demand for feedlot space does occur. This is supported, in part, by the seasonality to Queensland pen occupancy which has a peak in Winter and trough in Summer.

The implication is that continuity of supply to feedlots needs to be improved. One possible solution would be an expansion of dedicated backgrounding enterprises which, apart from keeping cattle growing, form the valuable function of marshalling cattle lines by feedlot entry specification throughout the year. Backgrounders would necessarily source cattle from different areas at different times of the year to accommodate the dominant calving patterns of these different areas. It would be managerially more difficult for breeding enterprises to shift calving patterns to offset feedlot entry troughs and probably not economically tenable unless a good premium was paid for 'out-of-season' calves. The best option to addressing the seasonality of supply will come from exploiting the existing region to region and property to property spread of calving.

[6] O'Rourke et al (1992) North Australia Beef Survey

2.6 Existing Spatial Supply Patterns

Supply catchment areas for feedlots are extensive and as the number of feedlots increase, and their geographic spread widens, it is axiomatic that the supply patterns for the feedlot sector as a whole, and individual feedlots in particular, will change.

Empirical data on interstate cattle movements is scant and intra State movements can only be gleaned from interview. Recorded state movements in Appendix A, Tables 22 and 23 show that there is a two-way flow between NSW and Queensland and that the flows fluctuate widely from year to year. A regular annual flow of cattle occurs from southern Northern Territory into South Australia. Southern Western Australia is generally isolated from significant interstate movements. A free flow of cattle occurs between NSW and Victoria and to a lesser extent between South Australia and Victoria and NSW. Freight subsidies between Tasmania and the mainland have encouraged some live cattle movements from Tasmania to Victoria and NSW. Some cattle movements from Victoria to Queensland feedlots have been recorded. Table 4.9 ranks the volume of interstate cattle flows.

Table 4.9 INTERSTATE CATTLE FLOWS

To From	NSW	QLD	NT	WA	SA	VIC	TAS
NSW		H	N	N	N	M	N
QLD	H		H	N	N	N	N
NT	L	H		L	M	N	N
WA	N	N	L		N	N	N
SA	L	N	N	N		M	N
VIC	H	L	N	N	L		L
TAS	L	N	N	N	N	M	

H = high, M = moderate, L = low, N = negligible

This analysis suggests that WA can be treated as an isolated production cell. All other adjoining states have moderate to high across-border cattle flows. Significant cattle movements occur between the northern and southern supply regions, in particular between NSW and Queensland, and from the point of view of matching supply and demand have to be treated as one cell.

In the northern supply region, supply patterns, for cattle going into the premium grain or grass finished markets, are typically from the north and west into the south east of Queensland where cattle are finally slaughtered. This is reflected in the spread of corporately-owned properties which have 47 percent of their carrying capacity in specialised breeding properties in the Northern Territory and northern Queensland, a further 22 percent of carrying capacity in integrated breeding and finishing activities in SW Queensland and 31 percent of carrying capacity in specialised grass

finishing/backgrounding activities in southern Queensland (Appendix A, Table 26, Appendix B, Maps 6 and 7). In general, corporations which have their breeding properties in the preferred feedlot supply areas (see Map 1c) will have the breed of cattle most suited to the grain finishing market, whereas corporate breeding properties located in the Brahman imperative far north will primarily direct their steer offtake to grass finishing, with perhaps cull heifers being finished on grain for the domestic market.

Within the southern supply region, B3 type feeder steer movements are typically from the breeding zones in the High Rainfall regions of New South Wales (excluding the coastal region) and the Sheep Wheat zone of that State, into the feedlots of the Riverina. That is, to the feedlots at Narrandera, Wagga Wagga and Hay. To a lesser extent B3 type cattle move to the Northern Slopes feedlots around Quirindi. Backgrounding, that is, growing from weaning to feedlot entry has proven to be a problem in the past and must be addressed in the near future to improve the overall efficiency of the B3 production system.

Movement of B3 type feeder steers also occurs from the breeding areas of south east South Australia and throughout Victoria, to the feedlots in Victoria's north and to the emerging lots in the Riverina region of New South Wales.

2.7 The Effect of Drought

For the feedlotter, drought means:

- feedgrain supply decrease and price increase;
- cattle supply increase and price decrease;
- and reducing age of cattle on feed during the drought;
- post drought cattle supply decrease;
- decrease in the quality of cattle on feed;
- re-opening of old opportunity feedlots and the establishment of new opportunity feedlots.

For the cattle breeder, the availability of feedlot capacity in times of drought enables:

- earlier decision to lighten-up stocking rate and, as a consequence, greater drought security.

Undoubtedly the continuing drought in eastern Australia since the early 1990's has spurred the expansion of feedlot capacity. Mostly, it is expected this drought-driven feedlot expansion will be permanent. For some, the often poor feedlot margins in drought times will be seen as the norm, and will return to grass finishing post drought.

From a feedlotters strategic planning viewpoint, there is a need to educate the cattle supplier that drought survival feeding is different to long-term, market driven production feeding.

3.0 FEEDLOT CAPACITY

Current total capacity of feedlots (ie. with more that 500 head capacity), according to the ALFA survey in May 1994, amounts to 542,000. For all feedlots with a capacity greater than 100 head the aggregate capacity is estimated at around 662,000 which is assumed to represent the capacity of dedicated feedlots. Expansion plans from a few major operators would take feedlot capacity to over 1.2 million head by year 2000. The indications are that future expansion will be strongly biased towards NSW (+ 370,000 head) which will usurp Qld (+ 164,000 head) as the premier feedlot State. Insignificant expansion is planned in other States. Table 4.10 illustrates.

Table 4.10 FEEDLOT CAPACITY ('000 head)

State	Present Capacity Feedlots > 500 head \1	Present capacity Feedlots > 100 head \2	Planned Future Capacity by Year 2000 \3	Planned Capacity Increase by Year 2000
Qld	259	323	487	164
NSW	187	233	605	372
Other	96	106	110	4
Total	**542**	**662**	**1202**	**540**

\1 ALFA survey May 1994

\2 Consultants estimates based on comprehensive records for Qld and estimates for other States

\3 Expansion applications

Plans by the feedlot industry to expand capacity would appear to be in excess of pen space required to meet the market for fed cattle projected in this study. For the future high feedlot demand scenario (Market Shift - see Table 5.10)), 53% utilisation (down from 73% in 1994) is indicated by year 2000 if present expansion plans are implemented. For the high feedlot use scenario a 20 percent expansion of the feedlot capacity is indicated to meet the projected demand for grainfed cattle. Table 4.11 refers.

Table 4.11 RECONCILIATION OF FEEDLOT CAPACITY AND DEMAND PROJECTIONS FOR GRAINFED CATTLE

	Year 1994	Year 2000 Baseline Scenario	Year 2000 Optimistic Scenario	Year 2000 High Feedlot Use Scenario\1
Total grainfed cattle throughput ('000 hd)	2001	2192	2283	2649
Grainfed cattle throughput in dedicated feedlot sector ('000 hd) \2	1593	1774	1871	2086
Required feedlot capacity to service dedicated sector @ 80% utilisation ('000 hd) \3	617	698	750	796
Estimated present or planned future capacity ('000 hd)	662	1202	1202	1202
Estimated feedlot utilisation (%)\4	73%	46%	50%	53%

\1 Market Mix Shift Scenario; see Table 5.10 for assumptions.

\2 Dedicated feedlot sector is assumed to include 50% of supplementary grainfed cattle.

\3 Equals days on feed by number of cattle for respective market segments.

\4 Compare to 80% which is the normal operational utilisation.

The extent to which the feedlot capacity needs to be expanded will depend not only on the rate of growth of export and domestic demand for grainfed beef but also on trends in the opportunity feedlot sector. At present this sector accounts for some 819,000 cattle annually and some industry observers expect that there will be considerable contraction in the opportunity feedlot sector in the future. The pressure for contraction in this sub sector is likely to grow once feed supplies return to normal and as declining feedlot profit margins leads to efforts to improve efficiency. Hence it is possible that some of the planned expansion in feedlot capacity is based on a commercial judgement that opportunity feedlotting will contract. If it is assumed that pasture supplemented feedlotting contracted by 50% and these cattle were in dedicated feedlots for 100 days, the required feedlot capacity by year 2000 under the high feedlot demand scenario would be around 900,000 head indicating that feedlot utilisation, under the present expansion plans would be around 60%.

It is noted that most new and expanded commercial feedlot are based on perceived geographic competitive advantage in terms of availability of specified cattle requirements and in terms of cost and reliability of supply of feed inputs. Expansion of opportunist feedlots which has actually

occurred, or has a high probability of occurring, has been primarily drought driven with little consideration of market outlets. With the indications of overcapacity and the continuing consolidation of feedlots in regions of competitive advantage, it is likely that some feedlots will cease to be viable. From the national viewpoint competitive supply of grainfed beef would be enhanced.

With respect to present and future capacity in other states, the following comments refer:

- **Western Australia** grainfed beef is all consumed by the domestic market and 'grain supplementation' is common. A working group looking at strategies for the Asian market is considering the opportunities to initiate a grainfed export beef market. This would most likely be based in the south west agricultural zone where supplies of grain are abundant and cattle number adequate.

- **Tasmania** has one major feedlot (Tasman Feedlots) which is vertically integrated into a Japanese retail outlet (Jusco) and future expansion is limited by cattle supply;

- **Northern Territory** does not have any feedlots and will probably continue to export grass finished beef or live cattle;

- **South Australia** has one major export linked commercial feedlot (Metro Meat International); market linkages and expansion intention not known;

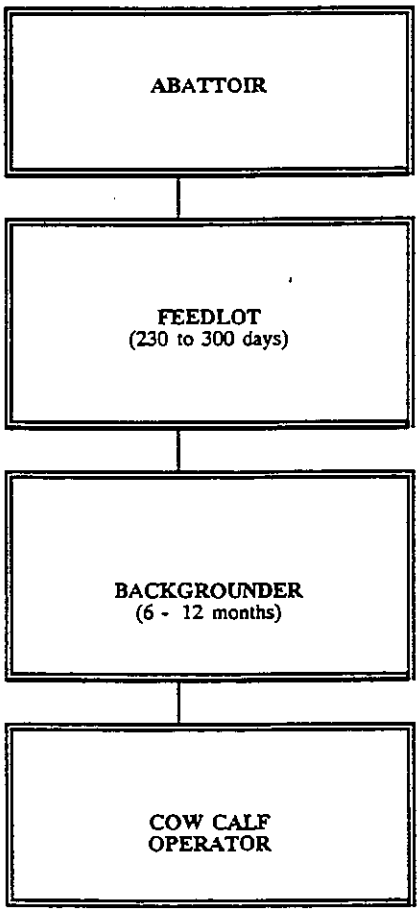
- **Victoria** has two major commercial feedlot (ICM Farms and Charlton) which service both the domestic and export market; expansion intentions in Victoria not known.

4.0 FEEDER CATTLE PRODUCTION SYSTEMS

The strengths and weaknesses of grainfed cattle production systems and the opportunities to improve these are pertinent to the cattle input requirements of the feedlot sector. The cattle production systems for the seven grainfed market segments supplied by Australia (namely, the Japanese B3, B2, B1 and grainfed yearling, Korean K1 and fullsets and Australian domestic grainfed) are reviewed.

Japanese B3 Production

The production system for the B3 market segment is outlined below.



OUTPUT

Weight	:	380 kg - 420 kg
Age	:	24 - 28 months
Fat Depth	:	17 - 27 mm
Saleable Yield	:	67 - 69%
Marble Score	:	3 & 4
Texture Firmness	:	4 & 5

OUTPUT

Weight	:	680 kg - 720 kg
Age	:	24 - 28 months
Daily Gain	:	1.1 - 1.3 kg
FCR(DM basis)	:	8.0 - 10.0: 1

INPUT

Weight	:	380 kg - 420 kg
Age	:	16 - 18 months

OUTPUT

Weight	:	380 kg - 420 kg
Age	:	16 - 18 months
Daily Gain	:	0.6 - 0.75 kg

INPUT

Weight	:	250 kg - 280 kg
Age	:	10 months

OUTPUT

Weight	:	250 kg - 280 kg
Age	:	9 months
Daily Gain	:	0.8 - 0.9 kg

Days-on-feed is a stipulation of this market segment and it is important to the study in that it is the criteria that will influence the amount of grain and roughage required. It is significant that the roughage requirement is up to 30 percent higher than for the B2, B1 and yearling systems, with roughage quality being of greater concern to the B3 system.

The backgrounding phase, while generally not as long as for the B2 market segment, is critical to the achievement of market specification. The potential to expand the backgrounding capacity, consistent with market expansion will be a significant factor in future penetration of this market segment.

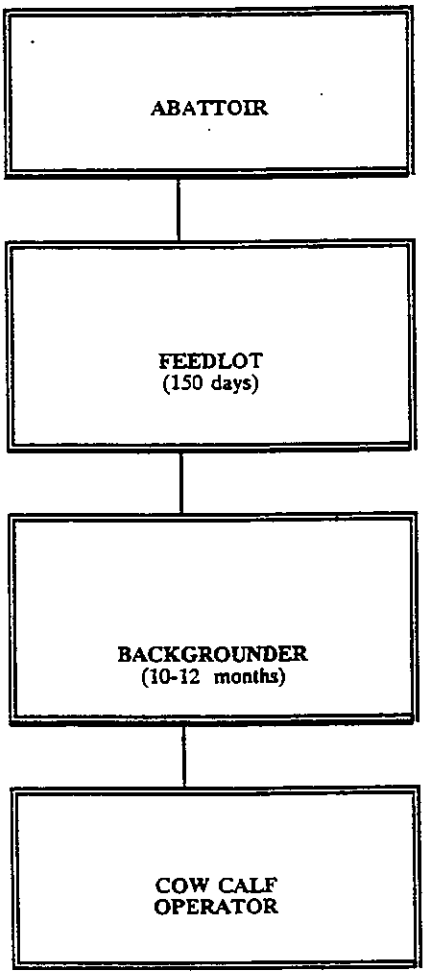
The Murray Grey, Angus and Shorthorn breeds are preferred because of their recorded abilities to achieve marble scores of 3 and 4 and so produce B3 status. It is unfortunate that meat importers have had to use breed and days on feed to prescribe their specifications to the Australian supplier. Ideally the customer (in this case the Japanese importer) should have access to a grading system based on both yield and quality parameters. If this was the case, the supplying companies within Australia could be in a position to supply according to meat specifications. Instead the importer has had to impose production based specification parameters (breed and days on feed) which have not proven all that efficient as far as the supplier is concerned. Currently only about 45 percent of the

cattle on feed achieve the 3 and 4 marble score and of these a significant proportion are grossly over-fat, with a reduction in saleable yield. The majority of the 55 five percent that fail to reach the B3 specification with respect to marbling are downgraded to B2's. However a 230 - 300 day feeding regime is a very expensive method of achieving B2's as they receive from between 25 - 30 percent less per kg wholesale in Japan than the B3's and it costs 23 percent to 38 percent more to produce.

A future imperative for the feedlot sector is to improve the overall efficiency of the B3 production system. There are good opportunities by genetic selection to improve the marble score performance, reduce the total fatness and so increase saleable yield and reduce the days on feed requirement to around 200 days.

Japanese B2 Production

The production system for the Japanese B2 market segment is as follows:



ABATTOIR

OUTPUT
Weight : 360 kg
Age : 24 - 28 months
Fat Depth : 12 - 22mm
Saleable Yield : 69 - 70%
Marble Score : 2
Texture Firmness : 4 & 5

FEEDLOT (150 days)

OUTPUT
Weight : 680 kg
Age : 24 - 28 months
Daily Gain : 1.5 - 1.6
FCR (DM basis) : 7.5 - 8.0: 1

INPUT
Weight : 400 - 500 kg
Age : 20 - 22 months

BACKGROUNDER (10-12 months)

OUTPUT
Weight : 400 - 500 kg
Age : 20 - 22 months
Daily Gain : 0.6 - 0.75 kg

INPUT
Weight : 210 - 240 kg
Age : 10 months

COW CALF OPERATOR

OUTPUT
Weight : 180 kg - 240 kg
Age : 7 - 9 months
Daily Gain : 0.7 kg

The production of B2s is being encouraged across a vast range of breeding country in Australia, the exclusion zones being those areas with high Bos indicus contents. The majority of the B2's are finished with 150 days on feedlot. It is significant that the grain component is around 20 percent

higher than for B3 production. Roughage quality is not quite as important to the production of B2's as it is with B3's and so rather than use silage type products, cereal crop residues can suffice.

The backgrounding phase is most important for producers targeting this market segment requiring 10 to 12 months with weight gains of 0.6 to 0.75 kg live weight gain per day to meet the weight and age specifications. Major expansion of the B2 market is projected and an attendant increase in backgrounding capacity will be required for this market segment to develop unhindered.

Due to the lack of a grading system in Australia, inefficient production based specifications are used. For instance the majority of feedlots specify maximum of 50% Bos indicus content and 150 day feeding period to achieve this specification. At the moment about 65% of the cattle placed on feed to produce the B2 carcase achieve the marble score of 2 and so some 35% are downgraded to B1's. This is an expensive method of producing the B1 which really only require 100 days feeding.

There are plenty of opportunities of improving the B2 production system. Pre-selection in the backgrounding phase plus genetic selection in the breeding herds would mean 90 - 95% of cattle placed on feed achieving the marble score of 2 in 120 days feeding being an achievable goal. Accompanying the increase in marbling there needs to be a reduction in total fatness and an improvement in fat distribution which will improve saleable retail yield.

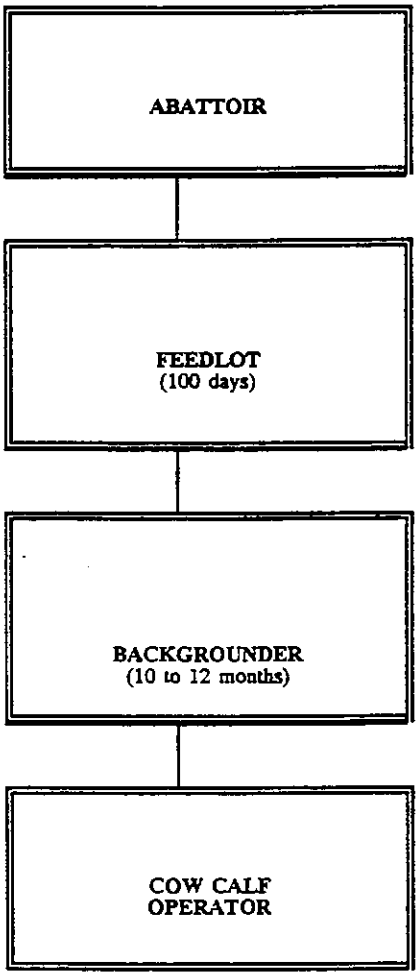
There is an advantage to the feedlotters who can source B2 type steers from both northern and southern Australia which will give continuity of supply from complementary spring and autumn calvings.

The European, European crosses and other unspecified crosses do have the potential to target the B2 production system. The abilities of these breed combinations to marble at the required level does vary, but generally falls within the range of 55 - 65 percent. The real advantage this grouping has, in particular the European and European crosses, is their ability to achieve high boning room yields. The challenge therefore for this breed grouping is to lift marbling potential, or to concentrate on yield and growth and specifically target the shortfed B1 target that has no marbling requirements.

There is no doubt that the heifer portion produced from this cross, many of which are terminal crosses, can be utilised in the Korean market and also in the domestic grassfed and grainfed markets.

B1 Production

The production system for the Japanese B1 market segment is as follows:



OUTPUT
Weight : 330-360 kg
Age : 26 - 30 months
Fat Depth : 12 - 20mm
Saleable Yield : 70% plus
Marble Score : 1
Texture Firmness : 4 & 5

OUTPUT
Weight : 600- 660 kg
Age : 26 - 30 months
Daily Gain : 1.6
FCR (DM basis) : 6.0 - 7.0: 1

INPUT
Weight : 400 to 500 kg
Age : 22 - 26 months

OUTPUT
Weight : 400 kg to 500 kg
Age : 22 - 26 months
Daily Gain : 0.6 kg

INPUT
Weight : 190 to 240 kg
Age : 10 months

OUTPUT
Weight : 1980 to 240 kg
Age : 7 - 9 months
Daily Gain : 0.7 kg

The B1 specification is characterised by a minimum 100 day feeding period which in effect converts the grassfed beef into a more acceptable product. That is, the grain feeding enables supply as scheduled thereby guaranteeing consistent turn-off. Further it ensures a more consistent quality by reducing the fat colours within the acceptable range and by changing the odour to a grainfed rather than pasture of grassfed odour.

Marbling is not a criteria with the production of B1 type cattle. The main objective is to feed the cattle long enough to ensure that the fat structure has had sufficient time to be altered to similar configurations to the Japanese produced Holstein and US grainfed. The meat texture requirements will need close scrutiny if higher than 50% Bos indicus blood is used.

In the feedlot phase, the grain component of the ration for B1 production will be 80 percent or more and the emphasis is on maximum gain, with many feedlotters taking advantage of compensatory gain in order to achieve their profit margins. It is important to ensure that the B1 is slaughtered prior to the onset of darker meat colours and higher connective tissue content criteria starts occurring past 30

months. Even though the B1 is downgraded in price by about 30 percent when compared to the B2, it still must be reasonably tender and exhibit even fat distribution in order to maintain acceptability.

Substantial B1 production comes presently comes from downgrades out of the B2 system, and will continue to be supplied this way until the efficiency of the B2 production system is improved, and from those producers who for one reason or another, decide not to target the growth rate, marbling and saleable yields necessary for the B2 production.

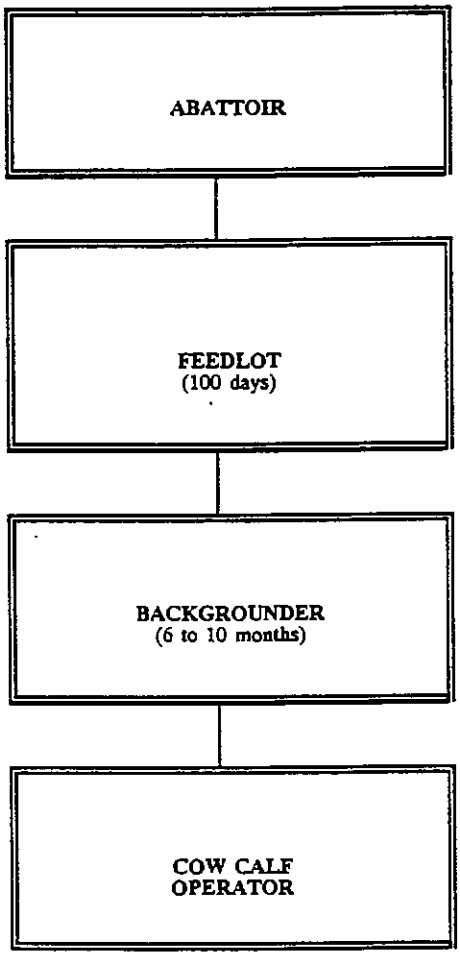
For example, the Bos indicus crosses produced in coastal New South Wales for instance may not achieve the desired growth rates to enable them to fulfil the B2 entry on feed requirements. Likewise many of the British crosses and Hereford steers will have problems achieving the B2 marbling requirements at acceptable saleable yields given the 150 day feeding requirement. Any reduction in days-on-feed and an increase in weight/age of the steers going on feed will mean they will satisfy the B1 requirement more readily. The European, European crosses and other unspecified groupings may have problems marbling. However, they will achieve above average growth rates on feed coupled with high saleable yields for the B1 requirement.

The production of B1 cattle will not require as sophisticated a backgrounding phase as either the B3 or B2 and will therefore appeal to many producers and feedlotters. However to achieve a slaughter age of less than 30 months will still require moderate growth rates during a dedicated backgrounding phase.

It may well be that the costs of producing the B1 type steer in southern Australia will not warrant a special designated production system. The downgrades from the B2's will provide some B1's but where growth rates up to 14 months are high enough may be best suited to grainfed yearling production.

Japanese Grainfed Yearling

The production system for the grainfed yearling market segment is as follows:



OUTPUT

Weight	:	240 kg - 260 kg
Age	:	16 - 20 months
Fat Depth:	:	8 - 12 mm
Saleable Yield	:	70%
Marble Score	:	1
Texture Firmness	:	4 & 5

OUTPUT

Weight	:	420 kg - 470 kg
Age	:	18 - 20 months
Daily Gain	:	1.4 kg
FCR (DM basis)	:	6.0 - 6.5 : 1

INPUT

Weight	:	290 kg - 350 kg
Age	:	15 - 17 months

OUTPUT

Weight	:	290 kg - 350 kg
Age	:	15 - 17 months
Daily Gain	:	0.6 - 0.8 kg

INPUT

Weight	:	170 kg - 220 kg
Age	:	10 months

OUTPUT

Weight	:	170 kg - 220 kg
Age	:	7 - 9 months
Daily Gain	:	0.65 - 0.75 kg

The grainfed yearling for Japan must be fed on grain for 100 days. Marbling is not a criteria with the production of the grainfed yearling although an intra-muscular fat content of the eye muscle at the grade site of about 3 percent will certainly enhance the acceptability of this specification amongst the Japanese consumers. The chief selling attribute of the yearling is its inherent tenderness and lack of offensive odours. That is, similar to those produced from the Japanese Holstein and US grainfed (120-150 days).

The grainfed yearling is slaughtered at around 18 months so that the meat will be tender. The slaughter age pre-determines the age of entry into the feedlot and backgrounding procedures. Slaughter below 16 months causes the meat colour to be too pink; there is a preference in Japan for the bright red colours (B2) as distinct from 1A. Further as age at slaughter is reduced, so "free" moisture content of the muscles increases, the Japanese loathe "wet, mushy meat".

Care needs to be taken with the maturity patterns of the cattle fed to produce the grainfed yearling. The maturity pattern should not be "too late" otherwise growth may well be achieved to the level that

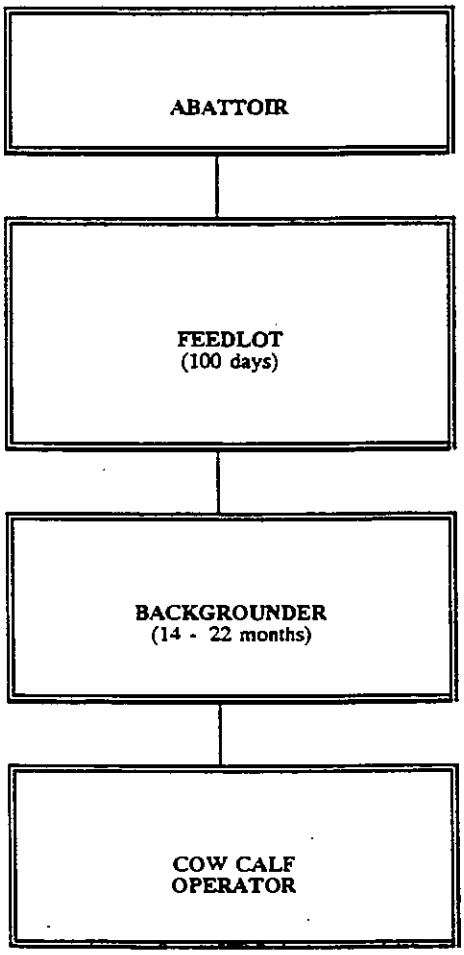
fulfils healthy feedlot profits but prevents any fat deposition over the butt cuts which will then render them susceptible to freezer burn. Likewise it should not be too early which will result in excessive fat deposition and so reduce saleable meat yield. Fat distribution in the lighter weight carcases is an important criteria.

The grainfed yearling specification does not pose for the production system as large a demand on backgrounding as does the B3 and B2. This, coupled with the no marbling requirement, makes it an attractive production system for the future where backgrounding costs are high.

The all-year round supply of grainfed yearlings should not present too much of a problem as they will be able to be drawn from both spring and autumn calving regions, within southern Australia. If a problem were to arise with all year supply, it will be from spring calves in New South Wales. This shortfall could be augmented with steers from SE Queensland. Hopefully in the future heifers might be able to be supplied into this specification provided they can achieve the meat specifications.

Korean Quarter Beef (K1)

The production system for the Korean K1 market segment is as follows:



OUTPUT		
Weight	:	220 - 320 kg
Age	:	Maximum 6 teeth
Fat Depth	:	5 - 10 mm
Saleable Yield	:	70% plus
Sex	:	Steer and heifer
OUTPUT		
Weight	:	400 - 580 kg
Age	:	Maximum 36 months
Daily Gain	:	1.6 kg
FCR (DM basis)	:	6.5 - 7.0: 1
INPUT		
Weight	:	250 - 430 kg
Age	:	24 - 32 months
OUTPUT		
Weight	:	250 - 430 kg
Age	:	24 - 32 months
Daily Gain	:	0.3 - 0.8 kg
INPUT		
Weight	:	150 - 170 kg
Age	:	10 months
OUTPUT		
Weight	:	150 - 170 kg
Age	:	7 - 9 months
Daily Gain	:	0.55 kg

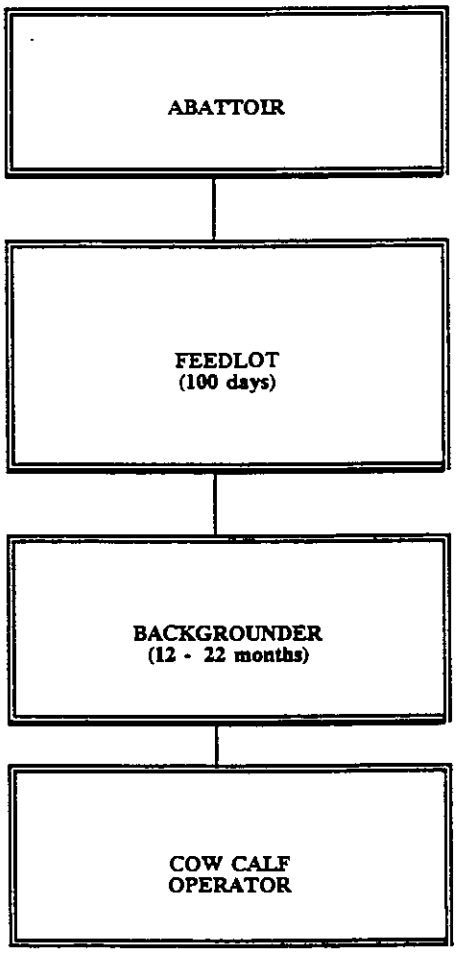
Currently Australia exports frozen grainfed quarter beef to Korea in accordance with the K1 specification and some grainfed fullsets into the SBS system.

There are no breeds excluded from this specification although it is difficult to achieve a "C" or better butt shape with a straight bred dairy steer or heifer and with some straight bred British breed and Bos indicus heifers.

This production system is very achievable, it really does suit the coastal regions where the growth rates at pasture are not all that high. It is expected that the K1 specification will decline in popularity between now and 2001 (liberalisation in Korea). Further given that Korea is a tendered market it is difficult to advise producers and feedlotters to actively seek out this specification.

Korean Fullsets

The production system for the Korean fullset market segment is as follows:



OUTPUT
Weight : 280 - 350 kg
Age : 24 - 36 months (6 teeth)
Fat Depth : 7 - 17 mm
Saleable Yield : 70%
Marble Score : 1
Texture Firmness : 3

OUTPUT
Weight : 500 - 650 kg
Age : 24 - 36 months
Daily Gain : 1.6 plus
FCR (DM basis) : 6.5 - 7.0: 1

INPUT
Weight : 330 - 470 kg
Age : 22 - 32 months

OUTPUT
Weight : 330 - 470 kg
Age : 22 - 32 months
Daily Gain : 0.4 - 0.8 kg

INPUT
Weight : 160 - 190 kg
Age : 10 months

OUTPUT
Weight : 160 - 190 kg
Age : 7 - 9 months
Daily Gain : 0.6 kg

The Korean fullset specification is very similar to the Japanese B1, the preference at this stage would be for the 6-teeth cattle prepared for the Japanese market to be transferred to the Korean fullset market at least until liberalisation. The Australian grainfed industry should continue to strive to ensure that the maximum age of slaughter from the feedlots is 30 months. The Korean fullset

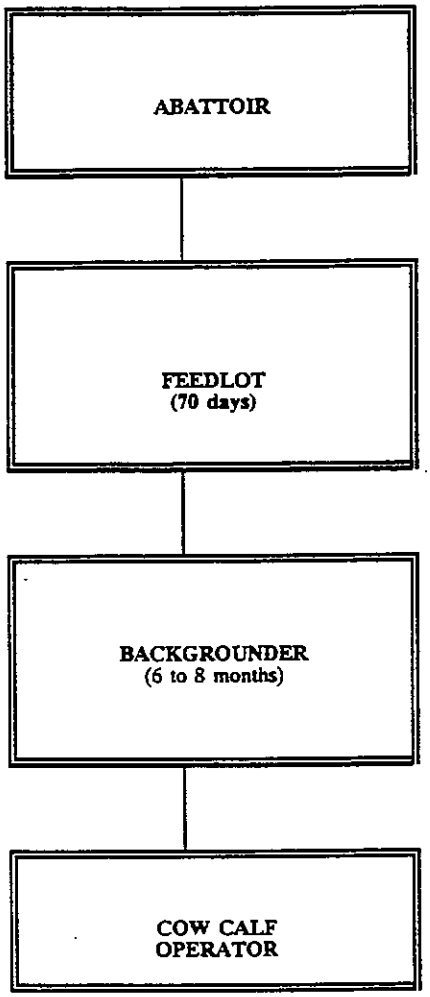
specifications from now until 2001 (liberalisation) will provide a further buffer zone, so that genetics and production systems in Australia can be further streamlined to ensure a maximum age of turn-off that will result in the product having optimal eating qualities.

