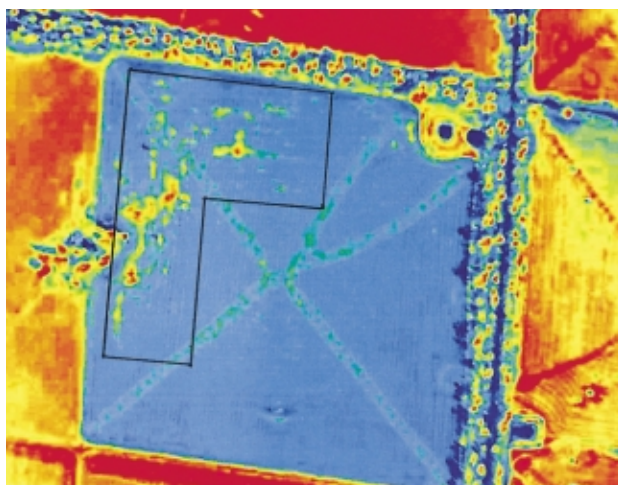


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Cattle supply, production systems and markets for Australian beef

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Abstract. Markets for Australian beef throughout the 20th century have been moulded by world wars, economic depressions, droughts, transport technology, cattle breeding, trade barriers, global competition, livestock disease eradication, human health risks, food safety, Australian Government policy, consumerism and beef quality. Major ‘shocks’ to beef marketing include the development of successful shipments of chilled carcasses to Britain in the 1930s, the widespread trade disruption caused by World War II, expansion (early 1950s) and then a reduction in beef exports to Britain (1956), the introduction and then proliferation of *Bos indicus* derived cattle in northern Australia (1960s), licensing and upgrading of Australian abattoirs to export to USA and the consequential brucellosis and tuberculosis eradication campaign leading to record export tonnages of Australian processing beef to USA (1960–70). In 1980, increased beef trade to Japan began, leading in the late 1980s to expansion of high-quality grain finished products into that market. By 1993, beef exports to Japan (280.5 kt) exceeded those to USA (274.4 kt), signalling the significant shift in beef exports to Asia.

Commencing in about 1986, the USA recognised the value of beef exports to Asian markets pioneered by Australia. Australia’s share of the Japanese and South Korean markets has been under intense competition since that time. Another major influence on Australia’s beef market in the early 1990s was growth in live cattle exports to Asian markets in Indonesia, Malaysia and the Philippines. Live exports accounted for 152 000 heads in 1992 and 858 000 heads in 1996. Improved management systems (e.g. fences) and consequent regulation of cattle supply even in the wet season, a by-product of the brucellosis and tuberculosis eradication campaign, were indirect drivers of the growth in live exports.

Throughout the period 1940–2000, domestic consumption of beef and veal declined from 68 to 33.3 kg/head.year, reflecting competition from other foods, perceptions of health risks, price of beef, periodic food safety scares, vegetarianism, changes in lifestyle and eating habits and lack of consistency of eating quality of beef. Despite this decline, the domestic Australian beef market still consumes a significant component (37%) of total Australian beef production.

In 1984–85, the reform of the Australian Meat and Livestock Corporation set in train a major directional change (‘New Direction’) of the beef sector in response to beef market trends. Under Dick Austen’s leadership, the Australian Meat and Livestock Corporation changed the industry’s culture from being ‘production-driven’ to being ‘consumer-driven’. Market research began in Australia, Japan and Korea to establish consumer preferences and attitudes to price, beef appearance and eating quality. Definite consumer requirements were identified under headings of consistency and reliability. The AusMeat carcass descriptors were introduced and a decade later traits like tenderness, meat colour, fat colour, meat texture, taste, smell, and muscle size were addressed.

These historical ‘shocks’ that shaped the Australian beef markets have all been accompanied by modification to production systems, breeding programs, herd structure, processing procedures, advertising and promotion, meat retailing and end-use. The increasing importance of the food service sector and the ‘Asian merge’ influence on beef cuts usage in restaurant meals and take-away products are the most recognisable changes in the Australian food landscape.

The Cooperative Research Centre’s research portfolio was built around the changing forces influencing beef markets in the early 1990s. Australia needed to better understand the genetic and non-genetic factors affecting beef quality. One example was the poor success rate of cattle being grain-fed for the Japanese premium markets. Another was the relative contribution of pre- and post-slaughter factors to ultimate eating quality of beef. The Meat Standards Australia scheme was launched in 1997 to address this problem in more detail. The Cooperative Research Centre contributed significantly to this initiative.