The Korean's currently do not have a problem with heifers in their P1 and K1 specification. There would appear to be no reason to exclude heifers from the fullset specification provided they can achieve the growth rate and fat (saleable Yield) requirements.

The significant difference between the current Japanese B1 and the Korean fullset specification is the size tolerance. This tolerance does allow producers some latitude in their growth rates at the farm level up to weaning and then during the backgrounding phase. A growth rate of 0.4 kg/day for the backgrounding phase is slow and in future may well be uneconomical, unless it is achieved on unimproved country of low value. As well as the age tolerance there is a wide carcase weight tolerance (280 - 350 kg). However it might be that the carcase weights need reducing for Korea given the fact that the cuisine is different to that of Japan. Prior to liberalisation in Korea it would be essential to determine the required portion and sub-primate sizes and weights so that the carcase weights and then the production sub-systems adjusted accordingly.

Domestic Grainfed Market

The future production system for the domestic grainfed market segment is expected to be as follows:



ABATTOIR

OUTPUT		
Weight	:	240 kg - 260 kg
Age	:	16 - 20 months
Fat Depth:	:	6 - 10mm
Saleable Yield	:	70% plus
Marble Score	:	1.5 - 2.5
Texture Firmness :	4 & 5	

FEEDLOT (70 days)

OUTPUT		
Weight	:	420 kg - 450 kg
Age	:	20 months
Daily Gain	:	1.4 kg
FCR	:	5.5 - 6.5 : 1
INPUT		
Weight	:	330 to 350 kg
Age	:	16 - 18 months

BACKGROUNDER (6 to 8 months)

OUTPUT		
Weight	:	330 to 350 kg
Age	:	16 - 18 months
Daily Gain	:	0.6 kg
INPUT		
Weight	:	170 to 220 kg
Age	:	10 months

COW CALF OPERATOR

OUTPUT		
Weight	:	170 kg - 220 kg
Age	:	7 - 9 months
Daily Gain	:	0.65 kg - 0.75 kg

Droughts, increased competition from chicken and pork plus the desire from retailers (in particular the supermarkets) and food service to supply consumers with a consistent quality product day-in-day-out for 365 days of the year, has seen a major increase in the amount of grainfed beef being produced domestically. This study has identified that there are about twice as many cattle being grain supplemented at pasture and fed in opportunistic feedlots (varying degrees of professionalism) than in being grainfed for 70 days in the major feedlots for domestic consumption.

The Australian consumer appears to have a preference for yearling beef and currently there are two differences to the Japanese grainfed yearling. Firstly, heifers are acceptable in Australia. Therefore the half sisters of steers destined for the Japanese grainfed yearling market (provided they are not required as future breeders) are available for the domestic grainfed system. Importantly the heifers must be able to achieve the target growth rates and specified fat depth requirements. The second difference is that the Australian domestic grainfed slaughter weights are 200 - 220 kg as against the 240 kg weight for the Japanese yearling. It is predicted that this carcase weight will increase in order to achieve greater industry, particularly processing, efficiencies and the schematic production shown

above represents the most likely future system. The supermarkets have already raised their slaughter weights.

The majority of the heifers produced for this specification will be fed for 70 days. Some of the steers, particularly those being fed for the supermarkets targeting the 260 kg carcase may have to be fed for 90 days.

Marbling is not an important criteria for the domestic market but, as is the case with the Japanese grainfed yearling, an intra-muscular fat content of 3 percent will certainly enhance consumer acceptance of this produce. Tenderness is the major selling point and if possible, slaughter should be achieved by 18 - 20 months. Care should be taken if late maturity pattern animals are being incorporated into this specification to increase growth rate on feed and yield, not to forego fat distribution. Some fat to protect the animals during processing will be desirable.

Texture needs to be closely monitored as the "wet mushy" meat, although not all that well understood in Australia by consumers, "dries out" during storage in the refrigerator and most importantly, during cooking. Therefore it is desirable not to reduce slaughter age too far below 16 months.

M112 results indicate that milk teeth animals grow about 7.0 percent faster in the feedlot than the two teeth animals who in turn, grow about 6.5 percent faster than four teeth animals. The faster growing animals are the most efficient converters.

The domestic grainfeeding system will assist in ensuring that Australian consumers are given consistent quality beef day in day out for 365 days of the year.

The backgrounding phase in this production system is of short duration and not as critical as with the longer fed regimes.

5.0 SUPPLY CHALLENGES UNDER GMI SCENARIOS

Under all GMI model Scenarios demand for grainfed and grassfed beef increases. The challenges which this presents in terms of cattle supply at the national level and by market segment are discussed.

5.1 National Supply

From 1994 to 2000 the total number of cattle slaughtered (or in the case of fed cattle, feedlot gate presentation number) rises by 2.6% per annum (from 8.262 million to 9.621 million) for the optimistic Scenario, the highest growth Scenario, and by 1.6% per annum for the pessimistic Scenario, the lowest growth Scenario. Table 4.12 presents total number of slaughter, or feedlot entry cattle for all Scenarios.

Table 4.12 TOTAL SLAUGHTER OR FEEDLOT GATE PRESENTATION NUMBERS BY SCENARIO

Scenario or Sensitivity test	Number of cattle required by 2000 ('000 head)	Annual Growth 1994-2000	Number of cattle required by 2005 ('000 head)	Growth 2000-2005
1.Baseline	9333	2.0%	10098	1.6%
2.Optimistic	9621	2.6%	10495	1.7%
3.Pessimistic	9081	1.6%	9545	1.0%
4.FMD free S.America	9259	1.9%	9965	1.5%
5.High wool price	9176	1.8%	10099	1.9%
6.Productivity improvement	9563	2.5%	10343	1.6%
7.Decline in Japanese dairy steer	9422	2.2%	10262	1.7%
8.Increased domestic grainfed & export mix shift	9285	2.0%	10035	1.6%

All slaughtering projections assume there is no increase in domestic slaughter weights for grainfed beef although implicit in Scenario 8 is an increase in the average slaughter weight of domestic disappearance as more grainfed cattle at a higher weight, relative to grassfed are slaughtered. However, the total slaughterings in Scenario 8 are reduced very little, compared to the Baseline, because of a projected increase in yearling grainfed beef at the expense of the heavier carcase of B1s.

Given the historical growth of the Australian beef herd production (see Table 4.1) these growth rates in cattle supply would seem achievable. However when analysed more closely, the GMI Baseline is suggesting the supply in grassfed cattle will have to increase 1.8 times faster than for grainfed which may not be achievable given the likely contraction of grassland area available for cattle through environmental degradation and the threats of Mabo and given that productivity increase in recent years has been primarily feedlot driven. Scenario 8 with a moderate growth in total slaughtering requirements (2% pa) is arguably more achievable in terms of resource utilisation because it requires grassfed supply to increase at only 0.98% per annum and grainfed supply at 4.78% per annum.

5.2 Japanese B3 Grainfed Market Segment

From 1994 to 2000 the number of feeder steers required for B3 production is expected to increase from 174,000 head to 202,000 head (2.5% per annum) for the Baseline Scenario, to 291,000 head (8.9% per annum)) for the productivity increase Scenario, the highest growth Scenario, and to

197,000 head (2.1% per annum) for the pessimistic Scenario, the lowest growth Scenario. Table 4.13 refers.

Table 4.13 FEEDLOT GATE PRESENTATION NUMBERS BY SCENARIO FOR JAPANESE B3 MARKET SEGMENT

Scenario or Sensitivity test	Number of cattle required by 2000 ('000 head)	Annual Growth 1994-2000	Number of cattle required by 2005 ('000 head)	Growth 2000-2005
1.Baseline	202	2.5%	209	0.7%
2.Optimistic	227	4.5%	226	0
3.Pessimistic	197	2.1%	167	-3.2%
4.FMD free S.America	208	3.0%	185	-2.3%
5.High wool price	204	2.5%	189	-1.5%
6.Productivity improvement	291	8.9%	262	-2.1%
7.Decline in Japanese dairy steer	211	3.3%	194	1.7%
8.Increased domestic grainfed & export mix shift	219	3.9%	227	0.7%

The total annual crop of calves suitable for B3 production (Angus, Murray Grey and Shorthorn) has been calculated for the high rainfall and sheep/wheat area of NSW, for Victoria, for South Australia (excluding the Eyre Peninsula) and for the whole of other States using our herd models (Appendix A, Table 32) and 1987 ABS breed composition data (Appendix A, Table 19). The supply of calves suitable for the B3 market segment is as follows:

State	No. B3 Calves
New South Wales	166,000
Victoria	102,000
South Australia	62,000
Tasmania	24,000
Western Australia	85,000
Queensland	31,000
TOTAL	408,000

These data show the southern supply region is currently the nursery for the production of B3 feeder calves within Australia, producing 87 percent, 354,000 head of the Angus, Murray Grey and

Shorthorn calves within reasonable proximity of eastern State the feedlots. Thus B3 production in 1994, requiring 174,000 feeder steers, represents about 50 percent of the calf output from the preferred breeds. By year 2000 feedlot throughput would amount to over 60 percent of the B3 calf crop unless a significant expansion in breed numbers or a decline in loss by downgrading was achieved or the breed imperatives relaxed. It would seem that the shift to the Riverina of those feedlotter/processors targeting the B3 market in Japan is totally warranted. Under an expanded B3 market Scenario a strategic planning imperative would be to expand the numeric base of the preferred breed and/or genetically improve the breeds to reduce downgrading loss.

5.3 Other Grainfed Export Market Segments

For the other grainfed export market segments (Japanese B2, B1 and yearling and Korean) the feedlot specification are less breed specific. Notwithstanding these market segments require the cattle feeder input by year 2000 to increase from 615,000 head to 748,000 head (3.3% per annum) for the Baseline, to 1,065,000 head (9.58% per annum) for the productivity increase Scenario, the highest growth rate Scenario, and to 761,000 head (3.6% per annum) for Scenario 8 in which there is an increase in domestic grainfed and a relative shift in mix of export grainfed. Table 4.14 refers.

Table 4.14 FEEDLOT GATE PRESENTATION NUMBERS BY SCENARIO FOR JAPANESE B2, B1, GRAINFED YEARLING AND KOREAN MARKET SEGMENTS

Scenario or Sensitivity test	Number of cattle required by 2000 ('000 head)	Annual Growth 1994-2000	Number of cattle required by 2005 ('000 head)	Growth 2000-2005
1.Baseline	748	3.3%	802	1.4%
2.Optimistic	834	5.2%	900	1.5%
3.Pessimistic	723	2.7%	706	-0.4%
4.FMD free S.America	753	3.4%	751	-0.1%
5.High wool price	743	3.2%	766	0.6%
6.Productivity improvement	1065	9.6%	1069	0.1%
7.Decline in Japanese dairy steer	766	3.7%	772	0.2%
8.Increased domestic grainfed & export mix shift	761	3.6%	815	1.3%

Gross cattle supply for these market segments are less likely to present difficulties, although increasing pressure will be on changing the genetic profile of the Australian herd to better suit performance on feedlot, without diminishing the performance in the breeding herds.

Most of the B2 and B1 increase is expected to be sourced from the northern supply zone where in 1993 1.4 million steer calves suitable for these market segments were produced. A greater capacity to increase productivity in the north and the already strongly developed feedlot culture would favour the northern supply region for future expansion of supply to this market segment. However there are regions within New South Wales that will produce some B2 type feeders. The high rainfall coastal region that now has similar genotypes to much of the Queensland breeding areas, has the potential to become a recognised nursery for the production of B2 type feeder steers in southern Australia and would, in terms of seasonality of supply, complement the northern supply region.

In excess of 90 percent of all steers produced in southern Australia, excluding Tasmania and Western Australian agricultural zone would be eligible for the production of grainfed yearling for export. That is 2.2 million. However, given that 313,000 Angus, Murray Grey and Shorthorns will be target produced for B3 production and about 1 million for B2 production, then there is the scope for about 900,000 steers being available for B1 and Grainfed Yearling. Given that Queensland will dominate in B1 production, then there is an opportunity for about 750,000 steers from southern Australia available for producing grainfed steers for export and domestic. Competing with the grainfed yearling will be the domestic yearling (grain and grass finished), pasture fed high quality bullocks for Japan, Canada and EC. Ultimately it will be price paid that will determine the likely grainfed yearling proportion of this residual 900,000 (assuming that the price for the B3 and B2 feeders will be the highest price and will therefore establish them as priority specifications).

5.4 Domestic Grainfed Market Segment

From industry interview the domestic grainfed market segment was estimated to account for 37 percent of the cattle slaughtered for domestic consumption amounting to 1.213 million head in 1993. Feed-on cattle required to meet this consumption was estimated to require 394,000 head in the >70 feeding regime and 819,000 in the grain supplemented regime. For the Baseline, in which the proportion of domestic grainfed to grassfed remains constant, total feeder cattle requirements by year 2000 increased to 1.243 million (0.4% per annum increase). Of these 404,000 head would come from the >70 feeding regime. For Scenario 8, in which the domestic grainfed share was increased to 50 percent in line with retailers expectations, the cattle requirements by year 2000 increased to 1.669 million (5.4% per annum increase). Of these 542,000 would come from the >70 feeding regime.

As heifers as well as steers are acceptable in the domestic grainfed market, the 2.5 million surplus heifers produced in Australia (Appendix A, Table 32) will provide a major proportion of the domestic offtake.

6.0 THE CONSTRAINT OF BACKGROUNDING

'Backgrounding' is the term used to describe the growing out of weaner cattle to feedlot entry weights. In Australia, backgrounding does not usually include 'preconditioning' whereby cattle are trained onto feed and most feedlots dislike preconditioned cattle. The feedlotter may buy the cattle prior to backgrounding or the cattle breeder may own the cattle through the backgrounding phase.

From the point of view of cattle supply, it is suggested that a well-established backgrounding industry has four main effects: (a) smoothing seasonability of supply of cattle into the feedlot, (b) culling potentially poor performers, (c) regulating pre-feedlot growth rates to avoid over-fatness at feedlot entry, and (d) bulking up of small drafts of cattle, particularly in southern Australia, to feedlot pen multiples. Particularly for the feedlotter/meat processor who owns the cattle in the feedlot, there are obvious financial and risk averting advantages to be obtained from facilitating the expansion of dedicated backgrounding enterprises.

The objectives of backgrounding vary in emphasis for animals destined for different markets. For example, the main objectives of backgrounding animals for the B3 market is to ensure they are not overfat and are structurally sound at feedlot entry weight. For the Japanese B2 and B1 markets, more rigorous culling of poor performers on weight gain can be applied. For cattle going into the Korean market, which at the moment has a wide slaughter age tolerance, a dedicated backgrounding phase is less critical because lower growth rates up to feedlot entry can be tolerated. For cattle going into the yearling grainfed market, the length of the backgrounding phase is very short to zero and not critical provided the cattle are adequately weaned.

Backgrounding is expected to grow as a specialist farm activity in both the southern and northern supply region and virtually all the major feedlotters are now involved in some form of backgrounding. Large corporate cattle breeders in the northern supply region, who are vertically linked into a feedlot or who are committed to targeting the Japanese B2 and B1 grainfed market, have acquired property or put in specialised backgrounding capacity or have custom backgrounding contracts with specialist backgrounders. In the south the common practice is for feedlotters to contract on a weight gain basis, with farmers to bring the feedlotters' weaner cattle up to feedlot entry weight.

For the age-critical market segments (Japanese B3, B2 and B1) the backgrounding phase requires the 7 - 9 month old weaner to keep growing at 0.6 to 0.75 kg per day until, depending upon the target market, they are 16 - 22 months old weighing 330 to 500 kg liveweight. These weight gains are readily obtainable during the growing season on improved dryland pasture in the south and north of Australia but inevitably, at some time of the year, supplementary feeding or irrigated forage production is required.

In the southern supply region it is expected that cattle bred in high rainfall northern, central and southern tablelands will be backgrounded on the more favourable adjacent slopes using grazing oats and/or winter pastures such as phalaris, rye grass and clover. The other option is for tableland bred cattle to be background fed on the irrigation country of the Lachlan, Murrumbidgee and Murray systems. The feedstuff utilised here may well include pasture, or as is starting to occur, maize silage.

In the northern supply region, the backgrounding operation is preferably located in the endowed (sheep/wheat) or high rainfall zones where fail-safe weight gains can be achieved by supplementary feeding. In the northern supply region there is an array of options for reaching 0.6 kg/day liveweight gain during the dry season, including sorghum silage, fortified molasses (eg M3U + cottonseed meal + Rumensin), whole cotton seed, and special purpose stand-over pastures (e.g. Leucaena or ponded pastures). Although initially driven by drought feeding, on-farm supplementary feeding infrastructure is now common place on beef cattle breeding properties in coastal and sub-coastal Queensland. Thus, in these areas the move to production feeding of weaners for feedlot entry is, in capital terms, painless and, given the right price signals for feedlot entry cattle, could evolve rapidly.

In the tropics, a good correlation between weight gain of weaners at the backgrounding phase and feed conversion in the feedlot[7] enables preselection of good performers before they go onto feed. One of the vertically integrated corporate breeder/feedlotter interviewed in this research is weighing weaners onto the backgrounding property and re-weighing three months later. The top one-third go onto feedlot, the middle on-third onto crop finishing and the bottom one-third onto grass finishing. It is noteworthy that there is a better correlation between cattle growth rate on grass and feedlot feed conversion than the reverse. In other words, breeding for high feed conversion on the feedlot is best done in the backgrounding phase if mutual advantage to the breeder and feedlotter is to be achieved in the tropics.

An expansion of backgrounding feeding in the endowed (sheep/wheat) zones will probably necessitate backgrounding substituting for some cattle breeding activities. The offset to this is that cattle will be turned off breeding regions earlier and a corresponding increase in breeder herd size will occur in the later. Increased backgrounding capacity will be critical to sustainable expansion of the Australian cattle industry to meet both grainfed and grassfed future markets.

Under all Scenarios an expansion of grass finishing and backgrounding capacity is required and competition for quality grassland (in more climatically secure environments) between feedlot backgrounding and grass finishing, will increase.

The endowed (sheep/wheat) regions of Australia are the discretionary regions for breeding, grass finishing and feedlot backgrounding. Here the on-farm mix of beef activities will be determined by the relative profitability of the three, and the perceived risk-spreading which arises from diversifying

[7] Heather Burrows, CSIRO, Rockhampton, personal communication

into two or more activities. Substitution between alternative activities, as well as absolute expansion in capacity, will occur.

Backgrounding is an essential requirement for cattle destined for the Japanese B3, B2 and B1 grainfed markets whereby the cattle have to be grown out from weaning to a feedlot entry weight of around 400 kg. Ignoring the yearling grainfed animal (export and domestic) as requiring substantial backgrounding capacity, the increase in the backgrounding carrying capacity for three example Scenarios by year 2000, is shown in Table 4.15

Table 4.15 INCREMENTAL BACKGROUNDING CAPACITY FOR THREE SCENARIOS IN YEAR 2000

Market Segment	Scenario	Average Period Backgrounding (months)	Incremental Backgrounding Carrying Capacity ('000 AE)
Japanese B3	Baseline	9	21
	Optimistic	9	40
	8. Market segment shift	9	34
Japanese B2 & B1	Baseline	11	66
	Optimistic	11	125
	8. Market segment shift	11	48

Given endowed zone dryland sown pasture carrying capacities of say 2.5 ha/AE and 2.0 ha/AE respectively, for the northern and southern supply regions, and with all the B3s backgrounded in the southern region but otherwise 50 percent share of backgrounding between the regions, these data indicate that for the Baseline Scenario there would be a need for an additional 82,500 hectares in the northern region and 105,000 hectares in the southern region to background cattle in year 2000. In practice, supplementary feeding, irrigated forage production and use of forage crops will moderate the area required.

7.0 OPTIONS FOR IMPROVING FEEDER CATTLE SUPPLY

Improving feeder cattle supply will be achieved by either:

- increasing size of national herd; or
- increasing the supply of calves out of the breeding herds.

Given that the carrying capacity of dedicated beef cattle country is fully exploited, and the competitive position of beef cattle, relative to other land-resourced enterprises does not improve, improvement in the supply of feeder cattle will necessarily come from an increased offtake from existing cattle country. While intensification through pasture improvement, fodder conservation and irrigation will continue, increase in productivity by these measures will be slow and unlikely to be big shifters by year 2000. Here we have looked at options which could conceivably impact by year 2000, and indeed options which are already beginning to be applied by industry in response to the changing signals from the beef market. The impact of four possible options (3 in the north and 1 in the south) for improving supply of calves out of breeder herds (beef and dairy) have been considered. These are:

- stratification: earlier transfer of sale cattle from the pastoral (harsh) zone to the sheep/wheat (endowed) zone in northern Australia;
- substituting grass finishing in the sheep/wheat (endowed) zone with feedlotting, that is, turning a steer off grass a year earlier in northern Australia;
- increased branding rates in northern Australia; and
- increased grainfed dairy steer numbers in southern Australia.

All these options require extra backgrounding or will substitute existing cattle enterprises. Estimates are made of production foregone using steady state herd models, with and without, the particular option. Impact of the supply options is evaluated from the physical and biological viewpoint, not from the financial viewpoint. Ultimately, whether any change takes place will be driven by an increase in sustainable profit.

7.1 Stratification

Stratification is the process whereby young sale cattle are moved off dedicated breeding properties to properties elsewhere for growing-out/backgrounding and/or finishing. It is a common practice in the north, particularly amongst corporate property owners but it is implemented with varying degrees of rigor.

In the pastoral zone of the northern supply region, there were approximately 3.662 million cattle in total in March, 1993 excluding herds supplying live export. Eighty three percent of these (3.043 million) are in the preferred supply region (see Appendix B, Map 1(c)) and are not high grade Brahmans. Our survey of the corporate enterprises suggests that about 14 percent of properties breed and turn off 12-24 month old cattle and about 26 percent turn off weaners less than 12 months. We estimate that the majority of the single property owner-operators would turn off 12-24 month old cattle. If one-third of this herd, that is one million head, reduced the age of turn-off by 12 months

and increased the number of breeders to take up the surplus carrying capacity, the following effect on offtake would apply:

	Enterprise 12-24 month turnoff ('000)	Enterprise ≤ 12 month turnoff ('000)	Change ('000)
Cows & heifers mated	569	692	+123
Cows & heifers sold	146	178	+ 32
Steers & bullocks transferred(sold)	169	216	+ 47

It might be reasonably assumed that the heifer component of this offtake would go straight to feedlots for the domestic grainfed yearling trade. On the other hand, the 47,000 steers would most likely be headed for the B2 market and therefore require backgrounding. It is likely they would be moved to the endowed region requiring an additional 38,000 AE carrying capacity. How this would be provided is problematical. Extra feed could be created (e.g. by forage cropping, sorghum silage etc) or alternatively substitution of an existing cattle enterprise may occur. Assuming the 38,000 AE fully substitutes for a breeding enterprise which produces grass finished Japanese ox, the offtake foregone would be, according to our models, approximately 6,600 Japanese ox and 6,500 cull cows and heifers.

By year 2000, an extra 72,000 B2 and B1 grainfed steers will be required under the Baseline Scenario and an extra 136,000 under the Optimistic Scenario. This option, fully implemented, would contribute 65 percent of the year 2000 requirement of B2 and B1 grainfed steers under the Baseline Scenario and 35 percent under the Optimistic Scenario.

7.2 Substitution

Substitution is defined here as the replacement of a breeding enterprise which principally targets the grassfed Japanese ox market, with a breeding enterprise which turns-off feedlot entry steers of 400 kg. The example here assumes the production coefficients of the northern endowed zone (see Appendix B, Map 1(b)).

In the sheep/wheat (endowed zone) of the northern supply region there were some 3.280 million cattle comprising 1.538 females more than 1 year on 31 March,1993. These produce annually about 500,000 male calves (Table 4.5) not required for bull replacements, and which are Indicus composites or Taurus. A dominant cattle enterprise in this region is to turnoff grassfed Japanese ox. One option

is for these producers to switch, totally, or in part, to selling a feedlot entry steer of 400 kg liveweight which can be turned off 12 months earlier.

Price will obviously determine the choice of target market but it could make economic sense for such producers with an abundance of brigalow and downs grassland to diversify out of a totally grassfed outlet. Ideally, such producers would select their better performing cattle for feedlot destination and retain the slower performing tail for grass finishing.

Turning off a draft of younger animals means that extra breeders could be carried. Our herd modelling shows that if herds totalling 320,000 head (10 percent of the 3.2 million cattle herd) changed their enterprise from producing a grass finished Japanese ox to feedlot entry steer, the following change to the herd and offtake profile would apply:

	Enterprise Jap Ox ('000)	Enterprise Feeder Steer ('000)	Change ('000)
Cows & heifers mated	144	222	+ 78
Cows & heifers sold	49	76	+ 27
Japanese ox sold	51	0	- 51
Feeder steers sold	0	82	+ 82

This option, fully implemented, would alone contribute more (107 percent) than the Baseline Scenario requirement of B2 & B1 feeder steers required by year 2000 and 60 percent of the requirement under Optimistic Scenario.

From a national supply viewpoint, cow and cull heifer sales increase and total meat production would increase. From the producers viewpoint it may make good economic sense to diversify and target both markets. As with the stratification option, production foregone is in the turnoff of grassfed Japanese ox.

7.3 Increased Branding Rates

This option is most likely to apply to the northern supply region where branding rates are lower than in the south. In the preferred northern feedlot supply region there were 3.87 million female cattle more than 1 year on 31 March,1993. The effective female herd size, after correction for EVAO in the ABS statistics and deducting the high grade Brahman animals, amounted to 3.89 million. An increase in branding rate of 2 percent across all production sub regions would increase output of feeder steer calves by 36,000 and surplus heifer calves by 32,000. If all the extra steers were backgrounded in the endowed zone and sent to feedlots to produce B2/B1s, the offtake balance sheet would approximate the following:

Extra B2s or B1s ex feedlot after mortality	:	36,000
Extra surplus heifers	:	32,000
Loss of Japanese ox sales	:	4,700

7.4 Increased Grainfed Dairy Steer Numbers

In 1993, about 600,000 dairy bull calves were slaughtered in Australia. It is estimated that all but about 3 percent of these were slaughtered as trade bobby calves with an average weight of 40 kg. Of the 3 percent which were grown out, some were grass finished, some used as breeder replacements for vealer herds and a small percentage entering feedlots for grain finishing. On meat industry efficiency grounds there is a *prima facie* case to grow out more bobby calves and slaughter at heavier weights and it is postulated that grainfed dairy beef could be growth market. A number of Projects around Australia are looking at this prospect. Some industry experts are more sanguine about the opportunities. While they acknowledge that grainfed dairy beef is a developing market its development will be tempered by two factors:

- price incentives to artificially rear an animal for feedlot entry;
- growth & feed conversion rate of grainfed dairy beef.

The implication for the feedlot industry, particularly in southern Australia where the dairy industry is concentrated, is that there is a possible untapped source of feeder inputs, but this source will need commercial wooing and development.

The State where the greatest impact from the development of a dairy grainfed beef industry would be Victoria where almost 60 percent of the Australian dairy herd resides. For Victoria, the total dairy bobby calf slaughter represents about 50 percent of the supply of steer and surplus heifers coming out of beef cattle herds and, if developed, could have a significant impact on feeder supply to southern feedlots.

The logical market for grainfed dairy beef is Japan where local production from dairy steers is predicted to decline. Given that about half of the beef sold into the middle market in Japan is sourced from domestic dairy steer it is reasonable to expect the consumers to have an affinity for dairy beef. This is in fact the case and consumers do have a preference for dairy beef of the B2 and B3 grade over and above US beef and the majority of Australian grainfed beef (see M075 "Sensory Analysis of Fresh Beef in Japan" in MRC sponsored Project).

The fact that there is a positive affiliation amongst Japanese consumers toward dairy beef augers well for countries, in particular Australia, wishing to augment supply onto the expanding beef market in Japan. Significantly, 90 percent of the dairy cattle in Australia are Holsteins, the majority of which have been infused with North American blood, in particular Canadian, to improve milk yields.

Similar infusions have occurred in Japan, therefore the genetic base is similar in both countries. It is reasonable to assume then, that given adequate rearing and feeding systems in Australia, that similar carcase qualities, such as yield and meat quality, in particular marbling and texture, to those achieved in Japan will be produced in Australia. Interestingly, of the dairy steer carcases graded in Japan, approximately 40 percent grade B3, that is achieve a marble score of 3 or 4 (LIPC data).

Australia can logically utilise some of the 600,000 bobby calves currently slaughtered at 3.5 days of age to assist offset any shortfall in supply. There is likely to be a larger opportunity for Australia in the B3 rather than the B2 market due to:

- A totally production driven move in the US to reduce age at slaughter. In reducing age at slaughter from 17 - 18 months to 16 months it is becoming increasingly difficult for the US to achieve marble scores of 3 and 4. Marbling is maturity related and the optimum age for marbling to express itself (in relation to other tenderness and quality factors eg connective tissue increase, meat colour) is 24 to 28 months. It is noted that the Japanese slaughter their dairy steers at two years.

- Cost of production in Japan. It is becoming less and less viable for Japanese producers to grow dairy steers and, there is an increasing tendency for the dairy steer producer use Wagyu bulls in the hope they will achieve higher quality grades than the B3.

The great majority of these calves are located in Victoria and along the Murray Irrigation System (Dairy Beef for Export Markets DAN 068 a MRC sponsored Project). Unfortunately this resource will not be all that simple to harness. The establishment of the infrastructure to assemble these calves, to rear them to grass eating age and to grow them out to feedlot entry age/weight specifications will involve significant investment. Further the feed conversion rates of the Holsteins on feed have been reported as high as 14:1 which would make the exercise totally unpalatable to any prospective feedlotter. The DAN068 Validation Project is investigating this conversion issue, plus other relevant problems such as dark meat colour, odd shaped primal cuts and variability in eye area.

The new generation feedlots, that is those located in the Riverina region of New South Wales are well situated to this dairy calf resource. Further a large percentage of these companies with feedlots in the Riverina are targeting the B3 market. The downside still remains and that is the establishment of a cost-effective rearing system.

7.5 Summary

The impact of the three options for which offtake changes were modelled is summarised in Table 4.16.

Table 4.16 SUMMARY IMPACT OF OPTIONS TO INCREASE FEEDER CATTLE SUPPLY

Option	Extra B2/B1 feeder steers ('000 head)	Extra cull cows and cull heifers ('000 head)	Loss of Japanese ox production ('000 head)
Northern stratification	47	32	7
Substitution in endowed zone	82	27	51
Increased branding by 2%	36	32	5
Total change	**165**	**91**	**63**
Extra B2/B1 steers required by 2000 under Scenarios:			
- Baseline	72		
- Optimistic	136		

From this analysis we conclude that the incremental supply of feeder steers of the B2/B1 type required Australia wide by year 2000 is achievable by the options considered. The penalty cost will be a decline in the production capacity of Japanese ox finished on quality grassland in the endowed zone but the net effect is an overall increase in beef production, not only in the B2/B1 market segment but in the market segment which would receive additional cull cows and surplus heifers which would be both the manufacturing segment and the market which will accept heifers - the domestic grainfed and Korean markets. The overall constraint to the implementation of these options is one of confidence and financial advantage perceived by the breeder to make the necessary farm activity change. This will require on-going promotion by the feedlot sector and the provision of incentives such as the provision of forward selling agreements and price incentives to the supplier. Finally, the assessments done here are based on steady state models but in reality for a breeder to sell younger cattle requires, not only the divestment of older male cattle, but the retention of more replacement heifers to enable a build-up in the size of the cow herd. The immediate post-drought period, when most properties have already unloaded older male cattle and are looking for early cash flow, could be an opportune time for the feedlot industry to pro-actively push its case.

8.0 OPTIONS FOR DECREASING FEEDER CATTLE DEMAND

Two options exist for decreasing feeder cattle demand:

- increased domestic slaughter weights; and
- reduction of downgrading/improved backgrounding.

8.1 Increased Domestic Slaughter Weight

Currently there are in the order of 390,000 yearlings being grainfed in registered feedlots in Australia for domestic consumption. The slaughter weights range from 200 - 220 kg averaging 210 kgs. The major supermarket chains in Australia are actively promoting a 240 kg yearling carcase for distribution through their retail outlets. There are significant benefits to accrue to producers, feedlotters, processors and the retailers in terms of efficiencies by moving to a 240 kg grainfed carcase. Care would need to be taken to ensure that the increase in carcase weight was not achieved by simply putting on additional fat. Also, prior to the move, cryovacing, grading, improved carcase fabrication techniques and quality assurance programs need implementing. It would be important that retailers do not simply use larger traditional cuts to "dispose" of the heavier carcase. Consumers are moving toward purchasing smaller cuts of meat and selecting a wider variety of cuts for a broader spectrum of meal preparation techniques.

The increasing numbers of Asians in Australia now makes it possible to prepare the traditional low valued forequarter cuts into slices and cubes for use in traditional Asian cuisine. The larger offcuts, shins, shanks, knuckles etc. can either be exported to Taiwan or minced for sale at retail in Australia.

In registered feedlots cattle produced for the domestic market on a > 70 day feeding regime were estimated at 390,000 head in 1994. At an average slaughter weight of 210 kg would have produced 81,900 kt cwe of beef and, 54,873 kt boneout beef at a saleable meat yield of 67 percent. By increasing the carcase weight to the preferred supermarket requirement of 240 kg, the number of cattle required in 1994 would have been reduced by 12.5 percent to 341,250 head. In addition, if the yield was increased from 67 percent to 69 percent, the required number of cattle would have been further reduced to 331,359 head which is 15 percent lower than required at 210 kg slaughter weight and 67 percent yield. Table 4.17 refers.

Table 4.17 EFFECT OF INCREASING SLAUGHTER WEIGHT AND YIELD ON DOMESTIC SLAUGHTER NUMBERS IN REGISTERED FEEDLOTS IN 1994

	Average Slaughter Weight 210 kg in 1994	What if average slaughter weight increased to 240 kg
Saleable meat yield in 1994 67%	390,000 head 81.900 kt cwe 54.873 kt sm/1	341,250 head (-12.5%) 81.900 kt cwe 54.873 kt sm
What if saleable meat yield increased to 69 %	378,695 head (-2.9%) 79.526 kt cwe 54.873 kt sm	331,359 head (-15.0%) 79.526 kt cwe 54.873 kt sm

/1 sm = saleable meat being the estimated 1994 situation.

Cattle grain supplemented in unregistered opportunist feedlots destined for the domestic market amounted to 811,000 head in 1994. At an average 210 kg slaughter weight, these cattle would

produce 170.31 kt cwe and 114.108 kt saleable meat at 67 percent yield. To increase the weight and yield of cattle on opportunist feedlots or supplemented at pasture would be much more difficult. Assuming the carcase weight could be increased to say 220 kg, the number of feeder cattle would have been reduced from 811,000 head to 774,136, a reduction of 4.5 percent. If increasing yield to 69 percent was possible the required number of cattle would be further reduced to 751,700 being 7.5 percent lower than required at 210 kg dressed weight and 67 percent yield. Table 4.18 refers.

Table 4.18 EFFECT OF INCREASING SLAUGHTER WEIGHT AND YIELD ON DOMESTIC SLAUGHTER NUMBERS IN OPPORTUNIST FEEDLOTS IN 1994

	Average Slaughter Weight 210 kg in 1994	What if average slaughter weight increased to 220 kg
Saleable meat yield in 1994 67%	811,000 head 170,310 kt cwe 114.108 kt sm/1	774,136 head (-4.5%) 170.310 kt cwe 114.108 kt sm
What if saleable meat yield increased to 69 %?	787,495 head (-2.9%) 165.374 kt cwe 114.108 kt sm	751,700 head (-7.3%) 165.374 kt cwe 114.108 kt sm

/1 sm = saleable meat being the estimated 1994 situation.

By year 2000 the advantage of higher slaughter weights and yield in terms of reduced demand for feeder cattle would be dramatic. The impact is summarised in Table 4.19.

Table 4.19 DOMESTIC GRAINFED CATTLE REQUIREMENTS IN YEAR 2000 WITH AND WITHOUT WEIGHT AND YIELD INCREASES

	Baseline Scenario		Scenario 8: Grainfed Domestic Market 50 % by Year 2000	
	>70 on feed ('000 head)	Grain supplemented ('000 head)	> 70 days on feed ('000 head)	Grain supplemented ('000 head)
Number of cattle required at existing slaughter weights and yields	400	830	496	1033
Number of cattle required at higher slaughter weights and yields	340	769	422	958
Reduction in number of cattle required	-60	-61	-74	-75

This analysis highlights the value of increased slaughter weights and yield in a feeder supply constrained environment and the merit of the feedlot industry facilitating the genetic development of cattle which are high yielding and develop the required fat depth at the higher target slaughter weights.

8.2 Reduction of Downgrading and Improved Backgrounding

At present it is estimated that of the cattle leading feedlots into the B3 market, an extra 55 percent enter as feed-on steers to compensate for downgrading. For the cattle exiting as B2s an extra 35 percent need to enter as feed-on steers to compensate for the downgrading to B2s. The total number of dedicated feed-on steers required for the B2 market segment is reduced by the bonus of downgrades from B3s but notwithstanding a surplus of dedicated B2 steers is required to meet the market. As a result of the downgrades from B2 to B1, fewer dedicated B1s are required and because there is no downgrading beyond B1s, the total number of feeder cattle required for the aggregate B3+B2+B1 market remains the same regardless of the downgrading percent. The demand for feed-on steers required for the specific B3 and B2 market segments could be significantly reduced if the downgrading percent was decreased.

We have suggested that a reasonable goal would be to reduce downgrading by 20 percent, that is the B3 downgrades from 55 to 35 percent and the B2s from 35 to 15 percent. The impact of this for the Baseline in year 2000 would be as follows:

B3 feeder steers required	- 28,000	(-14%)
B2 feeder steers required	- 34,000	(-10%)
B1 feeder steers required	+ 62,000	(+32%)
Total change in feeder steers	0	

This will be primarily achieved by genetic improvement in the source breeding herds and to some extent by culling in the backgrounding phase.

The advent of more specialised backgrounding operations could be expected to assist in reducing the demand for feeder steers by reducing the culling and downgrading rate in feedlots. Financial incentives for the small owner/operator in the endowed regions to specialise in backgrounding, and forego breeding, appear to be attractive particularly on a contract basis where the cattle are owned by the feedlotter. In the southern region it has been suggested that returns on investment from backgrounding enterprises could be 14 to 20 percent compared to modern breeding returns of 6 to 7 percent.

Interviewed corporate cattle breeders in the northern supply region with their breeding activity focused in the pastoral zone are targeting the grainfed market to varying degrees. Those seriously targeting the grainfed market have acquired backgrounding properties with high feed security close

to the feedlot belt. Some have put in a feedlot and switched, in part, from grass finishing to grain finishing and taken up the grass finishing carrying capacity with breeders but with backgrounding still in the low feed security pastoral zone.

There is commercial advantage to the feedlot sector to promote the concept of backgrounding to regulate the flow and preselect cattle for feedlot entry. Adequate premiums for well backgrounded cattle meeting rigorous feedlot entry specifications will be the main drive to the future development of this activity in the cattle supply chain. Where ownership changes hands at the feedlot gate, it is important for the feedlotter to offer feedback on carcase performance to the backgrounder/supplier if a culture of commercially driven genetic improvement of cattle is to develop to the mutual benefit of the feedlotter and the supplier.

MODULE 5

GRAIN AND OTHER FEED SUPPLY

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1. INTRODUCTION

1.1 The Purpose of Module 5

The main purpose of this module is to determine the likely availability of feed supplies and from where it could be sourced. Particular attention is given to those regions where feedlots have been established and where additional development is likely to take place.

Access to regular feed supplies of specific quality and within a reasonable price range is of vital concern to the feedlot industry. Here, we attempts to determine whether such conditions will prevail in the feed grain industry over the next 5 to 10 years. It has to be kept in mind that the developing feedlot industry must compete with other well-established livestock industries specifically the poultry, pig, and dairy industries for both feed grains and concentrate feed supplies.

1.2 Data Availability and Quality

Crop production and crop areas are taken from the ABS agricultural census by ABARE reports and relevant statistics for crop projections are also used. With the recently concluded GATT Uruguay Round we have drawn on ABARE interpretations of possible effect on Australia's grain industries in the short to medium-term to assist with projections of future supplies and prices.

Grain traders and producers in the private sector have made available their trading figures and production estimates for various regions. These figures have been of particular value in cross-checking other production statistics. Feedlot operators interviewed have provided information on grain, roughage and concentrate procurement programs, ration formulation, and feedlot consumption patterns. These figures have been used to form the basis for calculating future feed demands for the industry.

1.3 Approach

Australian crop plantings and production figures for the seven years up until 1992/93 have been examined to establish any significant production trends over this period. The ABS figures for 1993/94 were not available at the time of writing this report. Particular attention has been paid to coarse grain production particularly barley and sorghum, but as they are often sown in direct competition with other cereal, oilseed and grain legume crops these production trends have also been examined.

Three regions in which the major feedlots have been established are the Darling Downs, Northern New South Wales (north west slope), the Western Riverina/Murrumbidgee Area of NSW have been identified (Appendix B, Map 8). The commercial feedlots in these regions account for

approximately 85% of all animals being fed in Australian feedlots at the present time. In the two northern regions both winter and summer crop production is equally important in regard to providing feed grains and roughage for adjacent feedlots. Drought on the Darling Downs over the last four years and to a lesser extent in Northern New South Wales have resulted in crop production in both summer and winter being affected so recent production opportunities in these regions are confusing and figures difficult to interpret. Future crop production trends in these regions have been discussed with a number of informed people throughout the industry both in the public and private sector. Possible technical developments in plant breeding, crop agronomy and the introduction of new crops have been considered when determining possible future production trends.

2. CURRENT GRAIN AND OTHER FEED PRODUCTION CONSUMPTION

2.1 Recent Trends in Australian Grain Production

While barley and sorghum are the major grains used in the feedlot industry other cereals, especially wheat and to a lesser extent oats and triticale, play an important role. In competing industries (ie pigs and poultry), wheat is often a major part of total rations used in these enterprises. These industries also compete for barley and sorghum. Over the 6-year period 1987/88 to 1992/93 the production of barley in Australia has increased by some 58 percent to 5.4 million tonnes while production of grain sorghum is down by some 66 percent to 548,000 tonnes. Production of wheat has been as low as 10.6 million tonnes in 1991/92 and then recovered to a six year high of 14.7 million tonnes in 1992/93. The production of all other coarse grains, including oats and maize, have shown little variation with oat production ranging from 1.5 - 1.9 million tonnes and maize production staying around 200,000 tonnes. (Appendix A, Table 34)

2.1.1 Barley Production

Over the six year period Australian barley production has risen from 3.4 million tonnes in 1987/88 to 5.4 million tonnes in 1992/93. Production for 1993/94 has been estimated at 6.1 million tonnes an increase of 79.4 percent in seven years (Chart 1).

Barley is the preferred grain of the feedlot industry and with the recent large annual increases of cattle on feed the domestic demand for feed barley has grown accordingly. This has also been stimulated by the increasing demand in the dairy industry. The demand for malting barley for export has risen to 2.4 million tonnes in 1993/94 and this has stimulated further increases in production.

BARLEY PRODUCTION

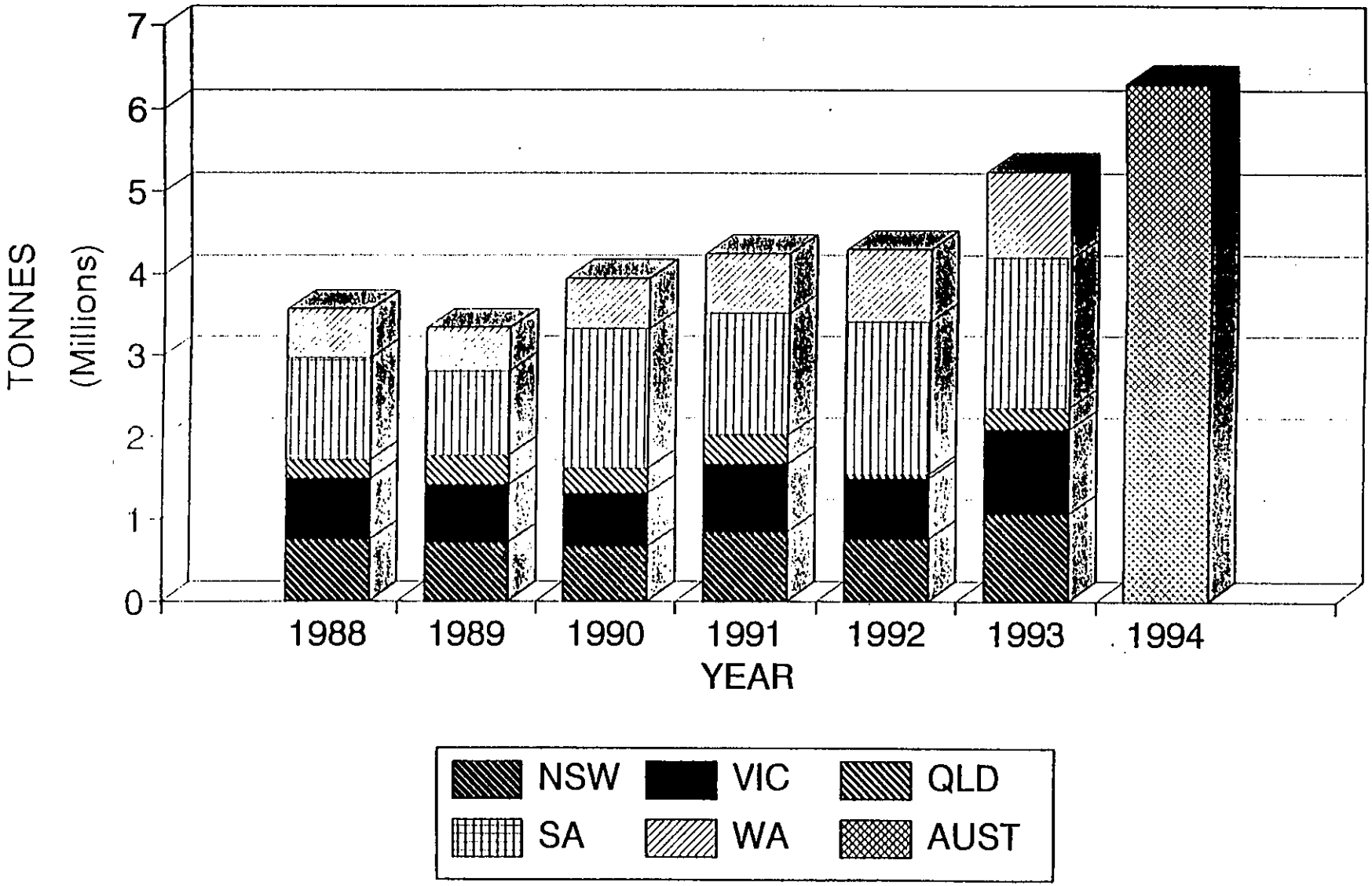

Chart 1

manufacture annually. In the ALFA/ALMC survey 1993 it accounted for some 18 percent of grain used in feedlot rations during 1992/93.

Oat production in Australia is around 1.5 - 2.0 million tonnes annually and in recent years with emphasis being placed on health foods and dietary fibre, increased areas of milling oats is being sown to meet this demand. Oats is the preferred grain for on-farm supplementation of sheep flocks for short periods of time and a fair proportion of total production is stored on farm. The dairy industry in the southern states uses oats freely in their ration formulations.

Lupins and other grain legumes are often included in poultry rations especially in southern states and Western Australia with an estimated 75,000 tonnes being used in the industry in 1992/93. While a large proportion of lupin production is used for on-farm supplementation of sheep there are indications that grain legumes will play a more important role in fed rations both in commercial concentrate mixes and in site mix feeds.

2.2 Regional Production in Major Feedlot Areas

There has developed three major commercial feedlot regions in eastern Australia, the Darling Downs in Queensland, Northern New South Wales in wheat sheep zone of the North West Slopes and in the Murrumbidgee/Riverina area of New South Wales. The three ABS statistical divisions which cover the areas are shown in Appendix B, Map 8. The feedlots in these three regions turn off more than 80 percent of all cattle held on intensive feed for more than 70 days. The major reasons why these feedlots have been located in these areas are:

- they can readily access a reliable feed source;
- they are in close proximity to export abattoirs;
- the climatic conditions are such that animals are not exposed to long periods of temperature variations and excess of wet conditions; and
- suitable cattle can be purchased from regional saleyards within reasonable distance.

2.2.1 Queensland - Darling Downs

As of July 1994 it is estimated Queensland was responsible for some 52 percent of all cattle on feed in Australia and the large majority of these were on the Darling Downs. All the conditions set out above apply and the transport and processing infrastructure is well developed with the Port of Brisbane handling all chilled and frozen meat exports.

The production of major feed grains on the Darling Downs, for the seven year period up till 31 March 1993, shows the wide annual variations brought about by the recent droughts. Wheat production on the Downs has ranged from in excess of 1 million tonnes in 1990/91 to as low as 185,000 tonne the following year with production only exceeding 500,000 tonnes on two occasions in the seven year period. Appendix A, Table 35 refers.

Grain sorghum has shown a similar variation ranging from 801,000 tonnes in 1987/88 down to 187,000 in 1992/93. The harvest has only been in excess of 500,000 tonnes in four of these seven years.

Barley production has varied from 325,000 tonnes in 1988/89 to 57,000 tonnes in 1991/92. It has only been in excess of 300,000 tonnes on two occasions. Now that there are better high yielding varieties of barley available, when seasons return to normal they could be expected to perform well in the Western Darling Downs.

Other feed grain crops (such as oats, triticale and maize) together seldom exceed a total of 90,000 tonnes with maize for human consumption being the most important of these. More recently other high value summer crops (including dryland cotton, sunflowers and soybean) have competed particularly with sorghum for the limited cropping land resource.

2.2.2 NSW - Northern

In northern New South Wales feedlots are located from Quirindi to the Queensland border - the majority of these commercial operations being in, or on, the border of the northern statistical division. In this region which has been less drought affected than the Darling Downs during the last seven year period the area sown to wheat has reduced by some 45 percent with a 40 percent drop in wheat production in 1992/93. During this time barley production has increased by some 52 percent to 245,000 tonnes with an increase in sown area from 95,000 ha to 138,000 ha (45 percent).

Sorghum production during this period has gradually fallen, except following the dry winter of 1991 when the area sown to sorghum increased by 82 percent from the previous year as farmers attempted to recover crop income following the failure of the winter wheat crop. In normal years it would be expected that competition from other summer crops with their potential to provide high operating returns will result in lower sorghum production.

2.2.3 NSW - Southern

In southern New South Wales major new feedlots are being constructed in central western Riverina in close proximity to reliable sources of irrigation water which is being used to provide a sizeable proportion of feed requirements particularly silage for the roughage component of the

The roughage component used also varies according to location. The northern areas place an emphasis on corn and fodder sorghum silages if they can be acquired at a reasonable price under contract. Should that not be the case then they must rely on sorghum stover or lucerne or cereal hay. By-products of cotton (such as cotton seed hull) also play an important role in the provision of roughage. The availability of good quality roughage in these northern areas is seen as a restriction on being able to provide a well-balanced ration. In a number of cases the feedlots may have access to their own land on which corn and forage sorghum can be grown for silage. Many have to contract out this production to farmers within a close radius (50 km). As silage production must compete with other summer cropping activities the price of this proportion of the ration is often expensive. Cost of silage material is often bought in at $30 - $40 a tonne on a 60 percent dry matter basis.

In the south good quality pasture hay is the main source of roughage and can normally be purchased at harvest time at reasonable cost. Most commercial feedlot operations would contract this production. Those large feedlots which have recently been established with irrigated land attached, will be producing their own corn silage as the principal roughage portion of the diet. It would appear that just as barley has become the preferred grain in the ration, corn silage is now the preferred roughage component in the south.

Other energy sources as an alternative to some grain and roughage in the rations are often considered. In the north molasses is added freely to ration if the price is competitive. Tallow in small quantities is often used. Substantial quantities of by-products of food manufacturing industries are sometimes accessed.

Concentrates in the form of grain meals are important protein supplements. In order to lift the overall protein percentage in the ration to at least 12 - 14 percent these meals such as cotton seed, sunflower, and canola are included in ration formulations. There is also limited use made of urea supplementation. Special premixes are often used and feed additives including anabolic agents and minerals are added. The preparation and mechanical treatment of rations to give optimum economic returns has become a most important part of feedlot operations.

3. FUTURE GRAIN AND OTHER FEED PRODUCTION

3.1 Recent GATT Negotiations

Following the conclusion of the Uruguay round of GATT in April 1994, agricultural exporting nations, including Australia, are expected to benefit considerably. The potential increase in world market prices for agricultural commodities by year 2000 is estimated at around 8 percent with Australia's key farm sectors increasing the value of annual exports by 1 billion dollars.

ABARE estimates that by the end of the implementation period (around six years for developed countries and 10 years for developing countries) Australia can expect to receive an additional $330 million in beef exports, $320 million in wheat, $210 million in dairy produce, $50 million in coarse grains, $30 million in rice and $10 million in sugar. The estimated increase in world price which will contribute to these gains are 5 percent for beef, 8 percent for wheat, 20 percent for cheese, 5 percent for coarse grains, 8 percent for rice and 1 percent for sugar. The benefit to Australian agriculture from these price increases will be enhanced by greater domestic production in response to higher prices. While overall gains to the value of Australian agricultural production as a result of the round may be moderate in the long-term, they are likely to have quite a positive effect on net farm incomes even during the mid 1990's.

The major implication for grain trading to come from the GATT agreement is a 21 percent cut in the volume of subsidised wheat exports from the US by the year 2000 relative to exports during the period 1986 - 1990. This will result in subsidised wheat volumes exported from the US being reduced from 32 to 14.5 million tonnes and in the European Union from 20 to 13.4 million tonnes.

Under the GATT Accord, USA and Europe subsidised barley exports are also to be reduced by 21 percent. This should result in some 2 million tonne being withdrawn from subsidy (ie. approximately 13 percent of total barley traded). It is well to remember here that corn exports from America are not subsidised and the US are responsible for more than 60 percent of a total world coarse grain trade amounting to some 85 - 90 million tonnes.

Not withstanding the conclusion of the GATT Round there are still a number of issues of critical importance to Australia. These include:

- The ongoing assistance provided to US farm products including wheat feedgrains, rice, sugar, cotton products. The agreement is expected to have very little impact on support levels for most agricultural industries. The same situation holds for European Union. At this stage all that has been guaranteed is the subsidy reduction on export grains.

- There could be increased pressure on Governments to use sanitary and phytosanitary measures to restrict imports, especially as health and safety measures involving the use of chemicals during production and storage. These measures may take various forms ranging from regulations requiring specific treatments and processing of products to the requirement that products must come from a disease free areas. These measures could be easily applied to restrict trade between specific countries.

- Continued growth in agricultural exports to the Asian region is also of critical importance. The conclusion of the Uruguay round will lead to some increase in agricultural exports, especially beef and rice but this will only be part of future increases. Continual growth

ration. The majority of these feedlots are in the Murrumbidgee statistical division where the larger feedlot operations are investing in their own slaughter and processing facilities. Appendix A, Table 35 sets out grain production for Murrumbidgee region over seven years. Here the area sown to wheat has declined by some 46 percent to 285,000 ha while the area sown to barley has increased by 24 percent to 127,000 ha. Other winter crops particularly oats and triticale play a more significant role in this predominantly winter rainfall area and in 1992/93 yielded 213,000 tonnes and 63,000 tonnes respectively. Rice is the major summer crop but in recent years maize production has increased to some 50,000 tonnes of which a small amount is used in the stock feed industries.

2.2.4 All Regions

The production of the two major grains used in the feedlot industry (ie barley and sorghum) have been plotted for the three feedlot areas (Chart 3). Total grain production of both has not shown a significant increase despite the large build-up of cattle on feed in these areas. The drought on the Downs and to a lesser extent in northern New South Wales may have contributed to this situation but competition from other crops has also been a major factor. On the Darling Downs additional feedlot grain supplies, predominantly barley has been brought in originally from northern New South Wales and over the last two years from as far away as South Australia. With the present severe drought conditions in Queensland and New South Wales both northern feedlot regions must continue to import grain in the short-term.

2.3 Meeting Present Feedlot Feed Requirements

With the rapid development of commercial feedlots and the increased competition for feedstuffs from other livestock industries the industry over the last six years has come to examine closely ration composition so as to arrive at efficient, least cost formulations, while placing emphasis on optimum weight gains. Over time the development of feeding regimes has been influenced principally by feedlot location thus those feedlots on the Darling Downs and northern New South Wales with a summer rainfall influence have developed particular rations based on barley and sorghum while the rapidly developing southern area centred on the Riverina have rations relying on barley, or to a lesser extent wheat, as the major sources of grain although oats and triticale are also included.

FEEDLOT AREAS

BARLEY AND SORGHUM PRODUCTION

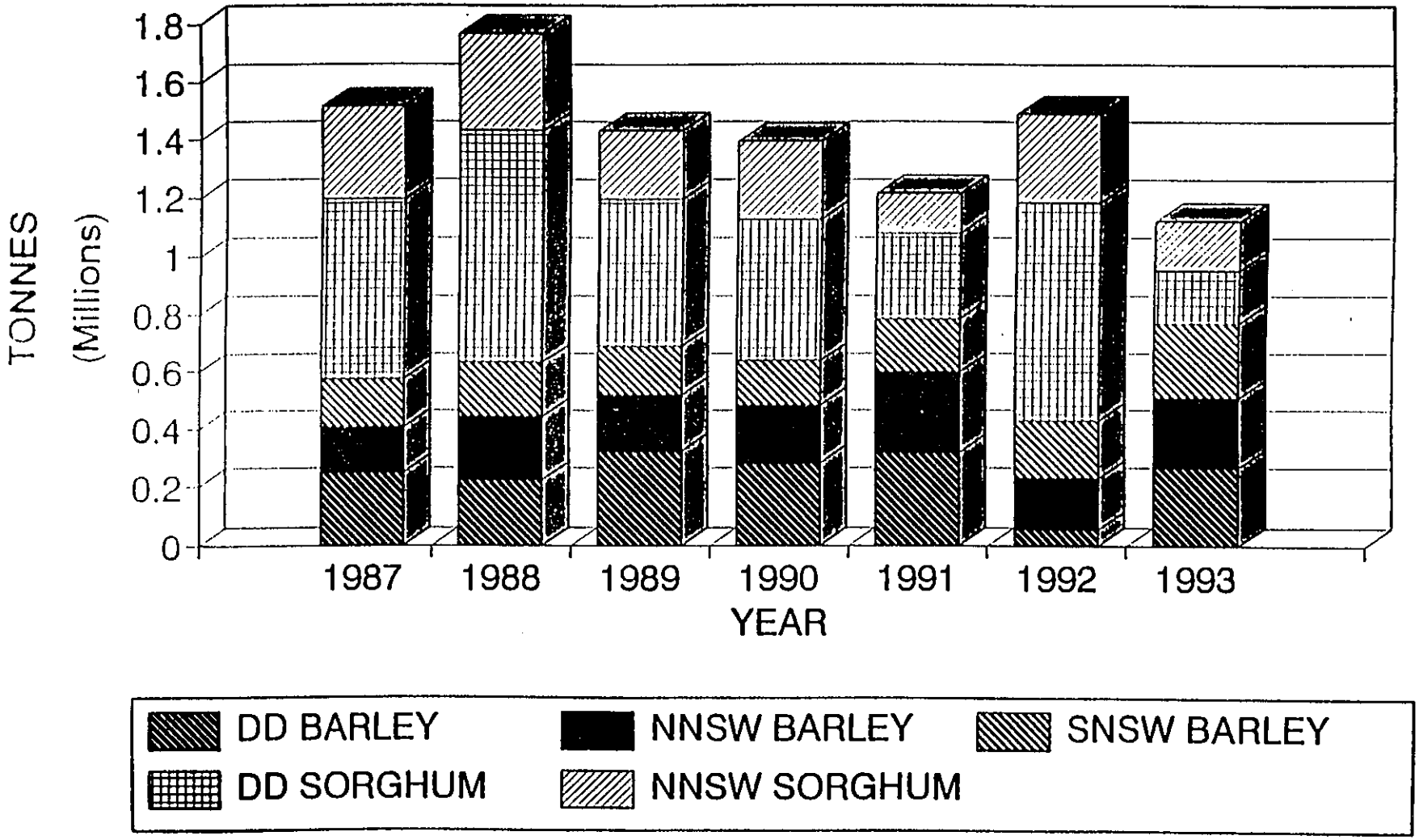

Chart 3

and changing dietary patterns must make the major contribution to increased demand in this important area.

3.2 Grain Price and Production

ABARE projections for World and Australian coarse grain production for the next five years to 1998/99 (Appendix A, Table 36) show the real price for feed barley, the preferred grain of our feedlot industry, over the five year period will rise by 12.4 percent. During the same period world corn prices in real terms are expected to remain static.

Production forecasts indicate that the world will harvest some 858 million tonnes of coarse grains in 1998/99, up 10.5 percent over the five years, while Australian production is expected to fall from 9.8 million tonnes in 1993/94 to 9.1 million tonnes (down 7.1 percent). These figures take to account the recent GATT negotiations.

World trade in coarse grains is expected to rise slightly from 87 to 91 million tonnes with carry over stocks up by 26.5 percent from 11.3 to 14.3 million tonnes. Australian exports are projected to remain static at about 3.5 million tonnes while local consumption will be around 5.5 million tonnes.

World production of wheat is estimated to rise by 46 million tonnes over the next five years (up 8.2 percent) and Australia's production is projected to decline from 18.2 million tonnes in 1993/94 up to 17.6 million in 1998/99. (Appendix A, Table 37) Already in September 1994/95 figures has been revised down from 15.5 million to 10.4 million tonne due to the drought.

Real price for world wheat is expected to rise over the five years, from US$142 to $158 (11.3 percent). Australian real price for the same period will are from A$165 to A$186 (12.7 percent). These projected price changes are almost the same as for feed grains but we should keep in mind that 1993/94 barley based prices are at a very low price.

3.3 Competition Between Wheat and Other Grains

Wheat production and prices have historically been used as the yardstick for the majority of Australia's farmers in the wheat/sheep zone to make their annual decisions on cropping programs and this is likely to remain the case in the future. It is by far Australia's largest crop and is predominantly handled by a statutory marketing authority The Australian Wheat Board. Variation in wheat prices has a major effect on areas sown to other crops. The world parity price for wheat is a major consideration in determining Australia's cropping program.

Over the last 10 years there has been an overall decline in the area sown to wheat from 12.9 million hectares in 1983/84 to 9.5 million hectares in 1993/94. The weather has been the major

determinant of production but there is evidence that the better varieties and improved farming practices has contributed to higher yield per hectare. During the mid to late 1980's there was a steady reduction in areas sown to winter crops as high prices for wool and to a lesser extent beef, encouraged farmers to leave more of their cropping paddocks in pasture. With the collapse of the Wool Reserve Price Scheme in 1990/91 there has been a return to cropping despite grain prices being depressed.

Over the last six years with wheat prices remaining at low levels the area sown to barley in Australia has increased by almost 50 percent to 3.52 million acres, mainly in Victoria, New South Wales and Western Australia. The areas sown to other crops in these States has also shown a marked increase. Over the last three years the areas sown to other winter crops including Lupins has gone from 1.03 million ha to 1.12 million ha (9 percent) and Canola from 106,000 ha to 350,000 ha (230 percent). It is predicted that these crops along with pulses, especially chick peas and field peas will be significantly expanded in coming years and will be used in special rotational patterns with cereal crops.

3.4 Future Cropping Programs

Following the very difficult conditions experienced over the last five years in the wheat/sheep zone, brought about by adverse weather conditions, low world grain prices, disastrous wool prices, and now a severe drought in eastern Australian grain belt there will be a great deal of rationalisation in the grain industries in coming years. To crop their way out of debt farmers are going to concentrate on those grains with a high income potential. In selecting their cropping programmes they will evaluate the potential of new crops such as Canola and Chick Peas. They are going to be aware that wheat prices are forecast to recover in the short-term and the potential profit they can be expected from wheat is going to dictate what areas are set aside for other crops. In the northern wheat belt prime hard wheat will be grown on most areas that are capable of producing this premium product.

Table 5.1 sets out the gross margins calculated for the Darling Downs in Autumn of 1994 and projects that for winter cropping, prime hard wheat production has the potential to give the highest return with a farmgate price of $180 per tonne. The returns from both malting and feed barley are estimated at approximately the same due to the higher yield of the latter. The price of feed barley here at $130 per tonne is a deal higher than the November 1993 price in southern Australia at $85 per tonne.

The figures for summer crops illustrate how dryland cotton has the potential to produce much higher profits than other crops and that sunflower is the second most profitable dryland crop. Where irrigation is possible, cotton becomes a more outstanding crop with maize as the next most profitable crop.