In the year 2001, Australia, with only 2.5% of world cattle numbers retains the position of world number one beef trader. We trade to 110 countries worldwide. The Australian beef sector is worth A\$6 billion annually. The diversity of Australian environments, cattle genotypes and production systems provides us with the ability to meet diverse

specifications for beef products. A new set of market forces is now emerging. Strict accreditation rules apply to Australian producers seeking access to the lucrative European Union market. Transmissible spongiform encephalopathies like bovine spongiform encephalopathy and scrapie are a continuing food safety concern in Europe. This and the foot and mouth disease outbreak in Britain early in 2001 have potentially significant indirect effects on markets for Australian beef. And the sleeping giant, foot and mouth disease-free status of Latin American countries Brazil, Uruguay and Argentina continues to emerge as a major threat to Australian beef markets in Canada and Taiwan. As in the past, science and technology will play a significant role in Australia's response to these market forces.

Introduction

Markets for Australian beef influence the profitability of all sectors of the Australian beef industry. But markets and market forces have a much broader influence than just profit or loss: they influence herd structure, breed composition, geographical distribution of cattle, production systems (feedlots, pastures), type and distribution of processing plants, employment and labour requirements, and the complexity of retailing and export of beef products. Market forces also influence research and development and this is the main reason why a Cooperative Research Centre (CRC) should be dealing with market issues in an account of its activities. It is not an accident that the vision statement of the CRC for the Cattle and Beef Industry (Meat Quality) established in 1993 was 'Meeting Market Specifications'.

Historical analysis of beef industry fortunes since 1930 reveals a succession of 'shocks' to which the industry has had to respond. These continue to the present day. The Australian beef industry adopted a new attitude to market forces in 1984–85 when the newly instituted Australian Meat and Livestock Corporation (AMLC) embarked on the 'New Direction' program designed to achieve (*inter alia*): (i) a change to marketing systems aimed at improved efficiency, better intra-industry communication and an improved capacity to meet end-user requirements; (ii) selective research in domestic and export markets to secure a complete understanding of factors affecting sales, and to identify new opportunities; and (iii) marketing and promotional activities to protect existing outlets, stimulate consumer demand and improve customer understanding of the purchase and uses of red meat.

This represented the Australian beef industry's recognition of the customer and signalled a change from a production-driven to a customer-driven culture. The vision of AMLC Chairman Dick Austen in 1985, was to shift beef marketing from a commodity trading focus to one of differentiated beef products aligned with customer specifications. It is significant that the first domestic market research was undertaken in 1985, followed then by similar activities in the USA and Canada, then in Japan in 1987–88. Since 1985, there has been an increasing acceptance that Australian beef producers are in the food business rather than the cattle business.

This paper collates information on the structure of the Australian beef industry, the markets for beef and live cattle

and interprets their influence on herd composition, production systems and genetic improvement research in Australia.

Structure of the Australian beef industry

The most recent snapshot of the structure of the Australian beef industry is contained in a diagrammatic summary of the Australian red meat industry (Meat and Livestock Industry Reform 1996; Fig. 1). This diagram provides a useful overview of the number of specialist beef producers (17400), methods of selling cattle, the number of meat processing plants and the export and domestic value of red meat sales. Additional analyses (ABARE 1998) confirm that in 1996–97 there were 20716 specialist beef cattle properties and a further 20735 properties running more than 50 beef cattle, but which were mainly engaged in enterprises other than beef cattle. Their distribution is shown in Figure 2.

A significant feature of the Australian beef industry is that corporate agricultural properties make up only 2% of specialist beef properties, but operate 34% of the land devoted to beef production and own 16% of total beef cattle numbers. Expressed in another way, about 2000 specialist beef enterprises generate over 50% of beef industry activity, while about 38000 smaller enterprises account for the remaining 50%. This aspect of beef industry structure has a large bearing on the complexity of technology transfer to the beef industry end-users and the ability of beef enterprises to capture benefits of genetic improvement and marketing schemes, where economies of scale are important.