Table 5.1

CROP GROSS MARGINS DARLING DOWNS

Crop	Price $/t (Farm Gate)	Yield (t/ha)	Gross Income $/ha	Variable Costs $/ha	Gross Margin $/ha
WINTER CROPS					
Dryland[a]					
Wheat[b]	180	2.5	450	170	280
Wheat (ASW40)	130	2.5	325	137	188
Barley Malt	145	2.6	377	137	240
Barley Feed	130	3.0	390	151	239
SUMMER CROPS					
Dryland					
Sorghum	120/t	4.0	480	194	286
Maize	135/t	3.5	473	182	291
Sunflower	240/t	2.0	480	157	323
Corn Silage	32/t	16.0	512	208	304
Soybean	320/t	1.25	400	134	266
Cotton (skiprow)	327/b	3.2	1,046	603	443
Cotton (solid)	327/b	3.8	1,243	847	395
Irrigated					
Sorghum	120/t	8.0	960	447	513
Maize	135/t	8.5	1,148	577	570
Sunflower	240/t	3.0	720	325	395
Soybeans	320/t	2.5	800	326	474
Cotton	380/b	8.0	2,980	1,243	1,737

(a) QDPI Figures Adjusted Autumn 1994
(b) Prime Hard GM specially included

Corresponding gross margins for the NW slopes of New South Wales have been compiled by the NSW Department of Agriculture for 1994 and are shown in Table 5.2.

Table 5.2

CROP GROSS MARGINS NW SLOPES NSW

Crop	Price $/t (Farm Gate)	Yield (t/ha)	Gross Income $/ha	Variable Costs $/ha	Gross Margin $/ha
WINTER CROPS					
Dryland					
Wheat (ASW4O)	110	3.0	330	134	196
Malting Barley	125	3.2	400	148	252
Canola (S.F.)	290	1.7	493	130	363
Oats	100	2.5	250	121	129
Chick Peas	280	1.7	476	229	247
SUMMER CROPS					
Dryland					
Grain Sorghum	125	3.75	468	142	326
Sunflowers	300	1.6	480	128	352
Maize	160	4.5	720	243	477
Soy Beans	360	1.0	360	130	230
Cotton (Solid)	(bale) 415	3.0	1245		
(Seed)		1.0	158		
			1403	892	511

The calculations demonstrate that income earning potential of Canola and Chick Peas in this area and the opportunity for growing malting barley instead of ASW wheat. No separate figures have been provided for Prime Hard Wheat but if a figure of $160 per tonne was available at farmgate the a gross margin of $342 per ha is possible. This then makes it an attractive proposition on those soils with the ability to produce prime hard quality to allocate them to this activity.

As on the Darling Downs dryland cotton has the ability to be the most profitable crop by a fair margin although maize has the possibility of high returns. It is noteworthy that grain sorghum can provide a higher return than most winter crops at 3.75 tonne/hectare and farmgate price of $125/tonne.

When allowances are made for expected price differences between these and the Darling Downs' figures profitability is much in the same order.

Gross margins calculated by the New South Wales Department of Agriculture for eastern Riverina and south west slopes of New South Wales, where grain production is winter orientated except for small areas of summer irrigated crops, are shown in Table 5.3.

Table 5.3 CROP GROSS MARGIN RIVERINA/SW SLOPES

Crop	Price $/t (Farm Gate)	Yield (t/ha)	Gross Income $/ha	Variable Costs $/ha	Gross Margin $/ha
WINTER CROPS					
Wheat (ASW4O)	120	3.8	456	196	260
Oats	100	3.0	300	162	138
Barley (Feed)	110	3.0	330	227	103
Triticale	110	3.0	330	214	116
Lupins	160	1.6	256	186	70
Canola	290	1.8	522	241	281

These figures again indicate the importance of wheat as having the potential to guarantee optimum profitability. Canola is a more difficult crop to grow but still has the ability to give better returns than wheat. Many farmers are now placing sizeable areas in their crop rotations. The feed grain crops of barley, oats and triticale with the projected prices and yields allocated in Autumn 1994 are well down on profitability when compared with wheat.

The circumstances in which the grain industries, especially in the eastern states are now placed make it important that cropping programs will have to be orientated toward growing more wheat and high value crops such as Canola and certain pulses such as chick peas in the short to medium term as farmers attempt to crop their way out of debt after recent droughts and low prices. This implies those feedlots which have been located near the best cropping areas of Queensland, northern New South Wales and southern New South Wales may find it difficult to procure their grain and roughage supplies from local sources.

3.5 Competition for Feeds from Other Livestock Industries

The poultry, pig and dairy industry compete with the beef feedlot industry for feed resources. Table 5.4 sets out estimates of annual feed usage by the four major intensive livestock industries for 1994 breaking these feeds into grains and concentrates. The four industries are estimated to require in total 5.45 million tonnes of grain in 1994 with beef feedlots requiring some 28 percent.

Table 5.4 COMPETITION FOR FEED GRAINS ESTIMATED 1994 FEED USAGE BY MAJOR AUSTRALIAN LIVESTOCK INDUSTRIES

Industry	Grain (kt)	Concentrates (kt)	Total (kt)	Grain %
1. POULTRY[a]				
Chicken Meat	1,072	460	1,532	
Commercial Layers	305	187	493	
Backyard	39	10	49	
Sub Total	1,416	657	2,074	26%
2. PIG	1,356	339	1,695	24%
3. DAIRY INDUSTRY	1,175	294	1,469	22%
4. BEEF FEEDLOT[b]	1,506	815[c]	2,320	28%
TOTAL[d] [e]	5,453	1,949	7,327	100%

(a) Figures compiled by Vivian Kite - Stockfeed Manufacturer Association
(b) Taken from Study Figures.
(c) This includes roughage requirements
(d) Domestic Animal including horses not calculated
(e) On-Farm Supplementation of sheep not included.
(f) Aquaculture not included.

The poultry industry is estimated to require some 1.416 million tonnes of grain in 1994, where wheat and sorghum are normally the main grains of preference along with meat and bone meal as the major concentrates. This varies somewhat from state to state with oats and lupins becoming part of the rations in the southern States.

Poultry meat production over the last two years has increased by about 4.0% per annum to 492,000 tonnes and in the medium term production is expected to grow by 2.5 - 3 percent annually and to reach 560,000 tonnes in 1998/99, requiring 1.61 million tonnes of grain by 1998. Table 5.5 refers.

Table 5.5 SUMMARY AND PROJECTIONS OF KEY AUSTRALIAN PIG AND POULTRY MEAT STATISTICS

	Unit	1991 /92	1992 /93[s]	1993 /94[f]	1994 /95[z]	1994 /96[z]	1996 /97[z]	1997 /98[z]	1998 /99[z]
Pig Meat									
Pig Numbers[b]	'000	2,792	2,600	2,620	2,640	2,660	2,675	2,690	2,680
Production	kt	336	337	326	332	337	339	344	346
Total Consumption	kt	337	331	320	327	332	335	338	341
Consumption per person	kg	19.2	18.7	18.0	18.0	18.2	18.3	18.5	18.7
Poultry Meat									
Production	kt	455	468	492	502	515	530	545	560
Total consumption	kt	451	462	486	496	508	523	537	552
Consumption per person	kg	25.7	26.1	27.3	27.6	27.9	28.6	29	29.4

b. At 31 March
s. ABARE estimate.
f. ABARE forecast.
z. ABARE Project

Sources: Australian Bureau of Statistics; Australian Meat and Livestock Corporation; ABARE

The pig industry is also prepared to use a high proportion of wheat in rations so that any downgraded wheat coming on the market at competitive prices with other grains normally finds its way into pig and poultry rations.

Pig meat production, over the last two years, has actually fallen by around 3 percent to 326,000 tonnes but is projected to increase by 1.2 percent per annum over the next five years resulting in pig meat production increasing to 346,000. The additional demand for grain in the pig industry is expected to be around this 6 percent by year 2000, or 1.44 million tonnes. This does not take into account the possibility that an export industry could open up in South East Asia. Already we are informed that the development of a very large intensive piggery is proposed for the Darling Downs. Such development could be repeated in Western Australia and the Southern States, should this market develop.

Rationalisation in the dairy industry during the mid to late 1980's has resulted in fewer cows producing significantly more milk per lactation due mainly to better feeding and this includes regular crushed grain and protein meal supplementation. For an industry previously relying almost solely on pasture feeding for most of its production, the use of an estimated 1.17 million tonnes of grain in 1994 is surprising. This degree of feeding is expected to continue and even rise further as expected yield per cow per lactation reaches over 5,000 litres in 1998/99.

Barley has also become the preferred grain of the dairy industry and the large demand in the Victorian industry has come from the increased production in the Mallee and Wimmera. Most

dairies have invested in feed storage facilities and are in the position of being able to acquire a sizeable proportion of their annual requirements at harvest time. Despite the fact that most of the farms are situated away from the grain areas and the feedlots, they will come directly in competition with them for barley and other grain supplies.

Over the next five years annual production of milk is projected to increase by a total of 9 percent to 8,500 million litres while cow numbers are expected to rise by only 3,000 or less than 1 percent. Most of this increased production would be as a result of better feeding practices in which grain and protein meal supplementation will play a most important role.

3.6 Feed Requirements of the Cattle Feedlot Industry

For the eight grainfed market segments considered in this study, total feed requirements were calculated based on the production parameters shown in Table 5.6.

Table 5.6 PRODUCTION COEFFICIENTS USED TO CALCULATE GRAIN AND ROUGHAGE REQUIREMENTS FOR GRAINFED CATTLE BY MARKET SEGMENT

Market Segment	L/wgt in (kg)	L/wgt out (kg)	Days on feed	Total l/wgt gain (kg)	Avg. daily gain (kg)	Feed Requirements (kg DM basis)		Grain/ Roughage
						Per kg lwg	Total per head	
Japanese B3	400	700	230	300	1.30	9.00	2700	60/40
Japanese B2	450	680	150	230	1.53	7.75	1783	70/30
Japanese B1	450	630	100	180	1.60	6.50	1170	80/20
Japanese yearling	310	450	100	140	1.40	6.25	875	75/25
Korean K1	350	510	100	160	1.60	6.75	1080	80/20
Korean fullset	450	630	100	180	1.60	6.75	1215	80/20
Domestic > 70 dys	330	430	70	100	1.43	6.00	600	75/25
Domestic supp.	340	430	90	90	1.00	6.00	540	60/40

Grain and roughage requirements for the base year 1994, were determined from the estimated breakdown of cattle on feed (Appendix A, Table 1) and is shown in Table 5.7.

Table 5.7 FEED REQUIREMENTS FOR GRAINFED CATTLE IN AUSTRALIA IN 1994.

Market Segment	Number of cattle entry feedlots ('000 hd)	Feed Requirements (as fed)		
		Total (kt)	Grain (kt) \1	Roughage (kt) \1
Japanese B3	174	548	313	235
Japanese B2	287	590	398	192
Japanese B1	162	216	168	47
Japanese yearling	110	110	80	30
Korean K1	50	61	48	14
Korean fullset	6	8	6	2
Domestic > 70 dys	394	271	197	74
Domestic supplemented	819	516	295	221
Total	**2,002**	**2,320**	**1,506**	**815**

\1 Assume average dry matter of 90% for grain and 80% for roughage

Grain and roughage requirements for each Scenario, have been estimated and are shown in Appendix A, Tables 38 to 45. Grain and roughage requirements by Scenario for 1994 and year 2000 is shown in Table 5.8.

Table 5.8 SUMMARY OF GRAIN AND ROUGHAGE REQUIREMENTS BY SCENARIO

Scenario	Number of Cattle Grainfed		Grain Requirements \1		Roughage Requirements \1	
	1994	2000	1994	2000	1994	2000
	('000)	('000)	(kt)	(kt)	(kt)	(kt)
Baseline	2,001	2,192	1,506	1,713	814	914
Optimistic	2,001	2,282	1,506	1,849	814	983
Pessimistic	2,001	2,190	1,506	1,689	814	904
FMD Free South America	2,001	2,211	1,506	1,737	814	930
High Wool Price	2,001	2,185	1,506	1,713	814	916
Grainfed Productivity Increase	2,001	2,598	1,506	2,235	814	1,181
Japanese Dairy Beef Decline	2,001	2,212	1,506	1,751	814	936
Market Segment Shift	2,001	2,648	1,506	1,925	814	1,049

\1 As fed basis - assumes average dry matter of 90% for grain and 80% for roughage

3.7 Future Demand for Feedgrain by all Competing Livestock Industries by Year 2000

Table 5.9 GRAIN REQUIREMENTS OF ALL LIVESTOCK INDUSTRIES 1994 & 2000

Industry	1994 kt	1994 - 2000 Increase %	2000 kt	Year 2000 % of Total
Poultry	1,416	13.7	1,610	27
Pigs	1,356	6.1	1,440	24
Dairy	1,175	8.9	1,280	21
Beef Feedlot[1/]	1,506	13.7	1,713	28
TOTAL	5,453	10.8	6,043	100

[1/] Baseline scenario

For all livestock industries feedgrain requirements is projected to increase by 10.8% to 6.04 million tonnes by 2000 with each taking its share of the market.

APPENDIX A

TABLES

South Australia has for many years been the major barley state and in 1992/93 contributed some 1.9 million tonnes or 35 percent of Australia's total production. In the six year period under review, there have been significant increases in barley production in other states with Victoria up by 110 percent to 1.12 million tonnes, Western Australia of 72 percent to 1.06 million tonnes and New South Wales up 40 percent to 1.04 million tonnes. These increases can be mainly attributed to (a) low wheat prices, (b) the release of new varieties of malting barley with improved yield potential and which are easier to grow on marginal cropping country than is wheat, and (c) improved prices, especially for malting barley, relative to that of wheat and other grains.

2.1.2 Grain Sorghum

An ALFA/AMLC Survey in 1993 estimated that some 265,000 tonnes of grain sorghum accounted for some 26 percent of all grain used in feedlot rations for the year 1992/93. Of this amount 75 percent was fed in Queensland feedlots. There are three major regions growing sorghum in Australia: (a) Darling Downs, (b) Fitzroy region in Central Queensland and (c) north west slopes of New South Wales. Queensland is the major producer of grain sorghum responsible for more than 75 percent of Australia's total production in most years. Chart 2 indicates that 4 of the 6 harvests in northern New South Wales has been less than 400,000 tonnes and that other summer crops (ie sunflowers and dryland cotton) are replacing sorghum on the north west slopes. Part of the six year period from 1988 to 1993 has been influenced by drought, particularly in Queensland. A failed wheat crop in the winter of 1991 caused the sharp rise in production to 1.4 million tonnes in 1991/92.

There is evidence that the relative low prices received for grain sorghum in recent years has resulted in other crops such as sunflowers and dryland cotton being by an increasing number of farmers, particularly in northern New South Wales and on the Darling Downs. For example in Queensland raw cotton production has increased by 50 percent between 1989/90 - 1992/93 and the majority of this increase is due to the expansion in dryland plantings.

Sorghum is an acceptable grain for inclusion in all livestock and poultry rations but overall production may decrease as it fails to compete on financial returns with other summer cropping activities.

2.1.3 Other Feed Grains

Wheat is regularly used as a component of animal feed mixes in Australia. Rain damaged wheat at discounted prices is keenly sort after for use in the pig and poultry industries. Some feedlots are prepared to use up to 20 percent wheat in their ration if prices are competitive with other grains. There is strong evidence that some two million tonnes of wheat is used in stock feed

Chart 2

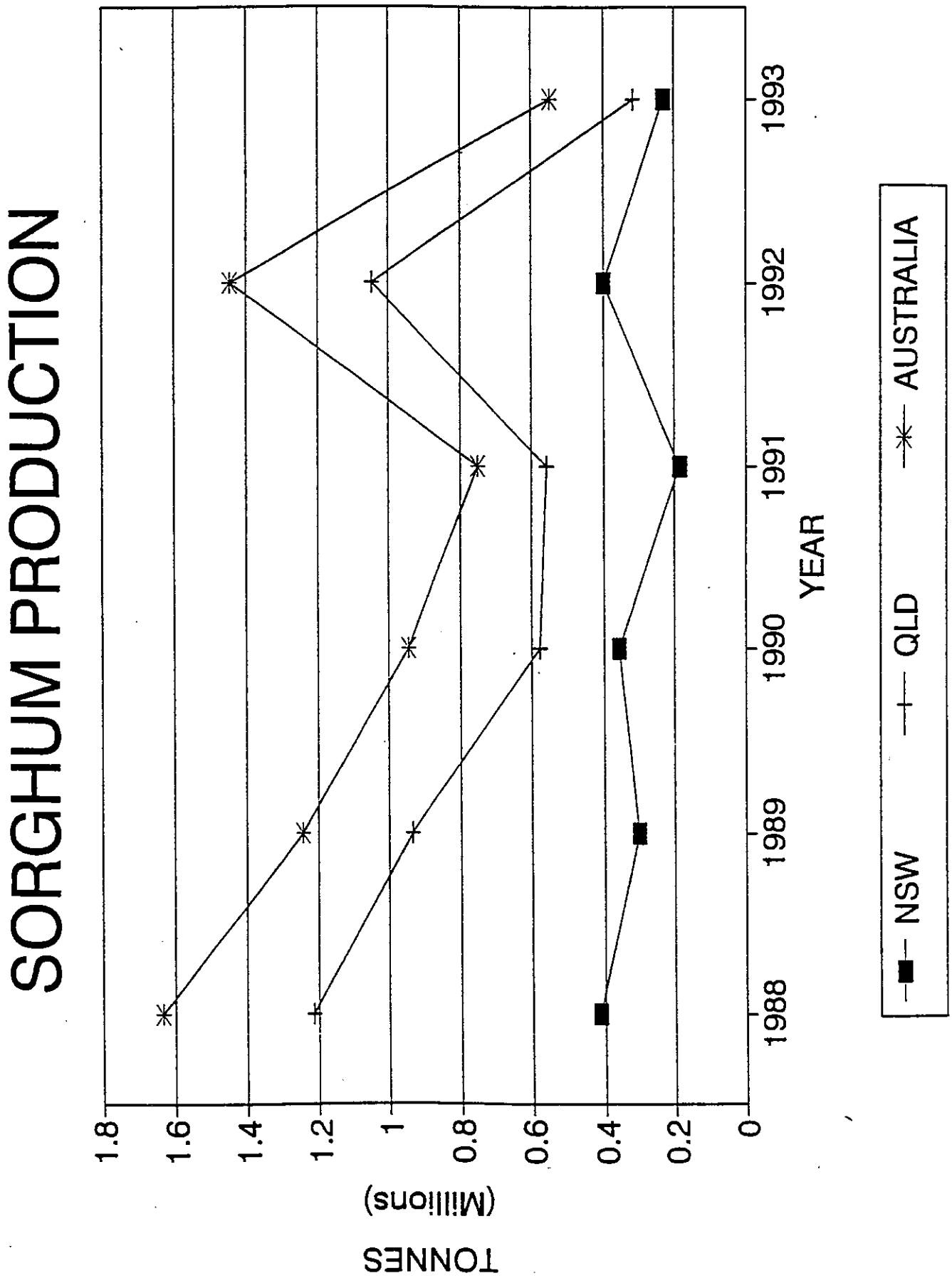
SORGHUM PRODUCTION
TONNES
(Millions)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1988
1989
1990
1991
1992
1993
YEAR
NSW
QLD
AUSTRALIA

Table 1	1994 Beef Production Disaggregated by Market and Cattle Supply
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Table 3	Number of Cattle to Produce Production Carcase Weights - GMI Baseline + Domestic Grainfed Disaggregation
Table 4	Transformation of GMI Source Data into Production Carcase Weights - GMI Optimistic+ Domestic Grainfed Disaggregation
Table 5	Number of Cattle to Produce Production Carcase Weights - GMI Optimistic + Domestic Grainfed Disaggregation
Table 6	Transformation of GMI Source Data into Production Carcase Weights - GMI Pessimistic + Domestic Grainfed Disaggregation
Table 7	Number of Cattle to Produce Production Carcase Weights - GMI Pessimistic + Domestic Grainfed Disaggregation
Table 8	Transformation of GMI Source Data into Production Carcase Weights - GMI FMD Free South America + Domestic Grainfed Disaggregation
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Table 12	Transformation of GMI Source Data into Production Carcase Weights - GMI Productivity Improvement + Domestic Grainfed Disaggregation
Table 13	Number of Cattle to Produce Production Carcase Weights - GMI Productivity Improvement + Domestic Grainfed Disaggregation
Table 14	Transformation of GMI Source Data into Production Carcase Weights - GMI Baseline + 25% Decline in Japanese Dairy Beef by 2005 + Domestic Grainfed Disaggregation
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GMI Baseline + Domestic Grainfed Disaggregation

APPENDIX A Table 2

TRANSFORMATION OF GMI SOURCE DATA INTO PRODUCTION CARCASE WEIGHTS (pcw) \1

Item	1994 kt	1995 kt	1996 kt	1997 kt	1998 kt	1999 kt	2000 kt	2005 kt	Percent Change '94-'05
GMI SOURCE DATA (cwe)									
Total Australia	1,818	1,890	1,927	1,965	1,999	2,038	2,074	2,249	24%
Total Australian Domestic	677	677	680	683	686	690	694	712	5%
Total Australian Export	1,141	1,213	1,247	1,282	1,313	1,348	1,380	1,538	35%
Total Export Japan	470	490	505	522	532	550	566	607	29%
Grainfed Export Japan	168	189	191	193	190	193	195	202	20%
Grainfed Export Korea	16	16	18	20	24	26	28	37	131%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - DOMESTIC									
Grainfed > 70 Days	82	82	82	83	83	83	84	86	5%
Grainfed supplemented	170	170	171	172	172	173	175	179	5%
Grassfed	425	425	427	429	431	433	436	447	5%
Total Domestic	677	677	680	683	686	690	694	712	5%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - EXPORT									
Grainfed Japanese B3	45	50	51	51	50	51	52	54	20%
Grainfed Japanese B2	90	101	102	103	101	103	104	108	20%
Grainfed Japanese B1	82	93	94	95	93	95	96	99	20%
Grainfed Japan Yearling	27	31	31	31	31	31	32	33	20%
Grainfed Japan Total	244	274	277	280	276	280	283	293	20%
Grainfed Korean Quarter	14	14	16	18	21	23	25	32	131%
Grainfed Korean fullset	2	2	2	2	3	3	3	4	131%
Grassfed Total Export	882	923	952	982	1,014	1,043	1,070	1,209	37%
Total Export	1,141	1,213	1,247	1,282	1,313	1,348	1,380	1,538	35%

\1 Production carcase weight is the gross carcase weight of animals slaughtered to provide beef cuts shipped

APPENDIX A, Table 3

GMI Baseline + Domestic Grainfed Disaggregation

NUMBER OF CATTLE TO PRODUCE PRODUCTION CARCASE WEIGHTS \1

Item	1994 ('000)	1995 ('000)	1996 ('000)	1997 ('000)	1998 ('000)	1999 ('000)	2000 ('000)	2005 ('000)	Percent Change '94-'05
AUSTRALIA									
Total	8,262	8,535	8,694	8,857	9,011	9,178	9,333	10,098	22%
Grainfed	2,001	2,093	2,114	2,135	2,142	2,169	2,192	2,286	14%
Grassfed	6,260	6,442	6,580	6,722	6,869	7,009	7,141	7,812	25%
DOMESTIC DISAGGREGATION									
Grainfed > 70 days (50% heifer)	394	394	395	397	399	401	404	414	5%
Grainfed supplemented (50% heifer)	819	819	822	826	830	834	839	861	5%
Grassfed	2,418	2,418	2,429	2,440	2,451	2,465	2,479	2,544	5%
Total Australian Domestic	3,631	3,631	3,647	3,663	3,679	3,701	3,722	3,819	5%
EXPORT DISAGGREGATION									
Grainfed Japanese B3	174	196	198	200	197	200	202	209	20%
Grainfed Japanese B2	287	323	326	330	325	330	333	345	20%
Grainfed Japanese B1	162	182	184	186	183	186	188	195	20%
Grainfed Japan Yearling	110	124	125	126	124	126	128	132	20%
Grainfed Japan Total	733	825	833	842	829	842	851	881	20%
Grainfed Korean Quarter (40% heifer)	50	50	56	63	75	81	88	116	131%
Grainfed Korean fullset (40% heifer)	6	6	7	8	9	10	11	14	131%
Grassfed Total Export	3,842	4,023	4,150	4,282	4,419	4,544	4,662	5,268	37%
Total Australian Export	4,631	4,904	5,047	5,194	5,332	5,477	5,611	6,279	36%

\1 For grainfed cattle = feedlot gate number; for grassfed cattle = abattoir gate number

GMI Optimistic + Domestic Grainfed Disaggregation

APPENDIX A Table 4

TRANSFORMATION OF GMI SOURCE DATA INTO PRODUCTION CARCASE WEIGHTS (pcw) \1

Item	1994 kt	1995 kt	1996 kt	1997 kt	1998 kt	1999 kt	2000 kt	2005 kt	Percent Change '94-'05
GMI SOURCE DATA (cwe)									
Total Australia	1,818	1,899	1,947	1,997	2,048	2,102	2,154	2,354	29%
Total Australian Domestic	677	676	677	678	679	680	682	698	3%
Total Australian Export	1,141	1,223	1,270	1,319	1,368	1,422	1,472	1,656	45%
Total Export Japan	470	498	520	545	567	591	612	684	46%
Grainfed export Japan	168	192	197	204	209	215	219	218	30%
Grainfed Export Korea	16	16	18	20	22	25	30	50	213%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - DOMESTIC									
Grainfed > 70 Days	82	82	82	82	82	82	82	84	3%
Grainfed supplemented	170	170	170	170	171	171	171	176	3%
Grassfed	425	424	425	426	426	427	428	438	3%
Total Domestic	677	676	677	678	679	680	682	698	3%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - EXPORT									
Grainfed Japanese B3	45	51	52	54	55	57	58	58	30%
Grainfed Japanese B2	90	102	105	109	111	115	117	116	30%
Grainfed Japanese B1	82	94	97	100	103	105	107	107	30%
Grainfed Japan Yearling	27	31	32	33	34	35	35	35	30%
Grainfed Japan Total	244	279	286	296	303	312	318	316	30%
Grainfed Korean Quarter	14	14	16	18	19	22	26	44	213%
Grainfed Korean fullset	2	2	2	2	2	3	3	5	213%
Grassfed Total Export	882	929	967	1,003	1,043	1,086	1,125	1,291	46%
Total Export	1,141	1,223	1,270	1,319	1,368	1,422	1,472	1,656	45%

\1 Production carcase weight is the gross carcase weight of animals slaughtered to provide beef cuts shipped

APPENDIX A, Table 5

GMI Optimistic + Domestic Grainfed Disaggregation

NUMBER OF CATTLE TO PRODUCE PRODUCTION CARCASE WEIGHTS \1

Item	1994 ('000)	1995 ('000)	1996 ('000)	1997 ('000)	1998 ('000)	1999 ('000)	2000 ('000)	2005 ('000)	Percent Change '94-'05
AUSTRALIA									
Total	8,262	8,567	8,766	8,970	9,178	9,404	9,621	10,495	27%
Grainfed	2,001	2,104	2,135	2,174	2,205	2,243	2,282	2,376	19%
Grassfed	6,260	6,463	6,631	6,796	6,973	7,161	7,339	8,119	30%
DOMESTIC DISAGGREGATION									
Grainfed > 70 days (50% heifer)	394	393	394	394	395	395	397	406	3%
Grainfed supplemented (50% heifer)	819	818	819	820	821	822	825	844	3%
Grassfed	2,418	2,415	2,418	2,422	2,426	2,429	2,436	2,494	3%
Total Australian Domestic	3,631	3,626	3,631	3,636	3,642	3,647	3,658	3,744	3%
EXPORT DISAGGREGATION									
Grainfed Japanese B3	174	199	204	211	216	223	227	226	30%
Grainfed Japanese B2	287	328	337	349	357	367	374	372	30%
Grainfed Japanese B1	162	185	190	197	202	207	211	210	30%
Grainfed Japan Yearling	110	126	129	134	137	141	143	143	30%
Grainfed Japan Total	733	838	860	890	912	938	956	951	30%
Grainfed Korean Quarter (40% heifer)	50	50	56	63	69	78	94	156	213%
Grainfed Korean fullset (40% heifer)	6	6	7	8	8	9	11	19	213%
Grassfed Total Export	3,842	4,048	4,213	4,374	4,547	4,732	4,903	5,626	46%
Total Australian Export	4,631	4,942	5,135	5,334	5,536	5,757	5,963	6,752	46%

\1 For grainfed cattle = feedlot gate number; for grassfed cattle = abattoir gate number

GMI Pessimistic + Domestic Grainfed Disaggregation **APPENDIX A Table 6**

TRANSFORMATION OF GMI SOURCE DATA INTO PRODUCTION CARCASE WEIGHTS (pcw) \1

Item	1994 kt	1995 kt	1996 kt	1997 kt	1998 kt	1999 kt	2000 kt	2005 kt	Percent Change '94-'05
GMI SOURCE DATA (cwe)									
Total Australia	1,818	1,879	1,906	1,932	1,958	1,985	2,009	2,100	16%
Total Australian Domestic	677	680	685	691	697	703	709	742	10%
Total Australian Export	1,141	1,199	1,221	1,241	1,261	1,282	1,301	1,358	19%
Total Export Japan	470	482	490	499	507	516	524	508	8%
Grainfed Export Japan	168	187	187	188	188	189	190	161	-4%
Grainfed Export Korea	16	16	18	20	22	24	26	49	206%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - DOMESTIC									
Grainfed > 70 Days	82	82	83	84	84	85	86	90	10%
Grainfed supplemented	170	171	172	174	175	177	178	187	10%
Grassfed	425	427	430	434	437	441	445	466	10%
Total Domestic	677	680	685	691	697	703	709	742	10%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - EXPORT									
Grainfed Japanese B3	45	50	50	50	50	50	50	43	-4%
Grainfed Japanese B2	90	100	100	100	100	101	101	86	-4%
Grainfed Japanese B1	82	92	92	92	92	93	93	79	-4%
Grainfed Japan Yearling	27	30	30	30	30	31	31	26	-4%
Grainfed Japan Total	**244**	**271**	**271**	**273**	**273**	274	**276**	**234**	**-4%**
Grainfed Korean Quarter	14	14	16	18	19	21	23	43	206%
Grainfed Korean fullset	2	2	2	2	2	3	3	5	206%
Grassfed Total Export	882	912	932	949	967	984	1,000	1,076	22%
Total Export	1,141	1,199	1,221	1,241	1,261	1,282	1,301	1,358	19%

\1 Production carcase weight is the gross carcase weight of animals slaughtered to provide beef cuts shipped

APPENDIX A, Table 7

GMI Pessimistic + Domestic Grainfed Disaggregation

NUMBER OF CATTLE TO PRODUCE PRODUCTION CARCASE WEIGHTS \1

Item	1994 ('000)	1995 ('000)	1996 ('000)	1997 ('000)	1998 ('000)	1999 ('000)	2000 ('000)	2005 ('000)	Percent Change '94-'05
AUSTRALIA									
Total	8,262	8,494	8,615	8,731	8,849	8,969	9,081	9,545	16%
Grainfed	2,001	2,090	2,106	2,128	2,146	2,168	2,190	2,203	10%
Grassfed	6,260	6,404	6,510	6,603	6,703	6,801	6,891	7,342	17%
DOMESTIC DISAGGREGATION									
Grainfed > 70 days (50% heifer)	394	395	398	402	405	409	412	432	10%
Grainfed supplemented (50% heifer)	819	822	828	836	843	850	857	897	10%
Grassfed	2,418	2,429	2,447	2,469	2,490	2,511	2,533	2,651	10%
Total Australian Domestic	3,631	3,647	3,674	3,706	3,738	3,770	3,803	3,980	10%
EXPORT DISAGGREGATION									
Grainfed Japanese B3	174	194	194	195	195	196	197	167	-4%
Grainfed Japanese B2	287	319	319	321	321	323	325	275	-4%
Grainfed Japanese B1	162	180	180	181	181	182	183	155	-4%
Grainfed Japan Yearling	110	122	122	123	123	124	124	105	-4%
Grainfed Japan Total	733	816	816	820	820	825	829	702	-4%
Grainfed Korean Quarter (40% heifer)	50	50	56	63	69	75	81	153	206%
Grainfed Korean fullset (40% heifer)	6	6	7	8	8	9	10	18	206%
Grassfed Total Export	3,842	3,975	4,062	4,135	4,213	4,290	4,358	4,691	22%
Total Australian Export	4,631	4,847	4,941	5,025	5,111	5,199	5,278	5,565	20%

\1 For grainfed cattle = feedlot gate number; for grassfed cattle = abattoir gate number

GMI FMD Free South America + Domestic Grainfed Disaggregation
TRANSFORMATION OF GMI SOURCE DATA INTO PRODUCTION CARCASE WEIGHTS (pcw) \1

APPENDIX A Table 8

Item	1994 kt	1995 kt	1996 kt	1997 kt	1998 kt	1999 kt	2000 kt	2005 kt	Percent Change '94-'05
GMI SOURCE DATA (cwe)									
Total Australia	1,818	1,890	1,925	1,957	1,991	2,025	2,058	2,209	22%
Total Australian Domestic	677	677	681	685	689	693	698	719	6%
Total Australian Export	1,141	1,213	1,244	1,272	1,301	1,331	1,360	1,490	31%
Total Export Japan	470	490	505	521	537	552	567	575	22%
Grainfed Export Japan	168	189	191	194	196	199	201	179	7%
Grainfed Export Korea	16	16	18	20	22	23	24	44	175%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - DOMESTIC									
Grainfed > 70 Days	82	82	82	83	83	84	84	87	6%
Grainfed supplemented	170	170	171	172	173	174	176	181	6%
Grassfed	425	425	427	430	432	435	438	451	6%
Total Domestic	677	677	681	685	689	693	698	719	6%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - EXPORT									
Grainfed Japanese B3	45	50	51	51	52	53	53	47	7%
Grainfed Japanese B2	90	101	102	103	105	106	107	95	7%
Grainfed Japanese B1	82	93	94	95	96	98	99	88	7%
Grainfed Japan Yearling	27	31	31	31	32	32	33	29	7%
Grainfed Japan Total	244	274	277	281	284	289	292	260	7%
Grainfed Korean Quarter	14	14	16	18	19	20	21	39	175%
Grainfed Korean fullset	2	2	2	2	2	2	3	5	175%
Grassfed Total Export	882	923	949	971	995	1,020	1,045	1,187	35%
Total Export	1,141	1,213	1,244	1,272	1,301	1,331	1,360	1,490	31%

\1 Production carcase weight is the gross carcase weight of animals slaughtered to provide beef cuts shipped

APPENDIX A, Table 9

GMI FMD Free South America + Domestic Grainfed Disaggregation
NUMBER OF CATTLE TO PRODUCE PRODUCTION CARCASE WEIGHTS \1

Item	1994 ('000)	1995 ('000)	1996 ('000)	1997 ('000)	1998 ('000)	1999 ('000)	2000 ('000)	2005 ('000)	Percent Change '94-'05
AUSTRALIA									
Total	8,262	8,535	8,686	8,822	8,965	9,110	9,259	9,965	21%
Grainfed	2,001	2,093	2,116	2,143	2,166	2,190	2,211	2,223	11%
Grassfed	6,260	6,442	6,570	6,679	6,798	6,920	7,048	7,743	24%
DOMESTIC DISAGGREGATION									
Grainfed > 70 days (50% heifer)	394	394	396	398	401	403	406	418	6%
Grainfed supplemented (50% heifer)	819	819	824	828	833	838	844	870	6%
Grassfed	2,418	2,418	2,433	2,447	2,461	2,476	2,494	2,569	6%
Total Australian Domestic	3,631	3,631	3,652	3,674	3,695	3,717	3,744	3,856	6%
EXPORT DISAGGREGATION									
Grainfed Japanese B3	174	196	198	201	203	206	208	185	7%
Grainfed Japanese B2	287	323	326	331	335	340	343	306	7%
Grainfed Japanese B1	162	182	184	187	189	192	194	173	7%
Grainfed Japan Yearling	110	124	125	127	128	130	132	117	7%
Grainfed Japan Total	733	825	833	846	855	868	877	781	7%
Grainfed Korean Quarter (40% heifer)	50	50	56	63	69	72	75	138	175%
Grainfed Korean fullset (40% heifer)	6	6	7	8	8	9	9	17	175%
Grassfed Total Export	3,842	4,023	4,137	4,232	4,337	4,445	4,554	5,174	35%
Total Australian Export	4,631	4,904	5,034	5,148	5,269	5,393	5,515	6,109	32%

\1 For grainfed cattle = feedlot gate number; for grassfed cattle = abattoir gate number

GMI High Wool Price + Domestic Grainfed Disaggregation
TRANSFORMATION OF GMI SOURCE DATA INTO PRODUCTION CARCASE WEIGHTS (pcw) \1

APPENDIX A Table 10

Item	1994 kt	1995 kt	1996 kt	1997 kt	1998 kt	1999 kt	2000 kt	2005 kt	Percent Change '94-'05
GMI SOURCE DATA (cwe)									
Total Australia	1,818	1,890	1,927	1,965	2,002	2,003	2,038	2,242	23%
Total Australian Domestic	677	677	681	683	687	687	691	712	5%
Total Australian Export	1,141	1,213	1,247	1,282	1,315	1,316	1,348	1,531	34%
Total Export Japan	470	490	505	522	538	544	560	588	25%
Grainfed Export Japan	168	189	191	193	196	194	197	182	8%
Grainfed Export Korea	16	16	18	20	22	24	25	46	188%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - DOMESTIC									
Grainfed > 70 Days	82	82	82	83	83	83	84	86	5%
Grainfed supplemented	170	170	171	172	173	173	174	179	5%
Grassfed	425	425	427	429	431	431	434	447	5%
Total Domestic	677	677	681	683	687	687	691	712	5%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - EXPORT									
Grainfed Japanese B3	45	50	51	51	52	51	52	48	8%
Grainfed Japanese B2	90	101	102	103	105	103	105	97	8%
Grainfed Japanese B1	82	93	94	95	96	95	97	89	8%
Grainfed Japan Yearling	27	31	31	31	32	31	32	29	8%
Grainfed Japan Total	**244**	**274**	277	**280**	**284**	**281**	**286**	**264**	**8%**
Grainfed Korean Quarter	14	14	16	18	19	21	22	40	188%
Grainfed Korean fullset	2	2	2	2	2	3	3	5	188%
Grassfed Total Export	882	923	952	982	1,009	1,011	1,038	1,222	39%
Total Export	1,141	1,213	1,247	1,282	1,315	1,316	1,348	1,531	34%

\1 Production carcase weight is the gross carcase weight of animals slaughtered to provide beef cuts shipped

GMI High Wool Price + Domestic Grainfed Disaggregation
NUMBER OF CATTLE TO PRODUCE PRODUCTION CARCASE WEIGHTS \1

APPENDIX A, Table 11

Item	1994 ('000)	1995 ('000)	1996 ('000)	1997 ('000)	1998 ('000)	1999 ('000)	2000 ('000)	2005 ('000)	Percent Change '94-'05
AUSTRALIA									
Total	8,262	8,535	8,699	8,857	9,015	9,022	9,176	10,099	22%
Grainfed	2,001	2,093	2,116	2,135	2,163	2,161	2,185	2,230	11%
Grassfed	6,260	6,442	6,583	6,722	6,852	6,861	6,991	7,869	26%
DOMESTIC DISAGGREGATION									
Grainfed > 70 days (50% heifer)	394	394	396	397	400	400	402	414	5%
Grainfed supplemented (50% heifer)	819	819	824	826	831	831	836	861	5%
Grassfed	2,418	2,418	2,433	2,440	2,454	2,454	2,469	2,544	5%
Total Australian Domestic	3,631	3,631	3,652	3,663	3,685	3,685	3,706	3,819	5%
EXPORT DISAGGREGATION									
Grainfed Japanese B3	174	196	198	200	203	201	204	189	8%
Grainfed Japanese B2	287	323	326	330	335	331	337	311	8%
Grainfed Japanese B1	162	182	184	186	189	187	190	176	8%
Grainfed Japan Yearling	110	124	125	126	128	127	129	119	8%
Grainfed Japan Total	733	825	833	842	855	846	860	794	8%
Grainfed Korean Quarter (40% heifer)	50	50	56	63	69	75	78	144	188%
Grainfed Korean fullset (40% heifer)	6	6	7	8	8	9	9	17	188%
Grassfed Total Export	3,842	4,023	4,150	4,282	4,398	4,407	4,523	5,325	39%
Total Australian Export	4,631	4,904	5,047	5,194	5,330	5,337	5,470	6,281	36%

\1 For grainfed cattle = feedlot gate number; for grassfed cattle = abattoir gate number

APPENDIX A Table 16

GMI Base Case + Domestic Disaggregation +Shifts between Grainfed Market Segments by year 2000
TRANSFORMATION OF GMI SOURCE DATA INTO PRODUCTION CARCASE WEIGHTS (pcw) \1

Item	1994 kt	1995 kt	1996 kt	1997 kt	1998 kt	1999 kt	2000 kt	2005 kt	Percent Change '94-'05
GMI SOURCE DATA (cwe)									
Total Australia	1,818	1,890	1,927	1,965	1,999	2,038	2,074	2,249	24%
Total Australian Domestic	677	677	680	683	686	690	694	712	5%
Total Australian Export	1,141	1,213	1,247	1,282	1,313	1,348	1,380	1,538	35%
Total Export Japan	470	490	505	522	532	550	566	607	29%
Grainfed Export Japan	168	189	191	193	190	193	195	202	20%
Grainfed Export Korea	16	16	18	20	24	26	28	37	131%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - DOMESTIC									
Grainfed > 70 Days	82	87	92	97	102	107	113	121	47%
Grainfed supplemented	170	180	190	201	212	223	234	251	47%
Grassfed	425	411	398	385	372	360	347	341	-20%
Total Domestic	677	677	680	683	686	690	694	712	5%
PRODUCTION CARCASE WEIGHT TRANSFORMATION - EXPORT									
Grainfed Japanese B3	45	51	52	53	53	55	56	58	30%
Grainfed Japanese B2	90	101	103	105	104	106	108	112	24%
Grainfed Japanese B1	82	90	88	86	82	81	79	83	0%
Grainfed Japan Yearling	27	32	34	35	36	38	40	41	51%
Grainfed Japan Total	244	274	277	280	276	280	283	293	20%
Grainfed Korean Quarter	14	14	16	18	21	23	25	32	131%
Grainfed Korean fullset	2	2	2	2	3	3	3	4	131%
Grassfed Total Export	882	923	952	982	1,014	1,043	1,070	1,209	37%
Total Export	1,141	1,213	1,247	1,282	1,313	1,348	1,380	1,538	35%

\1 Production carcase weight is the gross carcase weight of animals slaughtered to provide beef cuts shipped

APPENDIX A, Table 17

GMI Base Case + Domestic Disaggregation +Shifts between Grainfed Market Segments by year 2000
NUMBER OF CATTLE TO PRODUCE PRODUCTION CARCASE WEIGHTS \1

Item	1994 ('000)	1995 ('000)	1996 ('000)	1997 ('000)	1998 ('000)	1999 ('000)	2000 ('000)	2005 ('000)	Percent Change '94-'05
AUSTRALIA									
Total	8,262	8,527	8,679	8,834	8,980	9,138	9,285	10,035	21%
Grainfed	2,001	2,167	2,263	2,360	2,442	2,547	2,648	2,826	41%
Grassfed	6,260	6,360	6,416	6,474	6,538	6,592	6,638	7,209	15%
DOMESTIC DISAGGREGATION									
Grainfed > 70 days (50% heifer)	394	416	441	465	490	516	542	580	47%
Grainfed supplemented (50% heifer)	819	865	916	967	1,019	1,072	1,127	1,205	47%
Grassfed	2,418	2,337	2,265	2,192	2,119	2,048	1,976	1,941	-20%
Total Australian Domestic	3,631	3,618	3,622	3,625	3,628	3,636	3,644	3,725	3%
EXPORT DISAGGREGATION									
Grainfed Japanese B3	174	199	204	209	208	214	219	227	30%
Grainfed Japanese B2	287	325	330	336	333	340	345	357	24%
Grainfed Japanese B1	162	177	173	170	162	159	156	162	0%
Grainfed Japan Yearling	110	129	136	143	147	154	161	166	51%
Grainfed Japan Total	733	830	844	857	849	867	881	912	24%
Grainfed Korean Quarter (40% heifer)	50	50	56	63	75	81	88	116	131%
Grainfed Korean fullset (40% heifer)	6	6	7	8	9	10	11	14	131%
Grassfed Total Export	3,842	4,023	4,150	4,282	4,419	4,544	4,662	5,268	37%
Total Australian Export	4,631	4,909	5,057	5,209	5,352	5,502	5,641	6,309	36%

\1 For grainfed cattle = feedlot gate number; for grassfed cattle = abattoir gate number

ABS MEAT CATTLE STATISTICS

Appendix A Table 18

	Year	88/89			89/90			90/91			91/92			92/93			5-Year Average		
	Zone	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall
New South Wales																			
Beef breed bulls1yr & over used/intended for service		2,537	43,271	47,905	2,616	44,746	50,641	0	0	0	0	0	0	0	0	0			
Beef breed bull calves under 1 yr intended for service		464	14,930	14,934	611	18,446	17,916	0	0	0	0	0	0	0	0	0			
Total bulls all ages		3,001	58,201	62,839	3,227	63,192	68,557	2,947	59,773	62,383	2,564	59,583	59,684	3,150	56,469	60,117			
Meat cows and heifers 1 to 2 yo		28,147	284,963	282,989	28,302	298,804	305,068	0	0	0	0	0	0						
Meat cows and heifers over 2 yo		63,901	874,660	989,625	68,648	941,009	1,044,379	0	0	0	0	0	0						
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER		92,048	1,159,623	1,272,614	96,950	1,239,813	1,349,447	95,941	1,256,656	1,332,995	81,878	1,326,372	1,324,836	97,893	1,422,114	1,348,645	92,782	1,280,916	1,329,547
Meat heifer calves < 1 yo		19,475	314,556	342,656	21,467	334,531	354,604	0	0	0	0	0	0						
Meat steer calves <1 yo (excludes bull calves intended for sires)		21,254	368,556	363,375	23,955	393,252	380,408	0	0	0	0	0	0						
Total calves under 1 yo (excl.bull calves intended for sires) D		40,729	683,112	706,029	45,422	727,783	735,012	49,413	783,217	730,486	41,460	809,787	691,855	40,901	763,583	711,345			
Total calves (including bulls intended for sires) D		41,193	698,842	720,963	46,033	746,229	752,928	50,555	801,158	747,219	42,410	828,336	706,885	41,838	781,874	727,435	44,406	770,968	731,886
Sprayed meat cows and heifers 1 year and over		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Meat cattle nec (steers, bullocks, etc)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Meat cattle nec (steers,bullocks,spay co)		20,339	438,490	386,980	19,972	388,934	386,905	21,134	503,620	409,838	16,254	549,622	397,616	21,215	513,724	381,074			
Meat cattle excluding bulls and calves intended for sires		134,863	1,970,870	2,065,087							138,792	2,685,781	2,412,707	160,009	2,699,423	2,460,864			
MEAT CATTLE TOTAL		156,117	2,339,426	2,428,462	165,571	2,419,742	2,539,921	169,468	2,685,264	2,535,522	141,356	2,745,363	2,472,391	163,159	2,755,892	2,528,981	159,134	2,573,136	2,499,455
TOTAL MEAT AND DAIRY CATTLE		157,068	2,401,273	2,770,222	166,288	2,481,960	2,857,383												
Victoria																			
Beef breed bulls1yr & over used/intend		0	9,775	40,322	0	9,931	41,841		0	0		0	0		0	0			
Beef breed bull calves under 1yr intend		0	3,150	13,043	0	3,658	13,857		0	0		0	0		0	0			
TOTAL BULLS ALL AGES		0	12,925	53,365	0	13,589	55,698		12,721	52,735		11,665	48,568		12,481	49,439			
Meat cows and heifers1 to 2 years		0	48,041	209,766	0	34,217	214,741		0	0		0	0						
Meat cows and heifers over 2 years		0	136,353	664,945	0	147,964	707,723		0	0		0	0						
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER		0	184,394	874,711	0	182,181	922,463		191,286	897,586		195,120	857,396		286,665	922,267	0	195,969	894,844
Meat heifer calves < 1 year		0	55,620	208,325	0	62,820	229,678		0	0		0	0						
Meat steer calves <1 yo (excluding bulls intended for sires)		0	77,918	227,769	0	79,100	247,683		0	0		0	0		0	0			
Total calves under 1 yo (excl.bull calves intended for sires) D		0	133,538	436,094	0	141,920	477,361	0	142,098	481,155		146,320	462,615	0	139,895	465,622			
Total calves (including bulls intended for sires) D		0	136,688	449,137	0	145,578	491,218	0	146,137	494,797	0	150,448	475,731	0	143,841	478,823	0	144,545	477,941
Sprayed meat cows and heifers 1 year and over		0	0	0	0	0	0		0	0		0	0		0	0			
Meat cattle nec (steers, bullocks, etc)		0	0	0	0	0	0		0	0		0	0		0	0			
Meat cattle nec (steers,bullocks,spay co)		0	77,914	297,927	0	86,983	300,072		0	0		0	0		0	0			
Meat cattle excluding bulls and calves intended for sires					0	431,084	1,699,893		103,322	327,247		101,783	328,776		108,741	320,623			
MEAT CATTLE TOTAL		0	490,771	1,661,997	0	444,673	1,755,593		449,428	1,750,523		443,223	1,648,787		435,301	1,708,512			
TOTAL MEAT AND DAIRY CATTLE			880,152	2,628,485	0	918,666	2,727,062					454,888	1,697,355		467,902	1,757,951	0	442,815	1,716,570
Queensland (excluding North)																			
Beef breed bulls1yr & over used/intended use		54,141	60,804	48,597	58,393	63,176	54,869	0	0	0	0	0	0	0	0	0			
Beef breed bull calves under 1yr intended use		7,054	18,555	16,143	7,327	20,677	18,435	0	0	0	0	0	0	0	0	0			
TOTAL BULLS ALL AGES		61,195	79,359	64,741	65,720	83,853	73,304	65,197	78,646	59,218	68,675	75,893	54,773	71,148	74,281	55,508			
Meat cows and heifers1 to 2 years		356,745	363,733	298,461	386,851	389,497	307,695	417,372	429,460	324,090	487,158	439,344	330,529	408,716	333,690	272,055			
Meat cows and heifers over 2 years		958,933	1,073,204	801,161	1,063,009	1,115,622	832,357	1,184,911	1,177,065	833,744	1,230,706	1,149,202	814,094	1,102,778	974,911	712,333			
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER		1,315,678	1,436,937	1,099,622	1,449,860	1,505,119	1,140,052	1,602,283	1,606,505	1,157,834	1,717,864	1,588,546	1,144,623	1,509,363	1,308,636	1,168,512	1,559,810	1,535,149	1,142,129
Meat heifers calves < 1 year		253,323	365,971	253,843	268,548	390,837	261,767	0	0	0	0	0	0	0	0	0			
Meat steer calves <1 yo (excluding bulls intended for sires)		261,786	384,173	239,892	284,682	414,887	271,563	0	0	0	0	0	0	0	0	0			

ABS MEAT CATTLE STATISTICS

Appendix A Table 18

	Year	88/89			89/90			90/91			91/92			92/93			5-Year Average		
	Zone	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall
Total calves under 1 yo (excl.bull calves intended for sires) D		515,109	750,144	473,735	553,230	805,724	533,336	615,371	811,710	478,573	622,977	773,926	440,258	619,979	725,731	440,184			
Total calves (including bulls intended for sires) D		522,163	768,699	489,880	560,557	826,481	551,765	630,214	831,434	490,196	630,107	792,722	450,951	635,836	743,357	450,875	597,216	792,521	486,733
Sprayed meat cows and heifers 1 year and over		28,786	58,052	54,348	27,009	58,492	56,345	32,196	70,352	62,705	41,426	73,297	62,608	49,461	56,550	55,782			
Meat cattle nec (steers, bullocks, etc)		631,824	844,386	653,684	681,744	868,656	664,612	744,576	927,040	687,463	844,722	946,222	708,716	843,827	885,357	699,054			
Meat cattle nec (steers,bullocks,spay co)		660,610	902,438	708,032				776,772	997,392	750,168	886,150	1,019,519	771,324	893,288	941,907	754,836			
Meat cattle excluding bulls and calves intended for sires					2,711,843	3,237,991	2,394,339				3,226,991	3,381,991	2,356,205	3,222,630	3,206,274	2,363,532			
MEAT CATTLE TOTAL		2,552,592	3,168,878	2,346,131	2,777,563	3,321,844	2,467,643	3,059,523	3,494,253	2,445,793	3,295,666	3,457,884	2,418,978	3,293,778	3,280,555	2,149,840	2,995,824	3,344,663	2,363,917
TOTAL MEAT AND DAIRY CATTLE		2,557,631	3,254,255	2,567,384	2,782,897	3,406,680	2,686,240												
South Australia																			
Beef breed bulls1yr & over used/intended use		4,171	2,536	13,906	4,301	2,574	13,841	0	0	0	0	0	0	0	0	0			
Beef breed bull calves under 1yr intended use		163	1,241	4,624	186	1,211	4,960	0	0	0	0	0	0	0	0	0			
TOTAL BULLS ALL AGES		4,334	3,777	18,530	4,487	3,785	18,801	4,219	3,293	18,293	3,379	3,211	17,832	4,532	3,379	18,451			
Meat cows and heifers 1 to 2 years		27,611	10,747	66,699	30,751	11,003	66,330	0	0	0	0	0	0						
Meat cows and heifers over 2 years		76,464	34,491	213,330	82,320	37,474	213,041	0	0	0	0	0	0						
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER		104,075	45,238	280,029	113,071	48,477	279,371	100,103	49,520	285,048	87,646	58,164	294,123	90,450	73,353	344,663	101,310	54,950	296,647
Meat heifers calves < 1 year		20,217	12,251	61,447	26,982	13,022	65,729	0	0	0	0	0	0	0	0	0			
Meat steer calves <1 yo (excluding bulls intended for sires)		28,144	15,708	65,622	30,056	16,321	69,908	0	0	0	0	0	0	0	0	0			
Total calves under 1 yo (excl.bull calves intended for sires) D		48,361	27,959	127,069	57,038	29,343	135,637	47,350	33,160	139,327	41,391	38,505	150,776	44,752	37,361	155,804			
Total calves (including bulls intended for sires) D		48,524	29,200	131,693	57,224	30,554	140,597	48,729	34,125	143,383	42,596	39,436	163,390	46,855	38,346	160,340	48,625	34,370	147,882
Sprayed meat cows and heifers 1 year and over		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Meat cattle nec (steers, bullocks, etc)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Meat cattle nec (steers,bullocks,spay co)		40,683	13,252	84,781	41,962	17,649	14,878	44,953	20,593	102,791	34,376	33,555	113,379	41,378	32,738	105,022			
Meat cattle excluding bulls and calves intended for sires					0	0	0				0	0	0	0	0	0			
MEAT CATTLE TOTAL		197,453	90,226	510,489	216,558	99,254	514,489	204,624	106,566	545,459	161,793	133,435	584,110	189,310	146,731	623,940	193,947	115,242	555,665
TOTAL MEAT AND DAIRY CATTLE		197,453	127,377	617,593	216,628	135,291	617,168												
Western Australia (excluding northern sector)																			
Beef breed bulls1yr & over used/intended use		6,035	5,142	9,809	6,251	5,214	9,211	0	0	0	0	0	0	0	0	0			
Beef breed bull calves under 1yr intended use		1,714	2,324	2,776	1,573	2,797	3,204	0	0	0	0	0	0	0	0	0			
TOTAL BULLS ALL AGES		7,749	7,466	12,585	7,824	8,011	12,415	8,021	7,319	12,645	6,203	7,831	12,169	5,032	8,396	12,815			
Meat cows and heifers1 to 2 years		36,329	24,216	55,852	34,673	24,364	54,835	0	0	0	0	0	0						
Meat cows and heifers over 2 years		88,166	75,932	204,587	92,596	76,754	200,206	0	0	0	0	0	0						
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER		124,495	100,148	260,439	127,269	101,118	255,041	117,861	108,846	249,590	108,068	117,524	253,881	121,957	149,937	290,799	119,778	115,355	261,950
Meat heifers calves < 1 year		26,624	25,130	56,598	27,403	24,225	57,835	0	0	0	0	0	0						
Meat steer calves <1 yo (excluding bulls intended for sires)		25,905	24,663	78,215	31,478	23,902	82,581	0	0	0	0	0	0	0	0	0			
Total calves under 1 yo (excl.bull calves intended for sires) D		52,529	49,793	134,813	58,883	48,127	140,416	49,156	55,564	145,742	43,854	67,499	153,956	50,659	66,230	140,840			
Total calves (including bulls intended for sires) D		54,243	52,117	137,589	60,456	50,924	143,620	50,616	57,152	150,869	45,156	69,563	158,521	52,163	68,197	145,823	52,527	59,579	146,944
Sprayed meat cows and heifers 1 year and over		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Meat cattle nec (steers, bullocks, etc)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Meat cattle nec (steers,bullocks,spay co)		47,545	21,086	101,554	46,165	20,682	99,926	44,149	27,498	117,915	35,824	37,088	119,856	31,761	35,476	102,756			
Meat cattle excluding bulls and calves intended for sires											0	0	0	0	0	0			
MEAT CATTLE TOTAL		232,318	178,493	509,391	240,141	177,938	501,798	218,387	198,367	525,892	193,949	229,942	539,856	209,480	260,839	547,218	218,841	208,956	526,829
TOTAL MEAT AND DAIRY CATTLE		232,341	180,049	618,720	240,145	179,215	617,496												
Tasmania																			
Beef breed bulls1yr & over used/intended use				8,464			8,474			0			0			0			
Beef breed bull calves under 1yr intended use				3,488			3,315			0			0			0			
TOTAL BULLS ALL AGES				11,952			11,789			10,441			10,430			9,981			

Appendix A Table 18

ABS MEAT CATTLE STATISTICS

	Year	88/89			89/90			90/91			91/92			92/93			5-Year Average		
	Zone	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall
Meat cows and heifers1 to 2 years				44,712			44,139			0			0						
Meat cows and heifers over 2 years				148,189			152,564			0			0						
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER				192,901			196,703			199,113			198,425			210,891	0	0	199,447
Meat heifers calves < 1 year				61,450			64,841			0			0			0			
Meat steer calves <1 yo (excluding bulls intended for sires)				70,598			74,796			0	0	0	0	0	0	0			
Total calves under 1 yo (excl.bull calves intended for sires) D	0	0	132,048	0	0	139,637	0	0	148,748	0	0	143,887	0	0	134,283			
Total calves (including bulls intended for sires) D	0	0	135,536	0	0	142,951	0	0	152,473	0	0	146,588	0	0	137,645	0	0	143,039
Spayed meat cows and heifers 1 year and over			0			0			0			0			0			
Meat cattle nec (steers, bullocks, etc)			0			0			0			0			0			
Meat cattle nec (steers,bullocks, spay co)			80,714			84,673			86,118			94,789			90,821			
Meat cattle excluding bulls and calves intended for sires						421,013						436,221			435,195			
MEAT CATTLE TOTAL			425,615			431,882			444,420			446,651			445,176	0	0	438,933
TOTAL MEAT AND DAIRY CATTLE			560,399			568,994													
Northern Territory (excluding northern sector)																			
Beef bread bulls1yr & over used/intended use		41,775			43,282			39,278			39,667			41,190					
Beef bread bull calves under 1yr intended use		4,012			3,176			4,976			5,667			7,561					
TOTAL BULLS ALL AGES		45,787						44,254			45,334			48,751					
Meat cows and heifers1 to 2 years		217,415			187,738			184,814			184,823			198,827					
Meat cows and heifers over 2 years		584,777			602,287			598,336			571,692			535,723					
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER		802,192			790,025			783,150			756,515			734,550			773,286	0	0
Meat heifers calves < 1 year		144,233			132,019			161,187			144,600			163,192					
Meat steer calves <1 yo (excluding bulls intended for sires)		132,494			114,365			127,641			120,984			135,779					
Total calves under 1 yo (excl.bull calves intended for sires) D		276,727	0	0	246,384	0	0	288,828	0	0	265,584	0	0	298,971	0	0			
Total calves (including bulls intended for sires) D		280,739	0	0	249,560	0	0	293,804	0	0	271,451	0	0	306,533	0	0	280,417	0	0
Spayed meat cows and heifers 1 year and over		0			0			0			0			0					
Meat cattle nec (steers, bullocks, etc)		0			0			0			0			0					
Meat cattle nec (steers,bullocks, spay co)		261,829			242,655			235,226			264,946			190,778					
Meat cattle excluding bulls and calves intended for sires					1,279,064						1,287,245			1,296,433					
MEAT CATTLE TOTAL		1,386,535			1,315,512			1,351,458			1,332,579			1,345,184			1,340,256	0	0
TOTAL MEAT AND DAIRY CATTLE		1,388,001			1,327,122														
Northern WA, NT, Qld																			
Beef bread bulls1yr & over used/intended use		36,659			35,642			0			0			0					
Beef bread bull calves under 1yr intended use		6,058			5,692			0			0			0					
TOTAL BULLS ALL AGES		42,717			41,334			35,720			33,809			31,294					
Meat cows and heifers1 to 2 years		199,448			184,705			86,895			88,597			84,136					
Meat cows and heifers over 2 years		569,089			568,702			271,902			247,359			267,461					
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER		768,537			753,407			640,576			638,166			633,323			686,798	0	0
Meat heifers calves < 1 year		106,509			112,394			0			0			0					
Meat steer calves <1 yo (excluding bulls intended for sires)		118,794			115,885			0			0.			0					
Total calves under 1 yo (excl.bull calves intended for sires) D		225,303			228,279			285,028			232,922			213,754					
Total calves (including bulls intended for sires) D		231,341	0	0	233,971	0	0	210,339	0	0	228,697	0	0	229,550	0	0	226,784	0	0
Spayed meat cows and heifers 1 year and over		3,965			4,434			11,829			5,093			4,294					
Meat cattle nec (steers, bullocks, etc)		113,169			104,996			90,784			97,466			113,999					
Meat cattle nec (steers,bullocks,spay co)		248,348			116,510			226,675			243,358			226,755					
Meat cattle excluding bulls and calves intended for sires					596,570						552,974			586,669					
MEAT CATTLE TOTAL		1,284,965			1,248,961			1,107,999			1,130,435			1,115,126			1,179,885	0	0
TOTAL MEAT AND DAIRY CATTLE		1,285,130			1,249,248														

ABS MEAT CATTLE STATISTICS

Appendix A Table 18

	Year	88/89			89/90			90/91			91/92			92/93			5-Year Average		
	Zone	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall	Pastoral	Wheat Sheep	High Rainfall
Australia by Zone																			
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER		3,207,025	2,926,340	3,980,316	3,330,582	3,096,708	4,143,076	3,347,113	3,212,013	4,121,966	3,384,317	3,285,726	4,072,484	3,395,744	3,390,907	4,304,977	3,332,956	3,182,339	4,124,564
MEAT CATTLE TOTAL		5,809,920	6,185,794	7,882,005	5,974,316	6,463,451	8,218,166	6,111,459	6,853,880	8,255,609	6,263,777	7,009,847	8,102,773	6,315,966	6,911,199	8,044,298	6,095,888	6,684,834	8,100,570
TOTAL CALVES		1,178,223	1,684,746	2,064,798	1,207,801	1,799,686	2,223,080	1,284,257	1,869,986	2,178,137	1,268,417	1,880,656	2,102,074	1,311,175	1,774,834	2,100,140	1,249,974	1,801,982	2,133,646
% Calves		37%	58%	52%	36%	58%	54%	38%	58%	53%	37%	57%	52%	39%	52%	49%	38%	57%	52%
% females		55%	47%	50%	56%	48%	50%	55%	47%	50%	54%	47%	50%	54%	49%	54%	55%	48%	51%
Australia Total		All Zones			All Zones			All Zones			All Zones			All Zones					
TOTAL MEAT COWS & HEIFERS 1 YR AND OVER		10,113,681			10,570,366			10,681,092			10,742,527			11,091,628			10,639,859		
MEAT CATTLE TOTAL (ALL ZONES)		19,877,719			20,655,933			21,220,948			21,376,397			21,271,463			20,880,492		
% females		51%			51%			50%			50%			52%			51%		