Cattle supply and beef production trends

Cattle numbers

Total cattle numbers back to 1865 are shown in Figure 3, which illustrates the potential and volatility of cattle supply in Australia, especially since the advent of widespread pasture improvement in the 1960s. Official values for total cattle numbers include dairy animals, since they end their lives as beef or veal. This means that Figure 3 should be adjusted (e.g. to account for 4.89 million dairy cattle in 1960, reducing to 2.6 million in 1990) to arrive at total beef cattle numbers. Of note in Figure 3 is the peak of 33.9 million head in 1976, and more recent fluctuations of 22 million head in 1986 to 27 million head in 1997 (Australian Meat and Livestock Corporation 1989; ABARE 1998).

Fluctuations in cattle numbers can usually be traced to well-known market forces in the industry such as drought,

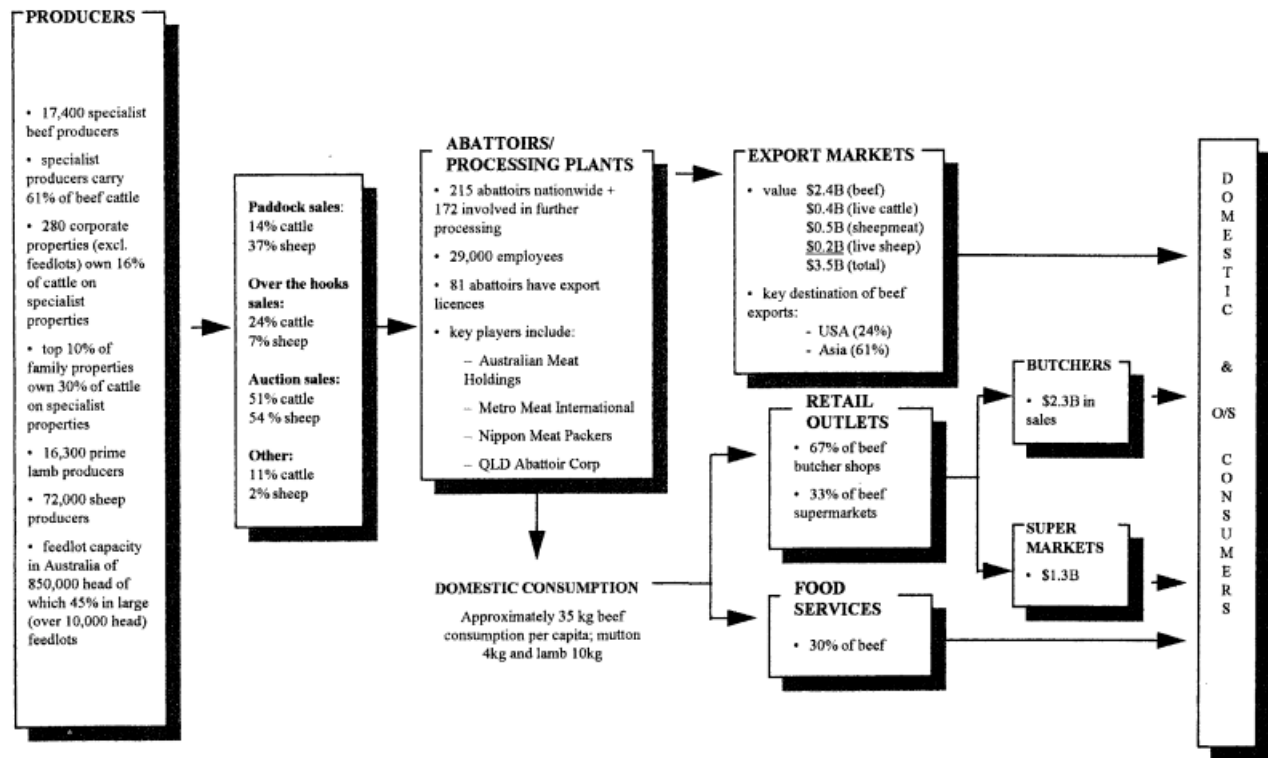


Figure 1. Diagrammatic representation of the Australian red meat industry (source: Australian Meat and Livestock Corporation 1996).

low wool prices, market failure from over-supply (1975–76) or the counter-cyclical influence created by herd building or herd reduction in the USA. World grain prices and, in particular, the price of corn in the USA is a major driver of

US cattle numbers and, ultimately, cattle prices and cattle numbers in Australia. The genesis of the most recent crash in Australian and international beef prices (late 1995 to late 1998) was the sharp increase in world grain prices, leading to unprofitable feedlotting in the USA with resultant low calf prices and increased cow slaughter. USA herd liquidation released a surge of US beef on to world markets (Meat and Livestock Industry Reform 1996).