BREED OF BEEF CATTLE BY ABS STATISTICAL DIVISION 1986/87

APPENDIX A, Table 19

STATE Statistical Division 1/	Indian				African		British								European		Unspecified		Dairy/Beef		Unspecified		Total	
	Brahman, Red Sindhi, Sahiwal		Composites & B. Indicus crosses		Africander & Belmont Red		Angus & Murray Grey		Shorthorn & Other British		Hereford		British x British Cross		European & Euro x other cross		Straight breeds		crosses		Crosses			
	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%
QUEENSLAND																								
Moreton & Brisbane	11,608	5%	97,094	39%	525	0%	5,158	2%	2,004	1%	44,174	18%	11,273	5%	6,565	3%		0%	12,040	5%	56,213	23%	246,654	100%
Wide-Bay Burnett	60,240	8%	360,692	50%	3,638	1%	2,545	0%	4,223	1%	83,373	12%	28,115	4%	24,548	3%		0%	11,488	2%	141,234	20%	720,096	100%
Darling Downs	19,312	2%	225,982	23%	2,455	0%	23,798	2%	40,421	4%	430,344	43%	53,499	5%	45,565	5%		0%	20,752	2%	138,301	14%	1,000,429	100%
South-West	17,865	2%	202,821	26%	438	0%	4,438	1%	81,118	10%	325,503	42%	28,108	4%	36,601	5%		0%	620	0%	81,796	10%	779,308	100%
Fitzroy	261,798	18%	765,280	53%	11,103	1%	9,061	1%	10,522	1%	111,273	8%	17,809	1%	16,106	1%		0%	1,587	0%	226,405	16%	1,430,944	100%
Central-West	27,315	4%	321,660	53%	982	0%	7,230	1%	88,559	15%	70,746	12%	19,530	3%	12,037	2%		0%	617	0%	59,718	10%	608,394	100%
Mackay	199,304	25%	476,324	59%	24	0%	19	0%	2,766	0%	5,724	1%	4,805	1%	11,989	1%		0%	680	0%	106,120	13%	807,755	100%
Northern	176,565	21%	515,345	62%	3	0%	6	0%	16,667	2%	2,363	0%	9,258	1%	10,090	1%		0%	2,870	0%	103,872	12%	837,039	100%
Far North	79,755	12%	418,823	65%	0	0%	201	0%	2,054	0%	2,412	0%	5,973	1%	1,205	0%		0%	4,010	1%	131,630	20%	646,063	100%
North-West	159,822	13%	717,898	59%	6,000	0%	665	0%	0	0%	36,646	3%	9,435	1%	10,593	1%		0%	10,367	1%	262,502	22%	1,213,928	100%
Total	1,013,584	12%	4,101,919	49%	25,168	0%	53,121	1%	248,334	3%	1,112,558	13%	187,805	2%	175,299	2%		0%	65,031	1%	1,307,791	16%	8,290,610	100%
VICTORIA																								
Melbourne	0	0%	832	1%	0	0%	23,281	22%	1,890	2%	45,429	44%	14,868	14%	3,785	4%	1,269	1%	10388	10%	2323	2%	104,065	100%
Barwon	0	0%	459	0%	0	0%	22,871	22%	2,189	2%	40,336	38%	15,092	14%	2,769	3%	1,544	1%	9558	9%	10900	10%	105,718	100%
South Western	0	0%	1,115	0%	0	0%	80,344	18%	17,391	4%	239,133	52%	50,904	11%	16,165	4%	2,360	1%	25772	6%	23113	5%	456,297	100%
Central Highlands	0	0%	317	0%	0	0%	14,328	19%	6,765	9%	35,579	47%	7,489	10%	3,109	4%	902	1%	6929	9%	1086	1%	76,504	100%
Wimmera	0	0%	2,261	7%	0	0%	5,358	16%	2,977	9%	17,088	49%	3,727	11%	741	2%	191	1%	1706	5%	495	1%	34,544	100%
Northern Mallee	0	0%	1,469	3%	0	0%	5,749	10%	6,449	12%	19,221	35%	7,286	13%	1,040	2%	217	0%	8770	16%	5429	10%	55,630	100%
Loddon Campaspe	0	0%	2,476	2%	0	0%	19,955	13%	14,763	10%	52,337	34%	24,990	16%	4,984	3%	1,328	1%	20876	14%	11304	7%	153,013	100%
Goulburn	0	0%	2,660	1%	0	0%	43,755	14%	13,183	4%	132,070	43%	34,555	11%	9,234	3%	2,883	1%	44345	14%	24343	8%	307,028	100%
North Eastern	0	0%	2,567	1%	0	0%	48,828	17%	7,453	3%	140,678	50%	36,364	13%	9,138	3%	2,847	1%	30456	11%	5114	2%	283,445	100%
East Gippsland	0	0%	321	0%	0	0%	21,501	13%	4,468	3%	104,307	62%	17,027	10%	2,825	2%	429	0%	10285	6%	6205	4%	167,368	100%
Central Gippsland	0	0%	1,540	0%	0	0%	50,680	13%	5,165	1%	160,583	41%	59,191	15%	14,619	4%	1,685	0%	65460	17%	29182	8%	388,105	100%
East Central	0	0%	297	0%	0	0%	13,364	19%	972	1%	26,218	36%	9,367	13%	3,067	4%	1,260	2%	14956	21%	2575	4%	72,076	100%
Total	0	0%	16,314	1%	0	0%	350,014	16%	83,665	4%	1,012,979	46%	280,860	13%	71,476	3%	16,915	1%	249,501	11%	122,069	6%	2,203,793	100%
SOUTH AUSTRALIA																								
Adelaide & Outer Adela	0	0%	140	0%	0	0%	11,687	15%	7,038	9%	17,099	22%	8,720	11%	3,744	5%	19,967	25%	10,698	14%	0	0%	79,093	100%
Yorke & Lower North	0	0%	605	2%	0	0%	3,870	15%	3,661	14%	7,374	28%	3,147	12%	1,868	7%	3,481	13%	1,898	7%	0	0%	25,904	100%
Murray Lands	0	0%	1,216	2%	0	0%	9,105	12%	10,942	14%	25,713	33%	11,944	15%	3,051	4%	8,370	11%	7,089	9%	0	0%	77,430	100%
South East	0	0%	2,729	1%	0	0%	34,940	9%	45,751	12%	181,949	47%	53,555	14%	25,168	7%	20,007	5%	20,405	5%	0	0%	384,504	100%
Eyre	0	0%	954	4%	0	0%	3,878	18%	2,642	12%	7,203	33%	3,246	15%	787	4%	2,010	9%	1,201	5%	0	0%	21,921	100%
Northern	0	0%	6,014	3%	0	0%	10,153	6%	74,911	42%	62,148	35%	17,902	10%	926	1%	4,849	3%	795	0%	0	0%	177,698	100%
Total	0	0%	11,658	2%	0	0%	73,633	10%	144,945	19%	301,486	39%	98,514	13%	35,544	5%	58,684	8%	42,086	5%	0	0%	766,550	100%
TASMANIA																								
Total	0	0%	0	0%	0	0%	93,900	23%	16,900	4%	125,100	30%	87,400	21%	12,800	3%	9,500	2%	57,800	14%	8,700	2%	412,100	100%
WESTERN AUSTRA																								
Kimberley 1/	0	0%	200,000	50%	0	0%	0	0%	200,000	50%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	400,000	100%
Southern Pastoral 1/	0	0%	65,400	30%	0	0%	0	0%	141,700	65%	10,900	5%	0	0%	0	0%	0	0%	0	0%	0	0%	218,000	100%
Agricultural 1/	0	0%	0	0%	0	0%	183,500	25%	110,100	15%	183,500	25%	73,400	10%	110,100	15%	0	0%	73,400	10%	0	0%	734,000	100%
Total		0%	265,400	20%	0	0%	183,500	14%	451,800	33%	194,400	14%	73,400	5%	110,100	8%	0	0%	73,400	5%	0	0%	1,352,000	100%

BREED OF BEEF CATTLE BY ABS STATISTICAL DIVISION 1986/87

APPENDIX A, Table 19

STATE Statistical Division 1/	Indian				African		British								European		Unspecified		Dairy/Beef		Unspecified		Total	
	Brahman, Red Sindhi, Sahiwal		Composites & B. indicus crosses		Africander & Belmont Red		Angus & Murray Grey		Shorthorn & Other British		Hereford		British x British Cross		European & Euro x other cross		Unspecified Straight breeds		Dairy/Beef crosses		Unspecified Crosses			
	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%	no.	%
NORTHERN T/TORY																								
Darwin & Northern 2/	232,000	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	232,000	100%
Victoria R. & Katherine	330,600	95%	17,400	5%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	348,000	100%
Barkly 2/	114,250	25%	297,050	65%	0	0%	0	0%	0	0%	45,700	10%	0	0%	0	0%	0	0%	0	0%	0	0%	457,000	100%
Alice Springs 2/	2,970	1%	29,700	10%	0	0%	0	0%	118,800	40%	133,650	45%	0	0%	11,880	4%	0	0%	0	0%	0	0%	297,000	100%
Total	679,820	51%	344,150	26%	0	0%	0	0%	118,800	9%	179,350	13%	0	0%	11,880	1%	0	0%	0	0%	0	0%	1,334,000	100%
NEW SOUTH WALE																								
Sydney	101	0%	752	3%	0	0%	2,551	10%	36	0%	6,609	27%	1,543	6%	468	2%	241	1%	3,331	14%	8,971	36%	24,603	100%
Hunter	1,395	0%	27,698	6%	0	0%	25,328	6%	21,242	5%	221,134	48%	42,502	9%	12,660	3%	3,734	1%	11,441	3%	88,931	19%	456,065	100%
Illawarra	8	0%	1,994	4%	0	0%	2,466	5%	1,287	3%	13,823	30%	4,587	10%	2,381	5%	650	1%	5,416	12%	13,453	29%	46,065	100%
Richmond-Tweed	2,795	1%	36,682	15%	0	0%	11,352	5%	1,346	1%	93,002	39%	21,405	9%	2,966	1%	1,402	1%	7,330	3%	58,849	25%	237,129	100%
Mid-North Coast	6,281	2%	45,615	14%	0	0%	28,085	8%	18,381	5%	114,222	34%	35,592	11%	3,716	1%	1,469	0%	7,434	2%	76,265	23%	337,060	100%
Northern	5,677	0%	108,626	8%	0	0%	89,149	7%	93,025	7%	695,018	52%	101,933	8%	40,349	3%	17,827	1%	15,979	1%	167,186	13%	1,334,769	100%
North Western	4,720	1%	49,578	9%	0	0%	19,551	4%	71,778	13%	234,075	44%	31,942	6%	13,266	2%	3,340	1%	6,898	1%	101,658	19%	536,806	100%
Central West	509	0%	16,169	4%	0	0%	33,932	9%	41,094	10%	166,770	42%	41,789	11%	16,609	4%	1,819	0%	10,078	3%	65,927	17%	394,696	100%
South Eastern	501	0%	5,631	1%	0	0%	46,684	12%	17,568	5%	206,140	54%	21,422	6%	6,405	2%	717	0%	12,703	3%	66,988	17%	384,759	100%
Murrumbidgee	706	0%	4,535	1%	0	0%	39,314	11%	22,323	6%	190,051	54%	25,546	7%	7,416	2%	3,237	1%	7,401	2%	54,282	15%	354,811	100%
Murray	1,439	0%	6,269	2%	0	0%	53,888	16%	24,225	7%	152,460	44%	22,900	7%	8,432	2%	1,487	0%	13,064	4%	63,398	18%	347,562	100%
Far West	175	0%	2,132	5%	0	0%	1,310	3%	8,139	17%	24,969	53%	2,478	5%	18	0%	42	0%	12	0%	7,462	16%	46,737	100%
Total	24,307	1%	305,681	7%	0	0%	353,610	8%	320,444	7%	2,118,273	47%	353,639	8%	114,686	3%	35,965	1%	101,087	2%	773,370	17%	4,501,062	100%
AUSTRALIA																								
Total	1,717,711	9%	5,045,122	27%	25,168	0%	1,107,778	6%	1,384,888	7%	5,044,146	27%	1,081,618	6%	531,785	3%	121,064	1%	588,905	3%	2,211,930	12%	18,860,115	100%

1/ Source: ABS transformation 86/87 data; Departments of Agriculture estimates in WA and NT

1/ Statistical divisions in WA aggregated as follows: 'Southern Pastoral' includes divisions Pilbara, Central South-Eastern including Johnson but excluding shires of Ravensthorpe and Esperance; 'Agriculture' includes Perth, South West, Upper and Lower Great Southern an Midlands plus the shires of Ravensthorpe and Esperance.

BREED GROUP PROFILE BY STATE

APPENDIX A Table 20

State	Breed Group	1989 -90		1990 -91		1991 -92		3-Year Average	
		Number	%	Number	%	Number	%	Number	%
NSW	British	3,864,474	41.8%	3,949,012	42.2%	4,107,362	42.8%	3,973,616	42.3%
	European	28,463	14.4%	28,280	15.8%	28,419	13.0%	28,387	14.3%
	Tropical	495,194	5.9%	558,495	5.9%	592,853	6.7%	548,847	6.2%
	Cross-breed	405,391	25.9%	393,861	24.0%	396,956	24.5%	398,736	24.8%
	Total	**4,793,522**	**24.8%**	**4,929,648**	**23.8%**	**5,125,590**	**25.3%**	**4,949,587**	**24.6%**
Qld	British	2,166,687	23.4%	2,215,922	23.7%	2,277,625	23.8%	2,220,078	23.6%
	European	145,863	73.6%	128,379	71.7%	151,143	69.2%	141,795	71.4%
	Tropical	5,870,991	70.5%	6,982,154	73.5%	6,237,104	70.8%	6,363,416	71.7%
	Cross-breed	404,046	25.8%	489,824	29.9%	518,234	31.9%	470,701	29.2%
	Total	**8,587,587**	**44.4%**	**9,816,279**	**47.5%**	**9,184,106**	**45.4%**	**9,195,991**	**45.8%**
NT	British	189,409	2.0%	185,456	2.0%	184,980	1.9%	186,615	2.0%
	European	604	0.3%	594	0.3%	594	0.3%	597	0.3%
	Tropical	1,048,029	12.6%	1,097,832	11.6%	1,104,954	12.5%	1,083,605	12.2%
	Cross-breed	37,946	2.4%	41,531	2.5%	41,531	2.6%	40,336	2.5%
	Total	**1,275,988**	**6.6%**	**1,325,413**	**6.4%**	**1,332,059**	**6.6%**	**1,311,153**	**6.5%**
Vic	British	1,612,252	17.4%	1,583,519	16.9%	1,555,278	16.2%	1,583,683	16.9%
	European	7,414	3.7%	7,708	4.3%	7,804	3.6%	7,642	3.8%
	Tropical	7,540	0.1%	23,225	0.2%	23,225	0.3%	17,997	0.2%
	Cross-breed	220,405	14.1%	224,991	13.7%	200,919	12.4%	215,438	13.4%
	Total	**1,847,611**	**9.6%**	**1,839,443**	**8.9%**	**1,787,226**	**8.8%**	**1,824,760**	**9.1%**
WA	British	553,091	6.0%	568,268	6.1%	583,507	6.1%	568,289	6.0%
	European	6,560	3.3%	4,099	2.3%	6,063	2.8%	5,574	2.8%
	Tropical	874,256	10.5%	827,976	8.7%	841,166	9.5%	847,799	9.5%
	Cross-breed	313,833	20.0%	298,663	18.2%	282,168	17.4%	298,221	18.5%
	Total	**1,747,740**	**9.0%**	**1,699,006**	**8.2%**	**1,712,904**	**8.5%**	**1,719,883**	**8.6%**
SA	British	595,767	6.4%	611,884	6.5%	610,986	6.4%	606,212	6.5%
	European	5,086	2.6%	5,103	2.8%	18,854	8.6%	9,681	4.9%
	Tropical	32,680	0.4%	12,111	0.1%	8,810	0.1%	17,867	0.2%
	Cross-breed	102,591	6.5%	109,837	6.7%	102,481	6.3%	104,970	6.5%
	Total	**736,124**	**3.8%**	**738,935**	**3.6%**	**741,131**	**3.7%**	**738,730**	**3.7%**
Tas	British	261,941	2.8%	244,855	2.6%	267,845	2.8%	258,214	2.7%
	European	4,256	2.1%	4,987	2.8%	5,571	2.6%	4,938	2.5%
	Tropical	73	0.0%	73	0.0%	73	0.0%	73	0.0%
	Cross-breed	82,200	5.2%	81,550	5.0%	81,001	5.0%	81,584	5.1%
	Total	**348,470**	**1.8%**	**331,465**	**1.6%**	**354,490**	**1.8%**	**344,808**	**1.7%**
Aust.	British	9,243,621	100.0%	9,358,916	100.0%	9,587,583	100.0%	9,396,707	100.0%
	European	198,246	100.0%	179,150	100.0%	218,448	100.0%	198,615	100.0%
	Tropical	8,328,763	100.0%	9,501,866	100.0%	8,808,185	100.0%	8,879,605	100.0%
	Cross-breed	1,566,412	100.0%	1,640,257	100.0%	1,623,290	100.0%	1,609,986	100.0%
	Total	**19,337,042**	**100.0%**	**20,680,189**	**100.0%**	**20,237,506**	**100.0%**	**20,084,912**	**100.0%**

Source: ABARE

APPENDIX A Table 21

CATTLE NUMBERS AND BEEF AND VEAL PRODUCTION AND PRODUCTIVITY BY COUNTRY

Country	Parameter	Unit	1985	1986	1987	1988	1989	1990	1991	1992	Chang '85-'92
Argentina	Number of Cattle	*million*	54.7	53.5	51.7	56.4	57	57.3	56.9	56.5	3%
	Beef & Veal Production	*kt cwe*	2,740	2,870	2,700	2,610	2,600	2,650	2,650	2,555	-7%
	Productivity	*kg cwe/h*	50	54	52	46	46	46	47	45	-10%
Australia	Number of Cattle	*million*	22.8	23.4	21.9	21.9	22.4	23.2	23.7	23.9	5%
	Beef & Veal Production	*kt cwe*	1,338	1,476	1,564	1,533	1,565	1,718	1,735	1,782	33%
	Productivity	*kg cwe/h*	59	63	71	70	70	74	73	75	27%
EC	Number of Cattle	*million*	90.8	89.6	87.9	85.2	85.4	85.9	84.8	81.3	-10%
	Beef & Veal Production	*kt cwe*	8,298	8,502	8,472	8,014	7,851	8,302	8,677	8,182	-1%
	Productivity	*kg cwe/h*	91	95	96	94	92	97	102	101	10%
USA	Number of Cattle	*million*	109.7	105.4	102.1	99.6	98.1	98.2	98.9	99.6	-9%
	Beef & Veal Production	*kt cwe*	10,997	11,292	10,884	10,880	10,633	10,464	10,534	10,607	-4%
	Productivity	*kg cwe/h*	100	107	107	109	108	107	107	106	6%
New Zealand	Number of Cattle	*million*	7.8	7.9	8.3	8.0	8.1	7.8	8.0	8.1	4%
	Beef & Veal Production	*kt cwe*	486	466	563	562	550	471	524	517	6%
	Productivity	*kg cwe/h*	62	59	68	70	68	60	66	64	2%
Japan	Number of Cattle	*million*	4.7	4.7	4.7	4.7	4.7	4.8	4.9	5.0	6%
	Beef & Veal Production	*kt cwe*	555	559	565	570	548	549	574	579	4%
	Productivity	*kg cwe/h*	118	119	120	121	117	114	117	116	-2%

Source: Commodity Statistical Bulletin 1993

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APPENDIX A, Table 22

CATTLE MOVEMENTS

DISTRICT OF ORIGIN	CLASS OF STOCK	FAT or STORE	1990 (no.)	1991 (no.)	1992 (no.)	1993 (no.)	1994 to July (no.)
Barkly Tableland & north	bulls	fat	1,450	578	684	1,596	
	cows	fat	4,419	3,291	7,030	16,892	
	steers	fat	7,271	9,074	5,724	6,153	
	calves	fat	0	0	0	0	
	bulls	store	1,589	1,044	2,056	247	
	cows	store	29,347	5,138	24,986	6,035	
	steers	store	46,648	26,230	66,670	10,207	
	calves	store	5,338	24	2,491	309	
	bulls	**total**	**3,039**	**1,622**	**2,740**	**1,843**	
	cows	**total**	**33,766**	**8,429**	**32,016**	**22,927**	
	steers	**total**	**53,919**	**35,304**	**72,394**	**16,360**	
	calves	**total**	**5,338**	**24**	**2,491**	**309**	
	All cattle	**total**	**96,062**	**45,379**	**109,641**	**41,439**	
Alice Springs	bulls	fat	374	42	15	507	
	cows	fat	473	560	83	837	
	steers	fat	1,441	3,134	765	4,906	
	calves	fat	0	0	0	0	
	bulls	store	83	0	6	0	
	cows	store	3,400	0	671	343	
	steers	store	1,848	0	1,721	740	
	calves	store	1,325	0	93	458	
	bulls	**total**	**457**	**42**	**21**	**507**	
	cows	**total**	**3,873**	**560**	**754**	**1,180**	
	steers	**total**	**3,289**	**3,134**	**2,486**	**5,646**	
	calves	**total**	**1,325**	**0**	**93**	**458**	
	All cattle	**total**	**8,944**	**3,736**	**3,354**	**7,791**	
	Total all cattle		**105,006**	**49,115**	**112,995**	**49,230**	

Source: E.Vinson QDPI Mount Isa

CATTLE MOVEMENTS

APPENDIX A, Table 23

	1990 (no.)	1991 (no.)	1992 (no.)	1993 (no.)	1994 to July (no.)
NT -> Qld	105,056	49,115	112,995	49,230	
NT -> SA	71,000	74,000	72,000		
Qld -> NSW			187,971	509,722	48,484
NSW -> Qld			213,163	280,702	271,755

APPENDIX A, Table 24

BEEF-SHEEP INDUSTRY 1992/93

STATE	Number beef/sheep farms /1	Average cattle number per farm /1	Average sheep number per farm /1	Percent stocking rate in cattle /3	Number cattle on beef/sheep farms /1	Percent cattle on beef/sheep farms	Total number cattle by state /2	Percent state herd on beef/sheep farms
New South Wale	5,592	234	1,985	49%	1,308,416	40%	5,440,032	24%
Victoria	2,213	218	1,624	52%	482,502	15%	2,225,933	22%
Queensland	1,281	597	4,516	51%	764,990	24%	8,723,373	9%
South Australia	1,281	289	2,163	52%	370,322	11%	959,981	39%
Western Australi	815	267	1,647	56%	217,720	7%	1,016,658	21%
Tasmania	349	296	3,562	40%	103,443	3%	445,176	23%
Australia	**11,649**	**282**	**2,249**	**50%**	**3,247,392**	100%	**21,271,463**	**15%**

1/ Source: ABARE 1994 Farm Surveys Report

2/ Source: ABS

3/ Sheep converted to cattle equivalents at 8:1

APPENDIX A, Table 25

FEEDLOT CAPACITY BY STATE - ALFA SURVEY MAY 1994

State	Parameter	May '94 Actual ('000 hd)	(%)	August '94 Forecast ('000 hd)	(%)
NSW	Capacity	186.6	31%	211.7	34%
	On-Feed	153.0	31%	173.6	33%
Qld	Capacity	297.5	50%	303.8	51%
	On-Feed	277.8	56%	282.5	57%
Vic	Capacity	44.7	7%	44.7	7%
	On-Feed	43.0	9%	43.0	8%
WA	Capacity	40.0	7%	40.0	6%
	On-Feed	1.5	0%	0.5	0%
Others	Capacity	28.5	5%	28.5	5%
	On-Feed	20.0	4%	20.0	4%
Total	**Capacity**	**597.3**	**100%**	**628.7**	**100%**
	On-Feed	**495.3**	**100%**	**519.6**	**100%**

LIVESTOCK ENTERPRISE OF MAJOR CORPORATE SUPPLIERS
Queensland and Northern Territory

APPENDIX A, Table 26

CATTLE ENTERPRISE	Queensland Area (sq km)	CC (head)	CC (%)	Northern Territory Area (sq km)	CC (head)	CC (%)	Total Area (sq km)	CC (head)	CC (%)
Breed, steer offtake < 12 mnths	49,476	278,777	20%	80,771	245,071	40%	130,247	523,848	26%
Breed, steer offtake 12-24 mnths	42,104	241,136	17%	17,914	41,585	7%	60,018	282,721	14%
Breed, export live steers	3,220	5,150	0%	61,673	209,966	34%	64,893	215,116	11%
Breed, grass finish	85,699	307,851	22%	42,309	119,116	19%	128,008	426,967	21%
Breed, background	6,448	44,690	3%			0%	6,448	44,690	2%
Grass finish	70,906	313,359	22%	2,648	3,884	1%	73,554	317,243	16%
Background	5,992	46,386	3%			0%	5,992	46,386	2%
Background/grass finish	49,786	168,298	12%			0%	49,786	168,298	8%
Total	**313,631**	**1,405,647**	**100%**	**205,315**	**619,622**	**100%**	**518,946**	**2,025,269**	**100%**

Source: Consultants' research 25 corporations, 165 properties

APPENDIX A, Table 27

Breedcow
NORTHERN REGION LIVE EXPORT STEADY STATE MODEL

Total Adult Equivalents	1000
Total Cattle Carried	1020
Weaner heifers retained	108
Total cows and heifers mated	539
Total calves branded	324
Calves/ cows mated %	60%
Calves/cows surviving %	65%
Overall breeder deaths %	7%
Female sales/total sales %	44%
Total cows and heifers sold	110
Maximum cow culling age	9
Heifer joining age	2
Weaner heifer sales %	33%
One year old heifer sales %	0%
Two year old heifer sales %	0%
Total steers and bullocks sold	141
Maximum bullock turnoff age	2

APPENDIX A, Table 28

Breedcow
NORTHERN REGION HARSH ZONE STEADY STATE MODEL

Total Adult Equivalents	1000
Total Cattle Carried	909
Weaner heifers retained	116
Total cows and heifers mated	630
Total calves branded	409
Calves/ cows mated %	65%
Calves/cows surviving %	68%
Overall breeder deaths %	5%
Female sales/total sales %	45%
Total cows and heifers sold	162
Maximum cow culling age	9
Heifer joining age	2
Weaner heifer sales %	43%
One year old heifer sales %	0%
Two year old heifer sales %	0%
Total steers and bullocks sold	196
Maximum bullock turnoff age	0

APPENDIX A, Table 29

Breedcow

NORTHERN REGION STEADY STATE MODEL - ENDOWED ZONE \1

	North	South
Total Adult Equivalents	1000	1000
Total Cattle Carried	902	900
Weaner heifers retained	107	105
Total cows and heifers mated	662	664
Total calves branded	497	531
Calves/ cows mated %	75%	80%
Calves/cows surviving %	77%	82%
Overall breeder deaths %	3%	2%
Female sales/total sales %	48%	49%
Total cows and heifers sold	226	248
Maximum cow culling age	9	9
Heifer joining age	2	2
Weaner heifer sales %	57%	60%
One year old heifer sales %	0%	0%
Two year old heifer sales %	0%	0%
Total steers and bullocks sold	244	261
Maximum bullock turnoff age	0	0

\1 Endowed Zone is the cropping area of Queensland; see Map 1(b) for division of "north" and "south" endowed zone

APPENDIX A, Table 31

Breedcow

SOUTHERN REGION STEADY STATE MODEL - ALL ZONES

	NSW high rainfall	NSW sheep/ wheat	NSW Pastoral	South Australia	Victoria	Tasmania	Western Australia
Total Adult Equivalents	1000	1000	1000	1000	1000	1000	1000
Total Cattle Carried	899	899	904	899	899	904	899
Weaner heifers retained	104	104	109	104	104	109	104
Total cows and heifers mated	763	763	762	763	763	762	763
Total calves branded	625	625	572	625	645	610	625
Calves/ cows mated %	82%	82%	75%	82%	85%	80%	82%
Calves/cows surviving %	84%	84%	77%	84%	87%	82%	84%
Overall breeder deaths %	2.0%	2.0%	3.0%	2.0%	2.0%	3.0%	2.0%
Female sales/total sales %	49%	49%	48%	49%	49%	48%	49%
Total cows and heifers sold	295	295	260	295	307	279	295
Maximum cow culling age	9	9	9	9	9	9	9
Heifer joining age	1	1	1	1	1	1	1
Weaner heifer sales %	67%	67%	62%	67%	68%	64%	67%
One year old heifer sales %	0%	0%	0%	0%	0%	0%	0%
Two year old heifer sales %	0%	0%	0%	0%	0%	0%	0%
Total steers and bullocks sold	308	308	280	308	319	300	308
Maximum bullock turnoff age	0	0	0	0	0	0	0

APPENDIX A, Table 30

Breedcow

NORTHERN REGION STEADY STATE MODEL - INTERMEDIATE ZONE \1

	North	South
Total Adult Equivalents	1000	1000
Total Cattle Carried	902	900
Weaner heifers retained	107	105
Total cows and heifers mated	662	664
Total calves branded	430	518
Calves/ cows mated %	65%	78%
Calves/cows surviving %	67%	80%
Overall breeder deaths %	2.5%	2.0%
Female sales/total sales %	48%	49%
Total cows and heifers sold	193	242
Maximum cow culling age	9	9
Heifer joining age	2	2
Weaner heifer sales %	50%	60%
One year old heifer sales %	0%	0%
Two year old heifer sales %	0%	0%
Total steers and bullocks sold	211	255
Maximum bullock turnoff age	0	0

\1 "Intermediate Zone refers to coastal high rainfall zone; Gladstone approximates the point of division between the "north" and "south".

CALCULATION OF MEAT STEER AND HEIFER PRODUCTION BY REGION

APPENDIX A
Table 32

REGION	Queensland and Northern Territory \1					NSW			SA	VIC	TAS	WA \1	'north'	Total
	Pastoral	S/W Nth	S/W Sth	HR/Nth	HR/Sth	H/R	S/W	Pastoral						
(a) No. cows & heifers > (ABS census 31/3/93)	1,937,166	722,972	815,663	608,789	559,724	1,368,645	1,422,116	97,893	516,674	1,129,132	210,091	562,693	1,140,070	11,091,628
From Static Models:														
steer calves	196	244	242	211	255	308	308	281	308	319	300	308	141	
(b) Cows & heifers > 1y	739	767	754	767	767	790	790	763	790	790	790	790	643	
calves branded	409	497	492	430	518	625	625	572	625	648	610	625	324	
(a) divided by (b)	2621	943	1082	794	730	1732	1800	128	654	1429	266	712	1773	
heifers branded	205	249	246	215	259	313	313	288	313	324	305	313	162	
% heifer surplus	43	57	61	50	60	67	67	64	62	67	68	48	67	
surplus heifer calves	89	141	149	108	154	209	209	182	194	217	207	150	109	
Cows & heifers sold	162	226	248	193	242	295	295	260	285	307	279	295	110	
Bulls sold	6	4	4	3	3	4	4	5	4	4	4	4	5	
EVAO factor \3	1	1.11	1.11	1.141	1.141	1.141	1.141	1	1.109	1.135	1.141	1.104	1	
Region Output:														
Steer calves	513,782	255,293	290,588	191,091	212,327	608,836	632,622	36,052	223,394	517,493	91,031	242,194	250,000	4,064,701
Surplus heifer calves	233,134	147,733	178,771	97,707	128,338	413,880	430,049	23,374	140,528	352,155	62,932	117,952	192,447	2,518,999
Cull bulls	15,728	4,185	4,803	2,717	2,498	7,907	8,216	642	2,901	6,489	1,214	3,145	8,865	69,310
Cull cows	191,522	88,727	119,022	77,082	73,164	169,258	175,871	9,984	73,437	145,871	21,726	114,020	2,589	1,262,275
Total	954,166	495,938	593,184	368,597	416,327	1,199,881	1,246,758	70,052	440,261	1,022,007	176,903	477,312	453,900	7,915,285
Production Coefficient														
Branding Rate	0.65	0.75	0.8	0.65	0.78	0.82	0.82	0.75	0.82	0.85	0.8	0.82	0.6	
Mortality	0.05	0.025	0.02	0.025	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.07	
Heifer joining age	2	2	2	2	2	1	1	1	1	1	1	1	2	
Maximum cow culling ag	9	9	9	9	9	9	9	9	9	9	9	9	9	

\1 excludes the 'north'
\2 No. cows & heifers in Qld & NT pastoral sub region equals 3,077,236 (total NT,north,Qld pastoral) less 1,140,070 (total from 'north' required to supply 250,000 live export steers)
\3 EVAO factor brings to account rural establishments excluded in Agricultural Census, namely those with an estimated value of agricultural operation (EVAO) under $22,500. We have used AMLC national cattle population (corrected for EVAO) as a % of the ABS 1993 Census and assigned a weighting by zone on basis of no. of farms in respective zones & assuming zero EVAO correction applies in the pastoral zone. The difference between States reflects the zone mix in the different States.

APPENDIX A, Table 33

RECONCILIATION OF CATTLE SLAUGHTER NUMBERS
1994 AMLC PROJECTION AND CONSULTANTS' AGGREGATED HERD MODELS

Item	Aggregated Model (mil.hd)	AMLC (mil.hd)
Steer calves branded	4.065	
Surplus heifer calves branded	2.519	
Cull bull offtake	0.069	
Cull cow offtake	1.262	
Sub Total Meat Cattle	7.915	
add Dairy calves slaughtered	0.800	
Total meat & dairy	8.715	
deduct Live export	0.250	
Net after live export	8.465	
Allowance for mortality in steer calves and surplus heifer calves between branding and slaughter @ 3.36% \1	0.221	
Total slaughter number	**8.244**	**8.244**

\1 Balancing figure - as steers and heifers are slaughtered at various ages it represents the weighted average of various slaughter ages

APPENDIX A, Table 34

PRODUCTION OF MAJOR FEED GRAINS BY STATE

		1987/88 ('000)	1988/89 ('000)	1989/90 ('000)	1990/91 ('000)	1991/92 ('000)	1992/93 ('000)
NSW							
Barley	*hectares*	*465*	*413*	*413*	*463*	*517*	*560*
	tonnes	**744**	**712**	**656**	**822**	**749**	**1,044**
Sorghum	*hectares*	*175*	*152*	*138*	*84*	*147*	*118*
	tonnes	**412**	**301**	**359**	**187**	**398**	**229**
Maize	*hectares*	*15*	*14*	*17*	*18*	*17*	*16*
	tonnes	**72**	**78**	**98**	**91**	**119**	**108**
Oats	*hectares*	*526*	*548*	*365*	*374*	*457*	*448*
	tonnes	**707**	**780**	**504**	**538**	**579**	**761**
Wheat	*hectares*	*2,464*	*2,309*	*2,123*	*2,166*	*1,499*	*1,694*
	tonnes	**3,997**	**4,105**	**3,423**	**4,128**	**2,183**	**3,583**
Victoria							
Barley	*hectares*	*366*	*350*	*389*	*463*	*534*	*551*
	tonnes	**529**	**545**	**696**	**651**	**898**	**1,116**
Sorghum	*hectares*	*0*	*2*	*0*	*0*	*0*	*0*
	tonnes	**0**	**1**	**1**	**1**	**0**	**0**
Maize	*hectares*	*1*	*1*	*0*	*0*	*0*	*0*
	tonnes	**6**	**1**	**1**	**2**	**3**	**3**
Oats	*hectares*	*216*	*189*	*189*	*177*	*183*	*223*
	tonnes	**325**	**276**	**330**	**301**	**300**	**404**
Wheat	*hectares*	*1,026*	*931*	*952*	*911*	*664*	*821*
	tonnes	**1,882**	**1,691**	**1,961**	**1,493**	**1,150**	**2,015**
Queensland							
Barley	*hectares*	*169*	*200*	*179*	*177*	*128*	*189*
	tonnes	**244**	**374**	**321**	**361**	**70**	**285**
Sorghum	*hectares*	*565*	*468*	*238*	*291*	*420*	*308*
	tonnes	**1,213**	**934**	**578**	**558**	**1,045**	**315**
Maize	*hectares*	*37*	*36*	*34*	*29*	*34*	*27*
	tonnes	**124**	**132**	**115**	**95**	**141**	**75**
Oats	*hectares*	*19*	*18*	*15*	*24*	*15*	*15*
	tonnes	**14**	**15**	**14**	**27**	**5**	**10**
Wheat	*hectares*	*646*	*768*	*894*	*1,060*	*492*	*669*
	tonnes	**718**	**1,550**	**1,420**	**1,973**	**344**	**735**
South Australia							
Barley	*hectares*	*876*	*837*	*900*	*945*	*999*	*1,023*
	tonnes	**1,261**	**1,036**	**1,724**	**1,506**	**1,882**	**1,855**
Sorghum	*hectares*	*0*	*0*	*0*	*0*	*0*	*0*
	tonnes	**0**	**0**	**0**	**0**	**0**	**0**
Maize	*hectares*	*0*	*0*	*0*	*0*	*0*	*0*
	tonnes	**0**	**0**	**0**	**0**	**0**	**0**
Oats	*hectares*	*132*	*156*	*172*	*135*	*129*	*123*
	tonnes	**135**	**131**	**250**	**148**	**172**	**165**
Wheat	*hectares*	*1,556*	*1,520*	*1,557*	*1,448*	*1,297*	*1,419*
	tonnes	**1,803**	**1,361**	**2,607**	**2,021**	**2,141**	**2,421**
Western Australia							
Barley	*hectares*	*461*	*383*	*421*	*498*	*554*	*611*
	tonnes	**617**	**552**	**628**	**742**	**900**	**1,061**
Sorghum	*hectares*	*0*	*1*	*0*	*1*	*0*	*0*
	tonnes	**0**	**1**	**1**	**2**	**0**	**2**
Maize	*hectares*	*1*	*1*	*1*	*1*	*1*	*2*
	tonnes	**5**	**4**	**5**	**5**	**5**	**13**
Oats	*hectares*	*373*	*389*	*340*	*324*	*367*	*332*
	tonnes	**502**	**618**	**529**	**497**	**614**	**578**
Wheat	*hectares*	*3,312*	*3,297*	*3,476*	*3,632*	*3,230*	*3,669*
	tonnes	**3,882**	**5,225**	**4,800**	**5,449**	**4,736**	**5,979**
Australia							
Barley	*hectares*	*2,346*	*2,190*	*2,310*	*2,556*	*2,744*	*2,947*
	tonnes	**3,417**	**3,242**	**4,044**	**4,108**	**4,530**	**5,397**
Sorghum	*hectares*	*745*	*625*	*380*	*378*	*569*	*427*
	tonnes	**1,633**	**1,244**	**946**	**751**	**1,447**	**548**
Maize	*hectares*	*56*	*52*	*52*	*49*	*52*	*45*
	tonnes	**208**	**217**	**219**	**194**	**269**	**199**
Oats	*hectares*	*1,275*	*1,309*	*1,089*	*1,044*	*1,160*	*1,149*
	tonnes	**1,698**	**1,838**	**1,640**	**1,530**	**1,690**	**1,937**
Wheat	*hectares*	*9,005*	*8,827*	*9,004*	*9,218*	*7,183*	*8,275*
	tonnes	**12,287**	**13,935**	**14,214**	**15,066**	**10,557**	**14,739**

FEED GRAIN PRODUCTION IN MAJOR FEEDLOT AREAS

APPENDIX A, Table 35

CROP		1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
DARLING DOWNS								
Wheat	ha	477,675	368,935	435,890	513,617	519,807	296,585	354,612
	tonne	**489,893**	**377,203**	**886,843**	**778,188**	**1,002,894**	**185,417**	**456,973**
Barley	ha	149,756	150,039	171,782	153,882	150,810	101,566	162,508
	tonne	**251,251**	**221,081**	**324,690**	**281,382**	**317,711**	**56,939**	**262,971**
Oats	ha	10,766	13,955	11,068	10,909	15,058	8,671	9,096
	tonne	**12,512**	**10,618**	**9,376**	**11,357**	**17,303**	**3,081**	**6,988**
Triticale	ha	9,355	6,617	8,577	11,316	12,091	2,742	3,693
	tonne	**18,397**	**9,916**	**19,966**	**24,189**	**29,302**	**2,202**	**6,660**
Sorghum	ha	287,780	320,436	238,169	177,518	151,145	251,272	150,625
	tonne	**621,302**	**800,939**	**505,849**	**493,177**	**298,181**	**759,746**	**186,532**
Maize	ha	14,839	15,141	15,339	14,357	10,787	14,340	10,015
	tonne	**51,061**	**67,882**	**58,973**	**62,210**	**40,976**	**62,893**	**26,937**
Total	ha	950,171	875,123	880,825	881,599	859,698	675,176	690,549
	tonne	**1,444,416**	**1,487,639**	**1,805,697**	**1,650,503**	**1,706,367**	**1,070,278**	**947,061**
NORTHERN NSW								
Wheat	ha	700,174	573,884	575,500	555,646	548,072	369,378	383,399
	tonne	**1,179,934**	**996,721**	**1,027,114**	**880,996**	**1,147,647**	**497,269**	**701,809**
Barley	ha	95,001	118,847	111,080	121,910	135,725	132,738	138,388
	tonne	**161,318**	**221,868**	**198,994**	**200,185**	**281,494**	**177,120**	**245,482**
Oats	ha	29,046	32,146	22,845	17,949	22,220	20,675	22,710
	tonne	**35,517**	**40,661**	**26,370**	**20,400**	**26,474**	**17,817**	**24,877**
Triticale	ha	5,956	5,764	4,038	1,578	1,234	1,098	899
	tonne	**11,242**	**9,961**	**5,052**	**2,264**	**1,695**	**1,625**	**2,936**
Sorghum	ha	157,851	150,716	126,186	109,143	62,955	113,466	89,875
	tonne	**322,041**	**336,609**	**239,258**	**267,720**	**139,689**	**308,344**	**169,593**
Maize	ha	8,504	6,763	5,625	6,451	7,753	7,467	5,963
	tonne	**33,087**	**29,603**	**33,383**	**39,683**	**36,673**	**47,742**	**38,345**
Total	ha	996,532	888,120	845,274	812,677	777,959	644,822	641,234
	tonne	**1,743,139**	**1,635,423**	**1,530,171**	**1,411,248**	**1,633,672**	**1,049,917**	**1,183,042**
RIVERINA/MURRUMBIDGEE								
Wheat	ha	532,605	392,364	335,796	331,434	346,525	222,931	284,769
	tonne	**1,055,426**	**758,559**	**637,211**	**653,222**	**750,681**	**470,931**	**814,956**
Barley	ha	101,658	114,829	100,144	90,926	102,423	114,951	126,878
	tonne	**168,659**	**190,659**	**175,382**	**157,941**	**189,624**	**200,684**	**264,603**
Oats	ha	120,203	120,570	117,601	91,945	92,632	107,117	105,959
	tonne	**183,420**	**182,246**	**183,005**	**144,554**	**156,959**	**167,706**	**213,346**
Triticale	ha	18,554	18,596	17,319	13,042	16,067	17,174	20,230
	tonne	**42,182**	**40,569**	**34,756**	**26,535**	**35,706**	**38,498**	**63,175**
Sorghum	ha	1,196	1,631	1,674	1,360	304	1,689	321
	tonne	**5,277**	**6,165**	**9,424**	**4,309**	**1,108**	**5,899**	**1,277**
Maize	ha	3,141	3,410	4,802	6,131	5,561	5,546	5,727
	tonne	**22,231**	**23,013**	**30,703**	**39,449**	**31,519**	**48,506**	**49,537**
Total	ha	777,357	651,400	577,336	534,838	563,512	469,408	543,884
	tonne	**1,477,195**	**1,201,211**	**1,070,481**	**1,026,010**	**1,165,597**	**932,224**	**1,406,894**

APPENDIX A, Table 38

WORLD AND AUSTRALIAN COARSE GRAIN PRODUCTION AND PRICE FORECASTS

	Unit	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
WORLD									
Area	million ha	318	318	311	314	316	318	320	322
Yield	t/ha	2.53	2.7	2.5	2.62	2.63	2.84	2.66	2.67
Production	Mt	803	857	779	822	831	841	851	861
Use	MT	809	834	823	814	823	836	846	858
Closing Stocks	Mt	134	158	113	122	130	135	140	143
Trade	Mt	94	88	87	87	88	89	90	91
Price - nominal (a)	US$/t	110	97	117	118	123	128	131	133
- real (b)	US$/t	116	100	117	114	116	117	116	113
AUSTRALIA									
Area (c)	million ha	4.6	4.6	5.4	4.9	5	5.1	5.1	5.2
Yield	t/ha	1.75	1.83	1.81	1.71	1.72	1.73	1.74	1.75
Production	Mt	8.1	8.5	9.8	8.4	8.6	8.7	8.9	9.1
Use (d)	Mt	5.4	5.2	6.6	4.6	5	5.2	5.4	5.5
Exports	Mt	2.7	3.3	3.2	3.8	3.6	3.5	3.5	3.6
Price - nominal (e)									
Feed Barley	A$/t	141	131	113	120	136	144	148	151
Price - real (g)									
Feed Barley	A$/t	146	134	113	116	127	130	129	127

Explanations:
a) Price of US corn fob Gulf
b) In 1993/94 US dollars
c) Includes barley, sorghum, oats, triticale and maize
d) Incudes additions to stocks
e) Prices relate to Sydney region
g) In 1993/94 Australian dollars
Sources: - US Department of Agriculture, ABARE

APPENDIX A, Table 37

WORLD AND AUSTRALIAN WHEAT PRODUCTION AND PRICE FORECASTS

	Unit	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
WORLD									
Area	million ha	222	222	222	226	227	228	230	232
Yield	t/ha	2.44	2.53	2.52	2.5	2.53	2.54	2.57	2.61
Production	Mt	542	561	559	564	574	579	591	605
Trade (a)	Mt	109	107	98	104	110	110	115	115
Price - nominal (b)	US$/t	150	140	142	138	139	156	173	185
- real (c)	US$/t	158	144	142	134	131	142	152	158
AUSTRALIA									
Area	million ha	7.2	9.1	9.5	10.1	10.2	10.4	10.6	11.2
Yield	t/ha	1.47	1.78	1.91	1.54	1.54	1.55	1.56	1.57
Production	Mt	10.6	16.2	18.2	15.5	15.7	16.4	17	17.6
Pool return - ASW (d)	$A/t	180	190	165	172	171	188	204	220
- real (e)	A$/t	187	195	165	166	160	170	179	186

Explanations:
a) Includes net EU trade
b) US hard red winter wheat fob Gulf, June-July
c) In 1993-94 US dollars
d) Australian standard white wheat, 10 per cent protein
e) In 1993-94 Australian dollars

APPENDIX A, Table 38

GRAIN AND ROUGHAGE REQUIREMENTS GMI Baseline + Domestic Grainfed Disaggregation

	Total Feed As Fed (kg/hd)	% grain	No. Cattle In 1994	2000	Total Grain 1994 kt	2000 kt	Total Roughage 1994 kt	2000 kt
Grainfed > 70 days	600	75	394	404	197	202	74	76
Grainfed supplemented	540	60	819	839	295	302	221	227
Grainfed Japanese B3	2,700	60	174	202	313	364	235	273
Grainfed Japanese B2	1,783	70	287	333	398	462	192	223
Grainfed Japanese B1	1,170	80	162	188	168	196	47	55
Grainfed Japan Yearling	875	75	110	128	80	93	30	35
Grainfed Korean Quarter	1,080	80	50	88	48	84	14	24
Grainfed Korean fullset	1,215	80	6	11	6	11	2	3
Total			2,001	2,192	1,506	1,713	814	914

APPENDIX A, Table 39

GRAIN AND ROUGHAGE REQUIREMENTS GMI Optimistic + Domestic Grainfed Disaggregation

	Total Feed DM Basis (kg/hd)	% grain	No. Cattle In 1994	2000	As Fed \1 Total Grain 1994 kt	2000 kt	As Fed \1 Total Roughage 1994 kt	2000 kt
Grainfed > 70 days	600	75	394	397	197	198	74	74
Grainfed supplemented	540	60	819	825	295	297	221	223
Grainfed Japanese B3	2,700	60	174	227	313	408	235	306
Grainfed Japanese B2	1,783	70	287	374	398	519	192	250
Grainfed Japanese B1	1,170	80	162	211	168	220	47	62
Grainfed Japan Yearling	875	75	110	143	80	105	30	39
Grainfed Korean Quarter	1,080	80	50	94	48	90	14	25
Grainfed Korean fullset	1,215	80	6	11	6	12	2	3
Total			2,001	2,282	1,506	1,849	814	983

\1 Assumes grain 90% dry matter, roughage 80% dry matter

APPENDIX A, Table 40

GRAIN AND ROUGHAGE REQUIREMENTS GMI Pessimistic + Domestic Grainfed Disaggregation

	Total Feed DM Basis (kg/hd)	% grain	No. Cattle In 1994	2000	As Fed \1 Total Grain 1994 kt	2000 kt	As Fed \1 Total Roughage 1994 kt	2000 kt
Grainfed > 70 days	816	75	394	412	197	206	74	77
Grainfed supplemented	360	60	819	857	295	309	221	232
Grainfed Japanese B3	3159	60	174	197	313	354	235	266
Grainfed Japanese B2	1966	70	287	325	398	450	192	217
Grainfed Japanese B1	1376	80	162	183	168	191	47	54
Grainfed Japan Yearling	1142	75	110	124	80	91	30	34
Grainfed Korean Quarter	1224	80	50	81	48	78	14	22
Grainfed Korean fullset	1377	80	6	10	6	11	2	3
Total			2,001	2,190	1,506	1,689	814	904

\1 Assumes grain 90% dry matter, roughage 80% dry matter

APPENDIX A, Table 41

GRAIN AND ROUGHAGE REQUIREMENTS GMI FMD Free South America + Domestic Grainfed Disaggregation

	Total Feed DM Basis (kg/hd)	% grain	No. Cattle In 1994	No. Cattle In 2000	As Fed \1 Total Grain 1994 kt	As Fed \1 Total Grain 2000 kt	As Fed \1 Total Roughage 1994 kt	As Fed \1 Total Roughage 2000 kt
Grainfed > 70 days	816	75	394	406	197	203	74	76
Grainfed supplemented	360	60	819	844	295	304	221	228
Grainfed Japanese B3	3,159	60	174	208	313	375	235	281
Grainfed Japanese B2	1,966	70	287	343	398	476	192	230
Grainfed Japanese B1	1,376	80	162	194	168	202	47	57
Grainfed Japan Yearling	1,142	75	110	132	80	96	30	36
Grainfed Korean Quarter	1,224	80	50	75	48	72	14	20
Grainfed Korean fullset	1,377	80	6	9	6	10	2	3
Total			2,001	2,211	1,506	1,737	814	930

\1 Assumes grain 90% dry matter, roughage 80% dry matter

APPENDIX A, Table 42

GRAIN AND ROUGHAGE REQUIREMENTS GMI High Wool Price + Domestic Grainfed Disaggregation

	Total Feed DM Basis (kg/hd)	% grain	No. Cattle In 1994	No. Cattle In 2000	As Fed \1 Total Grain 1994 kt	As Fed \1 Total Grain 2000 kt	As Fed \1 Total Roughage 1994 kt	As Fed \1 Total Roughage 2000 kt
Grainfed > 70 days	816	75	394	402	197	201	74	75
Grainfed supplemented	360	60	819	836	295	301	221	226
Grainfed Japanese B3	3,159	60	174	204	313	367	235	275
Grainfed Japanese B2	1,966	70	287	337	398	467	192	225
Grainfed Japanese B1	1,376	80	162	190	168	198	47	56
Grainfed Japan Yearling	1,142	75	110	129	80	94	30	35
Grainfed Korean Quarter	1,224	80	50	78	48	75	14	21
Grainfed Korean fullset	1,377	80	6	9	6	10	2	3
Total			2,001	2,185	1,506	1,713	1,129	916

\1 Assumes grain 90% dry matter, roughage 80% dry matter

APPENDIX A, Table 43

GRAIN AND ROUGHAGE REQUIREMENTS GMI Grainfed Productivity Improvement + Domestic Grainfed Disaggregation

	Total Feed DM Basis (kg/hd)	% grain	No. Cattle In 1994	No. Cattle In 2000	As Fed \1 Total Grain 1994 kt	As Fed \1 Total Grain 2000 kt	As Fed \1 Total Roughage 1994 kt	As Fed \1 Total Roughage 2000 kt
Grainfed > 70 days	816	75	394	404	197	202	74	76
Grainfed supplemented	360	60	819	839	295	302	221	227
Grainfed Japanese B3	3,159	60	174	291	313	524	235	393
Grainfed Japanese B2	1,966	70	287	480	398	666	192	321
Grainfed Japanese B1	1,376	80	162	271	168	282	47	79
Grainfed Japan Yearling	1,142	75	110	184	80	134	30	50
Grainfed Korean Quarter	1,224	80	50	116	48	111	14	31
Grainfed Korean fullset	1,377	80	6	14	6	15	2	4
Total			2,001	2,598	1,506	2,235	814	1,181

\1 Assumes grain 90% dry matter, roughage 80% dry matter

APPENDIX A, Table 44

GRAIN AND ROUGHAGE REQUIREMENTS

GMI Base Case+ 25% decline in Japanese dairy beef by 2005

	Total Feed DM basis (kg/hd)	% grain	No. Cattle In 1994	No. Cattle In 2000	As Fed \1 Total Grain 1994 kt	As Fed \1 Total Grain 2000 kt	As Fed \1 Total Roughage 1994 kt	As Fed \1 Total Roughage 2000 kt
Grainfed > 70 days	816	75	394	401	197	200	74	75
Grainfed supplemented	360	60	819	833	295	300	221	225
Grainfed Japanese B3	3,159	60	174	211	313	380	235	285
Grainfed Japanese B2	1,966	70	287	349	398	483	192	233
Grainfed Japanese B1	1,376	80	162	197	168	205	47	58
Grainfed Japan Yearling	1,142	75	110	134	80	97	30	37
Grainfed Korean Quarter	1,224	80	50	78	48	75	14	21
Grainfed Korean fullset	1,377	80	6	9	6	10	2	3
Total			**2,001**	**2,212**	**1,506**	**1,751**	**814**	**936**

\1 Assumes grain 90% dry matter and roughage 80% dry matter

APPENDIX A, Table 45

GRAIN AND ROUGHAGE REQUIREMENTS

GMI Base Case + Domestic Disaggregation +Shifts between Grainfed Market Segments by year 2000

	Total Feed DM basis (kg/hd)	% grain	No. Cattle In 1994	No. Cattle In 2000	As Fed \1 Total Grain 1994 kt	As Fed \1 Total Grain 2000 kt	As Fed \1 Total Roughage 1994 kt	As Fed \1 Total Roughage 2000 kt
Grainfed > 70 days	816	75	394	542	197	271	74	102
Grainfed supplemented	360	60	819	1,127	295	406	221	304
Grainfed Japanese B3	3,159	60	174	219	313	395	235	296
Grainfed Japanese B2	1,966	70	287	345	398	479	192	231
Grainfed Japanese B1	1,376	80	162	156	168	162	47	46
Grainfed Japan Yearling	1,142	75	110	161	80	117	30	44
Grainfed Korean Quarter	1,224	80	50	88	48	84	14	24
Grainfed Korean fullset	1,377	80	6	11	6	11	2	3
Total			**2,001**	**2,648**	**1,506**	**1,925**	**814**	**1,049**

\1 Assumes grain 90% dry matter and roughage 80% dry matter

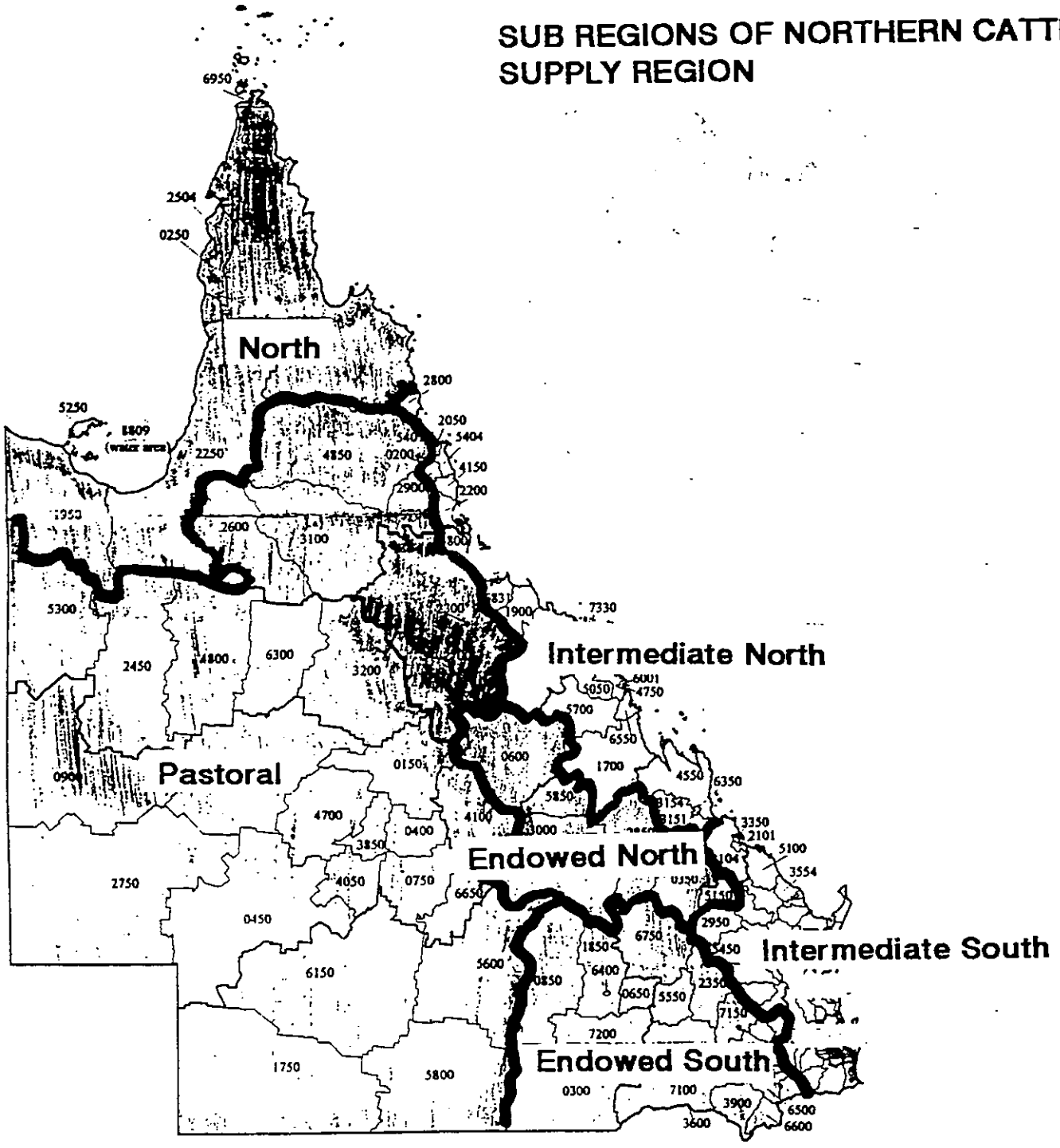
APPENDIX B

MAPS

Map 1(a)	Cattle Supply Zones
Map 1(b)	Sub Regions of Northern Supply Region
Map 1(c)	Preferred Northern Feedlot Supply Area
Map 2	Distribution of Angus and Murray Greys
Map 3	Distribution of Herefords
Map 4	Distribution of Shorthorns
Map 5	Distribution of Brahman and Bos indicus Composites
Map 6	Selected Properties Beef Production, Queensland
Map 7	Selected Properties Beef Production, Northern Territory
Map 8	Major Feedlot Areas

Map 1 (b)

SUB REGIONS OF NORTHERN CATTLE SUPPLY REGION

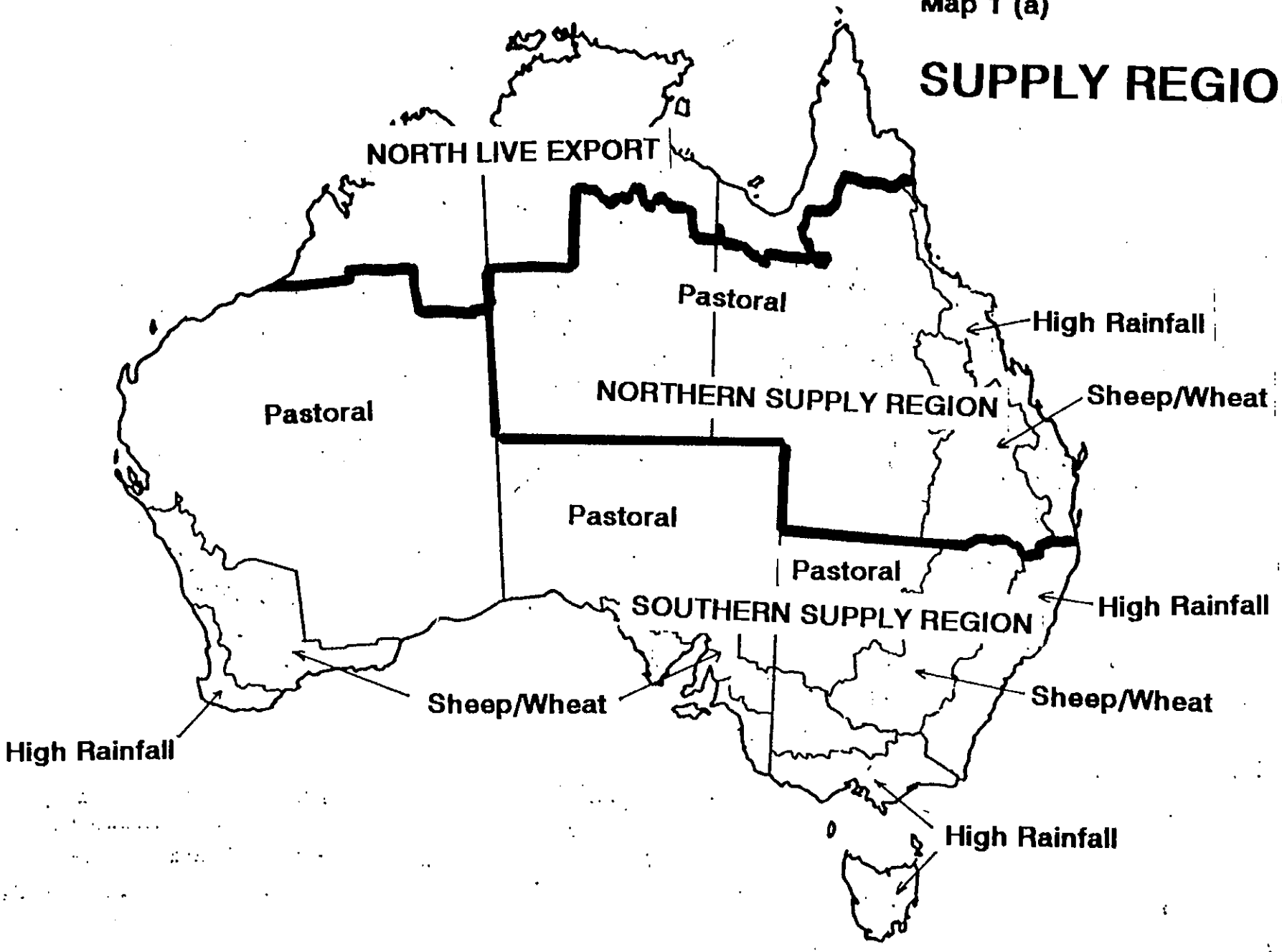


0 500
Kilometres

Based on Statistical Division and Statistical Local Area Boundaries
Source: 1991 Census of Population and Housing
Produced by: Product and Systems Development

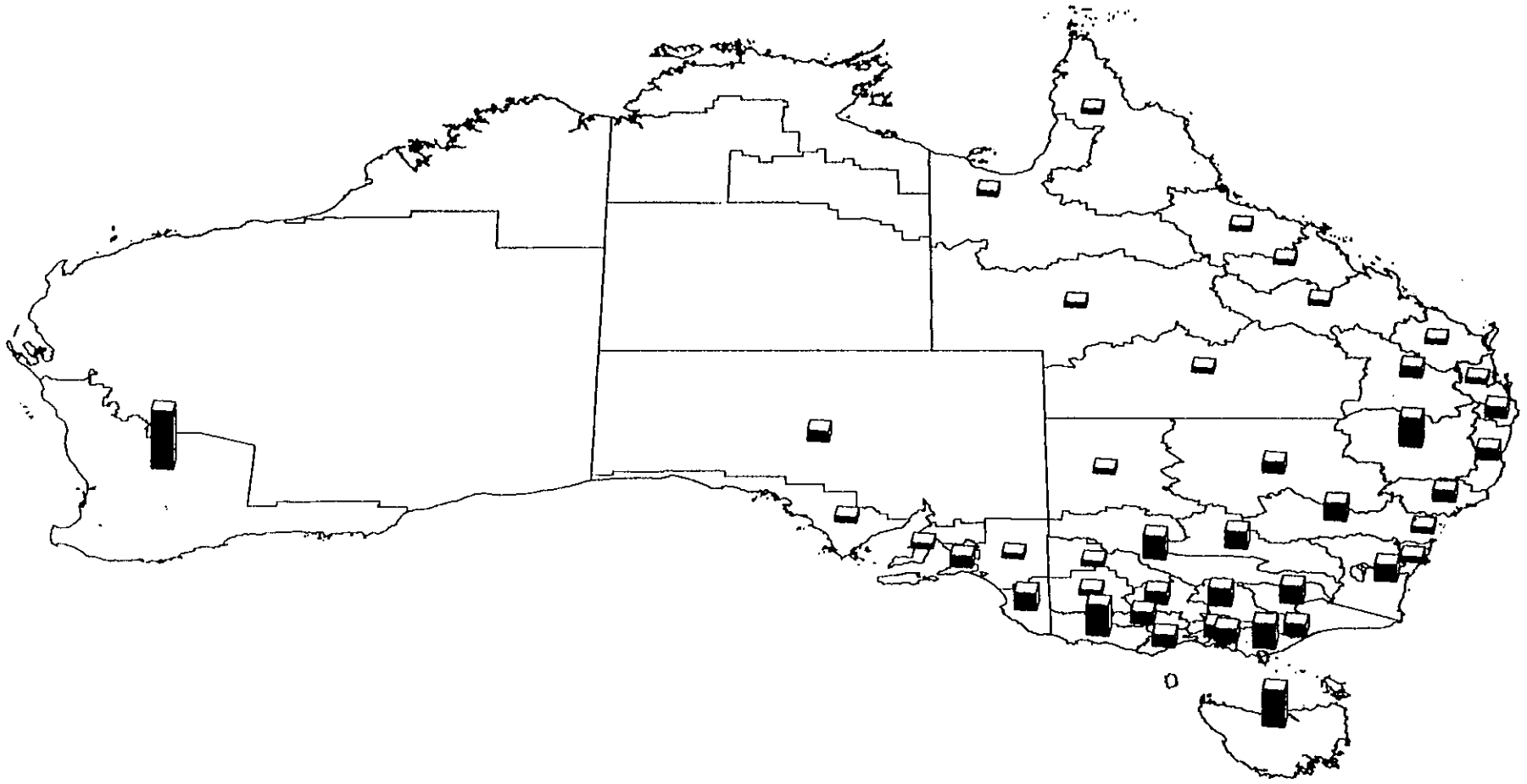
Map 1 (a)

SUPPLY REGIONS



Angus and Murray Grey

By Statistical Division

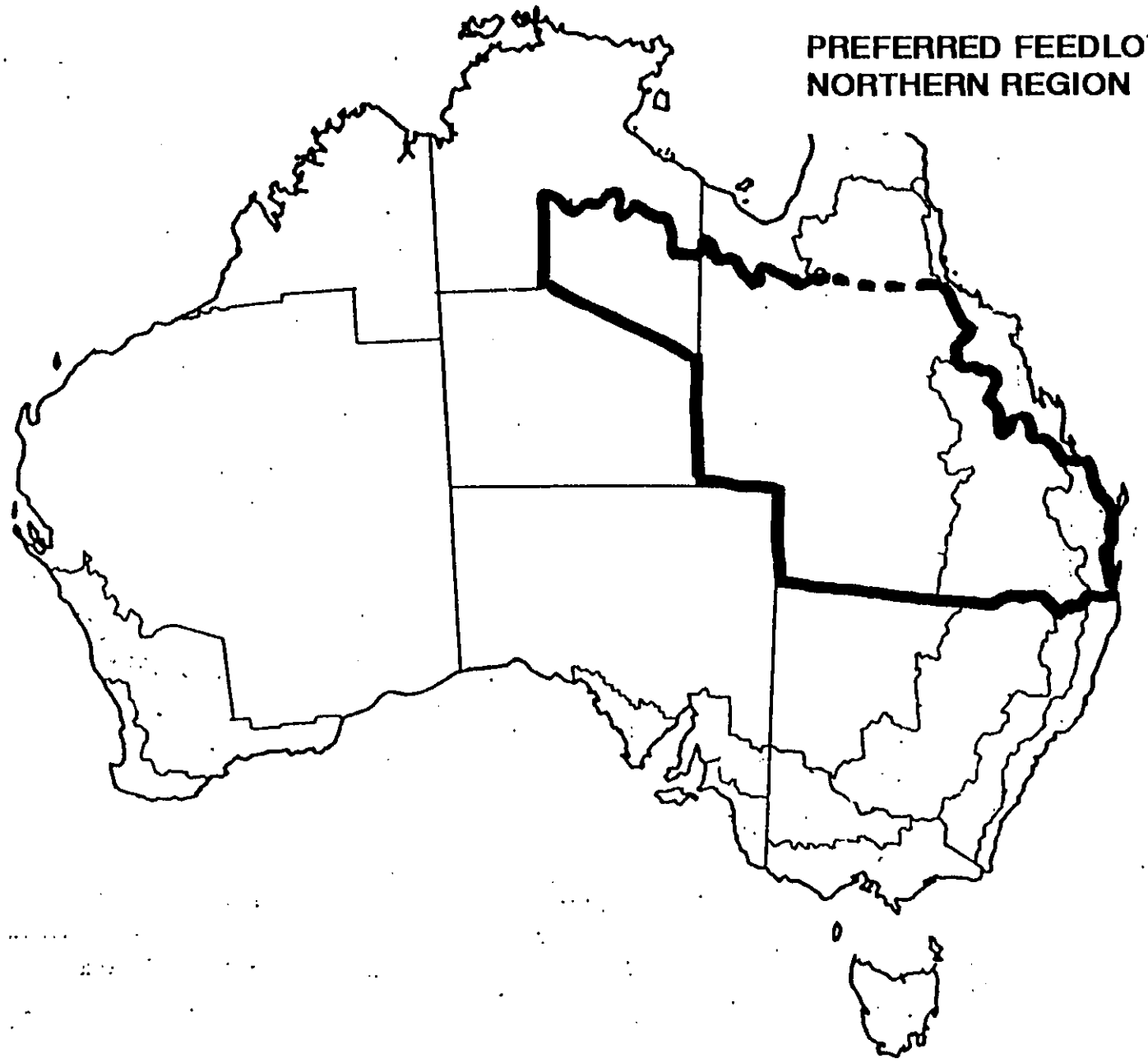


1mm = approx 22,000

Map 2 Distribution of Angus and Murray Greys

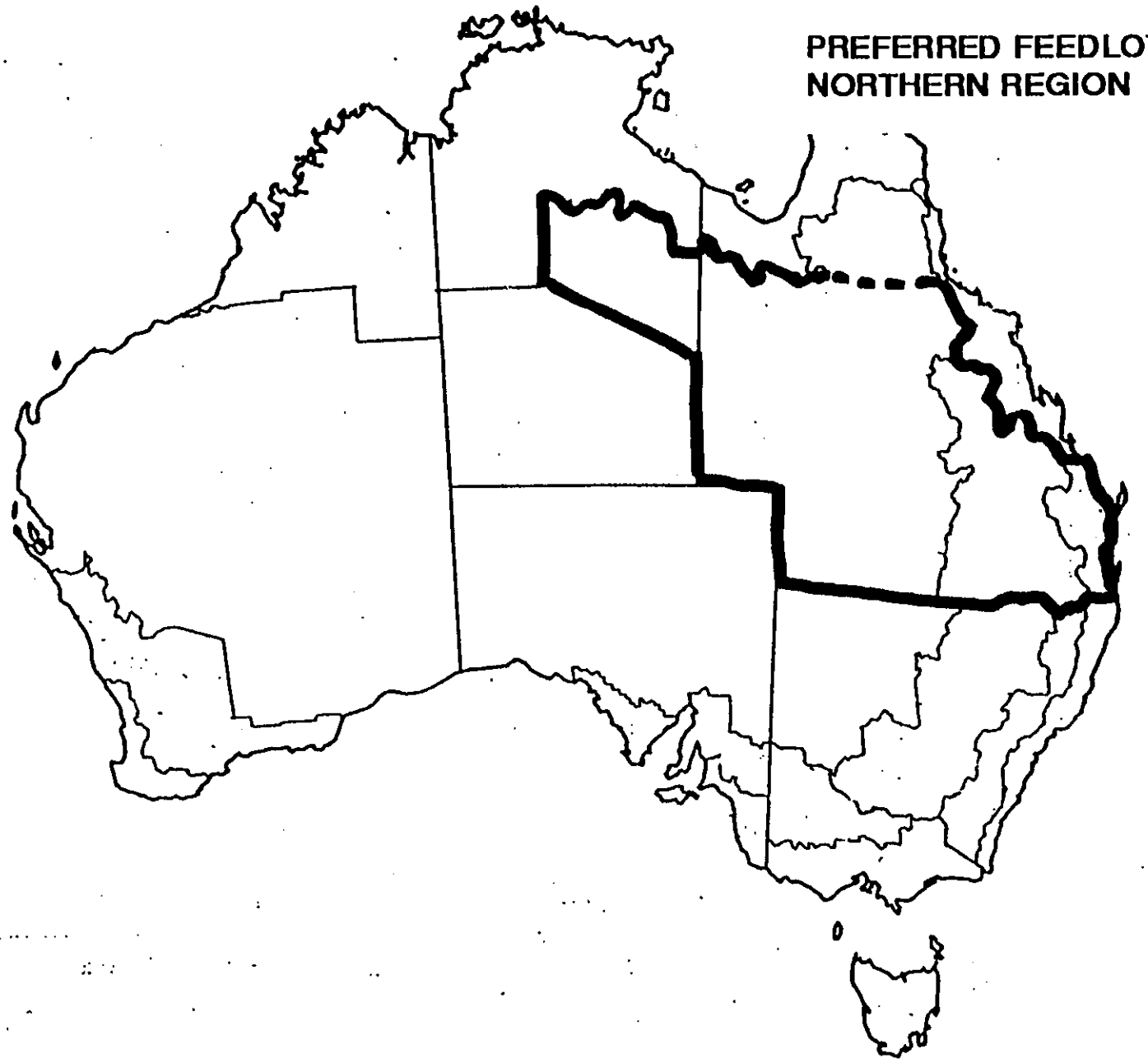
Map 1 (c)

PREFERRED FEEDLOT SUPPLY AREA
NORTHERN REGION



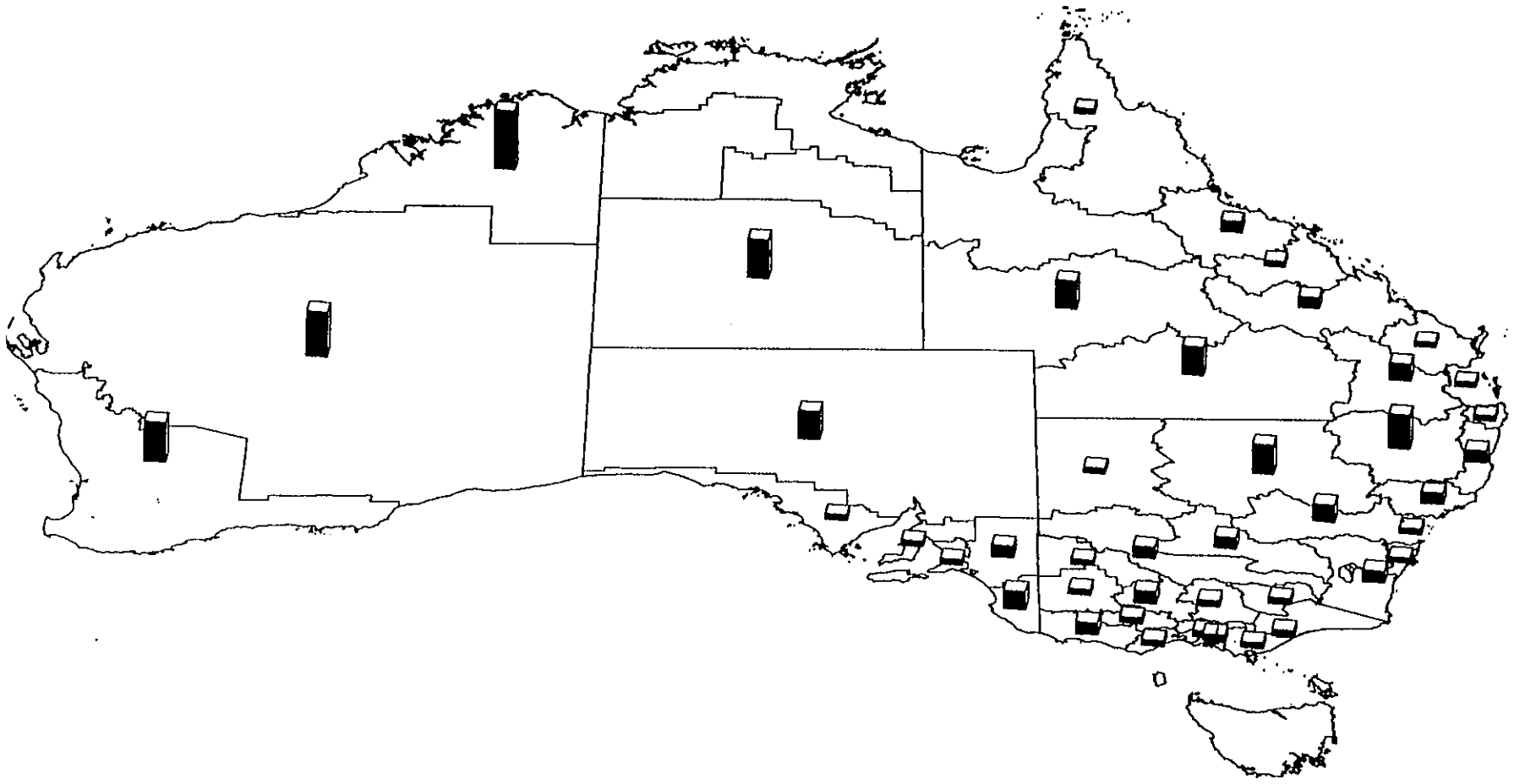
Map 1 (c)

PREFERRED FEEDLOT SUPPLY AREA
NORTHERN REGION



Shorthorn and Other British

By Statistical Division

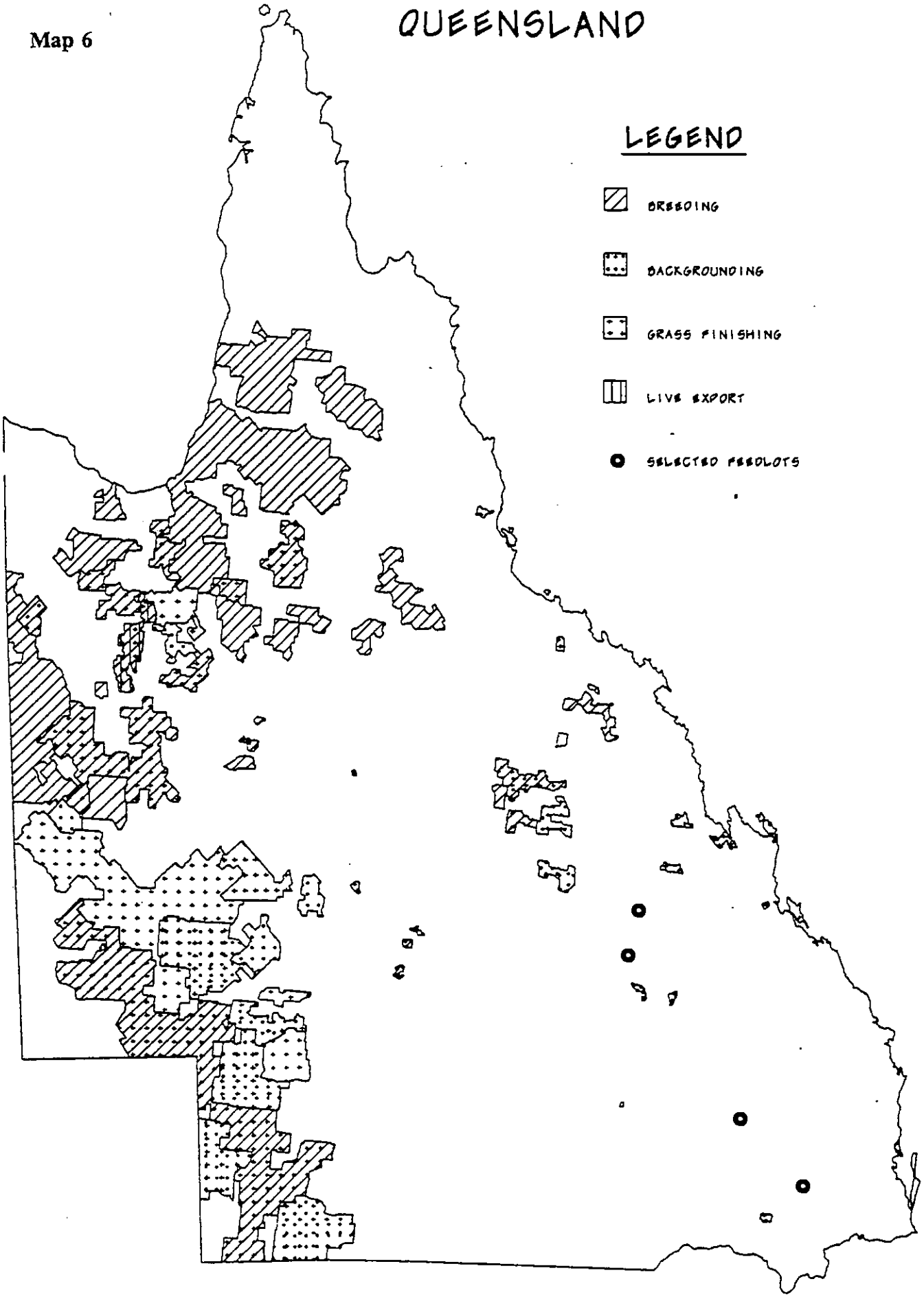


1mm = approx 22,000

Map 4 Distribution of Shorthorns

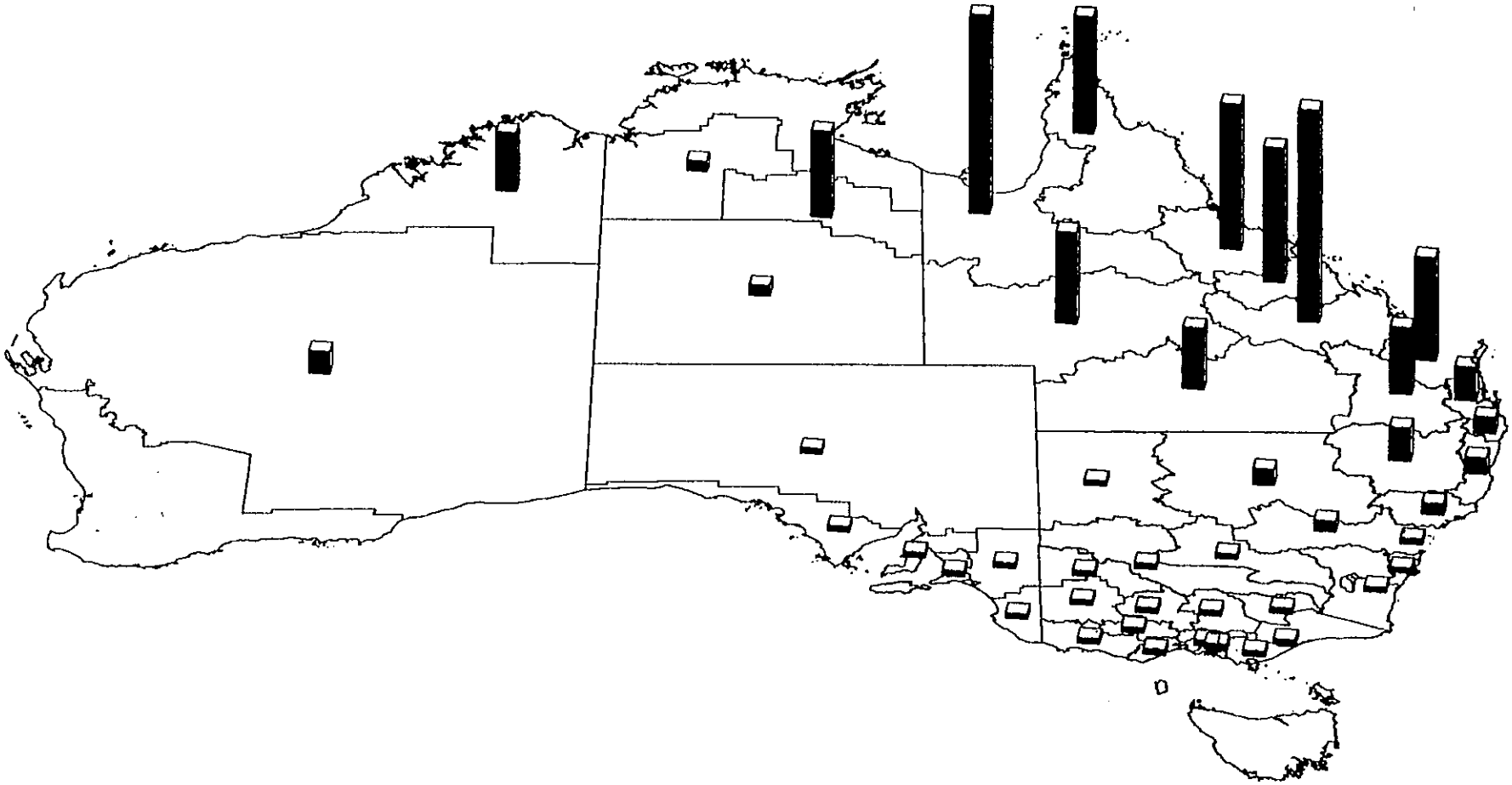
SELECTED PROPERTIES BEEF PRODUCTION QUEENSLAND

Map 6



Indian Composites and B. indicus crosses

By Statistical Division

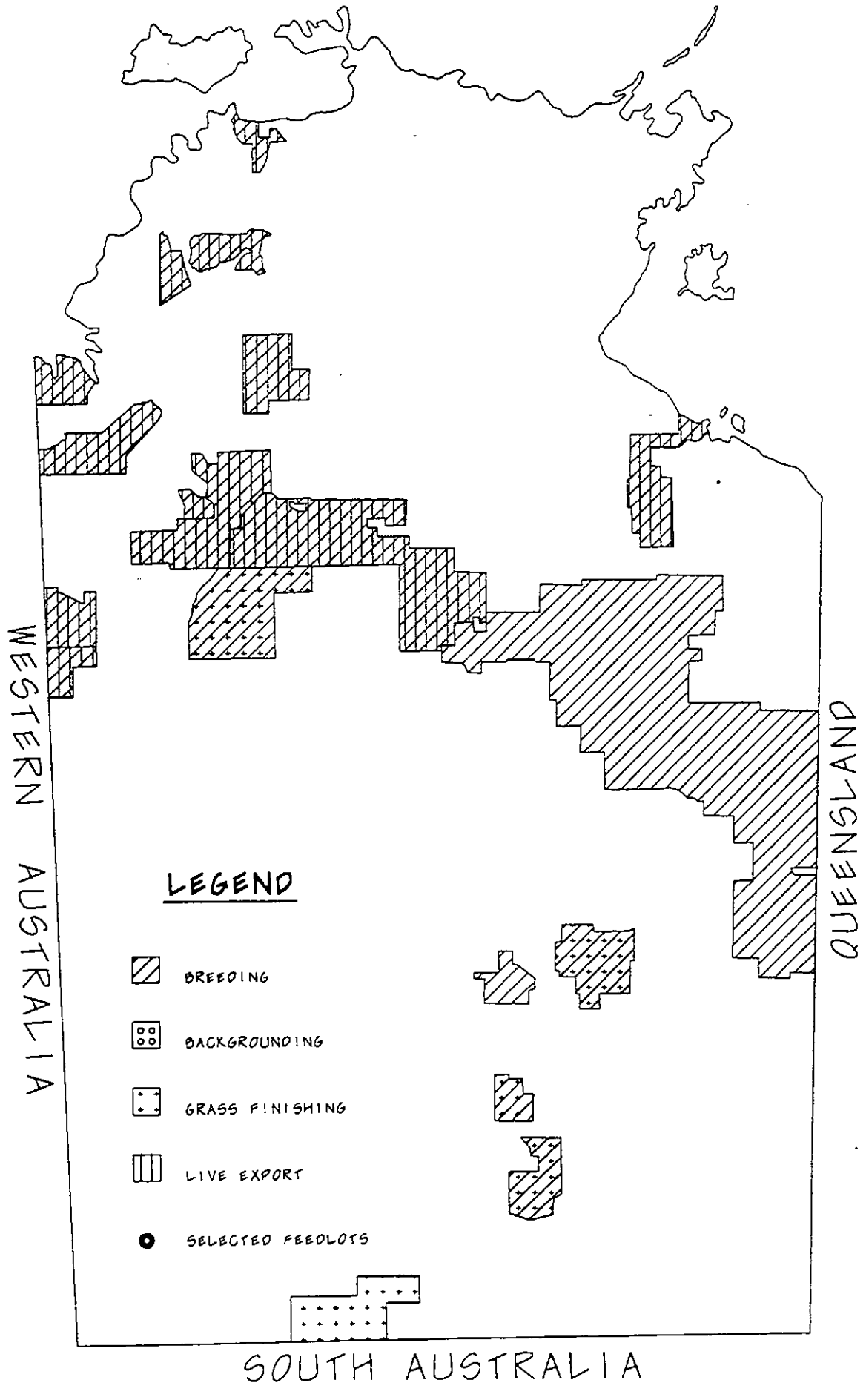


1mm = approx 22,000

Map 5 Distribution of Brahman and Bos indicus Composites

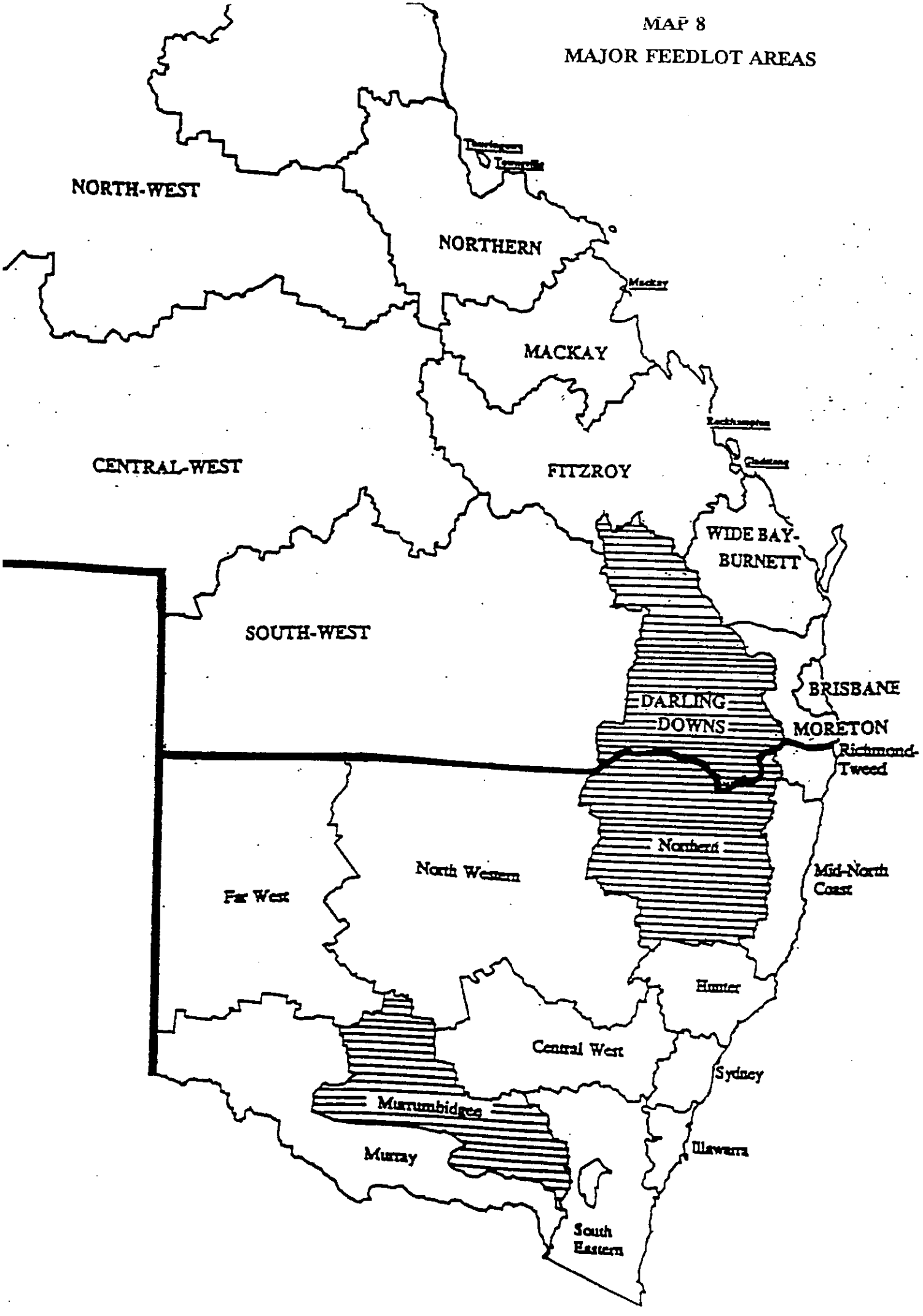
SELECTED PROPERTIES BEEF PRODUCTION NORTHERN TERRITORY

Map 7



MAP 8

MAJOR FEEDLOT AREAS



APPENDIX C

LIST OF CONTACTS

NAME	COMPANY NAME	LOCATION
Armstrong, John	Stanbroke Pastoral Company	Brisbane
Bronkhurst, Ross	NAPCO	Brisbane
Butler, Denis	Department of Agriculture	NSW
Cameron, Dugald	Feedlotter Aronui	Dalby
Capiccano, Philip	United Dairyfarmers of Victoria	Victoria
Chapman, Bruce	UGA Member	Calliope
Cox, John	Stanbroke Pastoral Company	Brisbane
Dingle, Peter	Department of Agricutre	NSW
Griffith, John	AA Company	Brisbane
Hart, Robin	Stockyard Meat Packers	Brisbane
Hart, Frank	Feedlotter, Meatpacker	Warwick
Heatley, Don	UGA Member	Townsville
Langford, Glen	QDPI Feedlot Services	Brisbane
Lawrie, Rod	UGA Member	Blackwater
Lott, Simon	QDPI Feedlot Services	Toowoomba
Millard, Stev	NAPCO	Brisbane
Milne, Peter	UGA Member	Cracow
Molloy, Geoff	Government Staticians Office	Brisbane
Moore, David	UGA Member	McKinlay
Morley, Phil	Woolworths	Brisbane
Murphy, Ken	QDPI, Cattle Husbandry	Rockhampton
Orton, Richard	Consultant	Wodonga
Perkins, Kevin	Feedlotter	Wondai
Prendergast, Mick	UGA	Brisbane
Raynor, Tony	QDPI Stock Inspector	Cloncurry
Roberts, Kev	Feedlotter Sandalwood	Dalby
Schmidt, Peter	UGA Member	Charleville

NAME	COMPANY NAME	LOCATION
Smith, David	Director, GSO	Brisbane
Smith, Peter	QDPI, Senior Adviser	Charters Towers
Teys, Alan	Feedlotter/Meat Packer	Brisbane
Thomas, Peter	UGA Member	Goomeri
Vincent, Ted	QDPI Stock Inspector	Mount Isa
Willett, Geoff	Feedlotter Maydan	Warwick
Acton, Graeme	Action Land and Cattle Co.	Croydon Wilpera, Werribee, Old Barwon, Dunead
Daley, Cameron	Arrabury Pastoral Co Pty Ltd	
	Australian Agriculture Co Pty Ltd	Brisbane
Oxford, Graham	Australian Bureau of Statistics	Sydney
McGreevy, Cathy	Australian Bureau of Statistics	Brisbane
Koch, Richard	AMLC	Sydney
Stewart, Marianne	Beef Improvement News	Melbourne
Brook, David	Brook Proprietors	Birdsville
	Cattlemans Union of Queensland	Brisbane
Hughes, Gwyn	Clifton Hills Pastoral Co.	South Australia
Warriner, Ken	Consolidated Pastoral Co.	
Johncock, Gary	Colinta Holdings Pty Ltd	Brisbane
Vinson, Ted	Department of Primary Industries	Mt Isa
Phillips, Andrew	Department of Primary Industries	Alice Springs
Eggington, Tony	Department of Primary Industries	Darwin
Dyer, Rodd	Department of Primary Industries	Katherine
De Witt, Kevin	Department of Primary Industries	Katherine
Doyle, Glen	Doyle and Co Pty Ltd	
Gibson, Vern	East Coast Cattle	Brisbane

NAME	COMPANY NAME	LOCATION
Peggs, Alan	WA Department of Agriculture	Western Australia
Martin, Debra	Western Grazing Co.	
Williams, RT	Mt Barry, Arcaringa, Nilpinna,	
	Mt Sarah, Lambena, Wooltana	South Australia
Stubbs, Dale	GRAINCO	Toowoomba
Brieley, Rob	GRAINCO	Toowoomba
Kemp, Nick	Hyfield Stockfeed	Toowoomba
Birt, Stephen	Australian Wheat Board	Toowoomba
Tiele, Mark	Australian Wheat Board	Sydney
Thompson, Robert	NSW Grains Board	Sydney
Kite, Vivian	Stock Feeds Association	Sydney
Schuurse, Peter	Ag Consultant	St George, QLD
Sparke, Ted	Ag Consultant	North Arm Cove, NSW
Haug, Noel	AA Company	Brisbane
Obst, John	QLD Cane Growers Association	Toowoomba
McDougall, Rob	Cargill Trading	Toowoomba
Gleeson, Bryan	Cargill Trading	Toowoomba
Berry, Malcolm	Cargill - Head Office	Melbourne
Matherson, Roger	Westfarmers/Dalgety	Albury, NSW
Marshall, Joan	QDPI	Dalby
Cutler, John	QDPI	Toowoomba
Graham, Jamie	NSW Agriculture	Camden, NSW
Clark, Trevor	Primary Industries of SA	Clare, SA
Lack, Steven	GRDC	Canberra
Letts, Mick	GRDC	Canberra
Rees, Robert	ABARE	Canberra
Cockinos, Alex	ABARE	Canberra
Coombs, Bob	ALFA	Canberra

NAME	COMPANY NAME	LOCATION
Campbell, Ray	Elders	Cloncurry
	Elders	Injune
	Henwood Pastoral Co.	
	Heytesbury Pastoral Group	Brisbane
Abel-Smith, Will	Kidman Holdings Pty Ltd	
Logan, Wallace		
Chalmers, Charlie	MacDonald Downs Station	
McDonald, Bob	MDH Pty Ltd	
McCarron, Andrew	Meat Industry Authority	
McCauley, Peter	Mengazzo Pastoral Company	
Henderson, Alistar	Morr Morr Pastoral	
Barber, Bob	Mount Skinner Pastoral	
Sleep, Colin	National Mutual Rural Enterprises	
Johnston, Brian	NSW Department of Agriculture	Orange
Sunstrum, Brian		Armidale
Ritchie, Mark	NAPCO	Brisbane
Bakc, Mike	NT Cattleman's Association	Northern Territory
Swanson, Gary	NT Department of Lands	Northern Territory
Nichol, Nev	Riverside Holdings	
Wilkinson, John	Shipfield Pty Ltd	
Cooper, Andrew	South Australian Lands Department	South Australia
	Stanbroke Pastoral Co.	
Bailey, David	Sterling Station Pty Ltd	Northern Territory
Turner, Jamie	The Garden	
	United Graziers Association	Brisbane
Webber, Alan	Webber Brothers	
Weir, Stewart	Amaroo, Derry Downs,	
	Todd River, Alambie	Northern Territory

APPENDIX D

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