State distribution of beef cattle

Queensland, New South Wales and Victoria dominate both the proportion of specialist beef properties in Australia and the proportion of the beef cattle population (Table 1; ABARE 1998). The relative number of cattle in these 3 states has been fairly stable in the last decade (Fig. 4). The overwhelming importance of the northern beef sector is shown by Queensland's 47% of total cattle numbers, on 28% of specialist beef properties, and the Northern Territory's 10% of total cattle numbers on only 1% of the nation's specialist beef properties.

Breed composition

The most recent estimate of breed composition of the Australian beef herd is presented in Table 2 (ABARE 1998). It is based on a sample survey rather than a national census, which has not taken place since 1987 (P. A. Rickards pers. comm.). The most obvious features are the dominance of

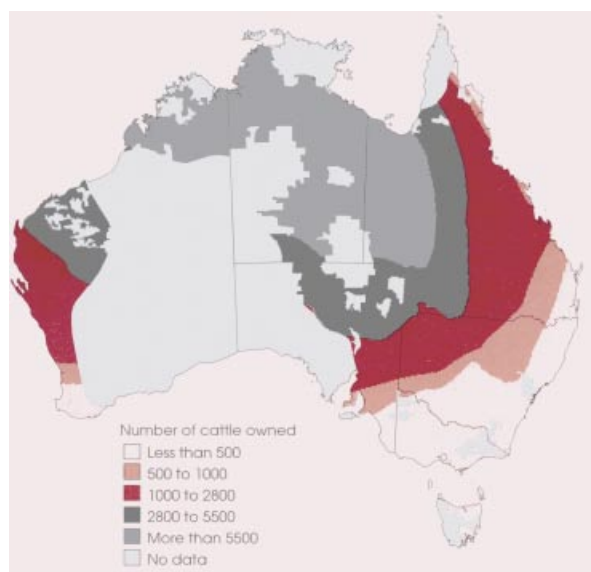


Figure 2. Distribution of specialist beef properties by herd size in 1996–97 (source: ABARE 1998).

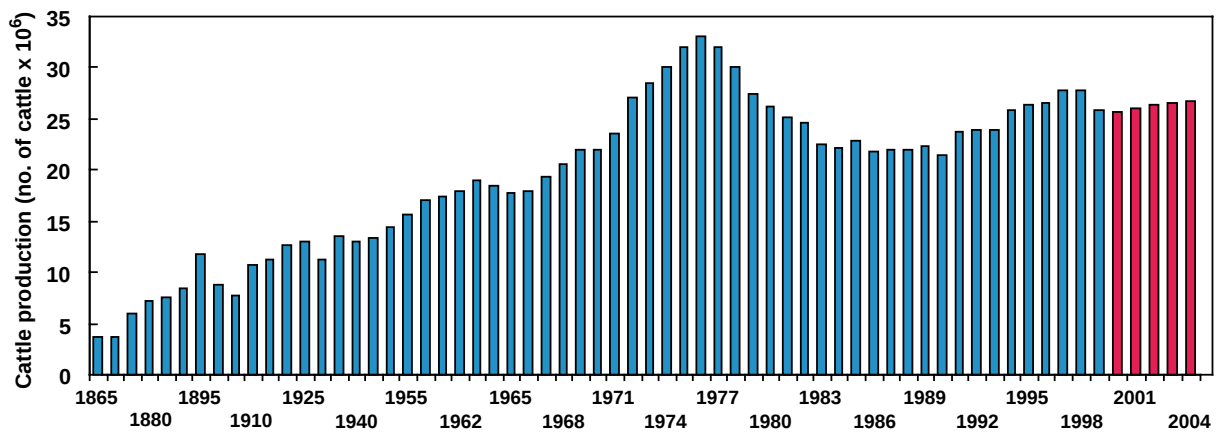


Figure 3. Australian cattle numbers between 1865 and 2004 (source: Bailey and Durand 1986; MLA 2000a). Values for 2000 to 2004 (in red) are MLA forecasts.

Hereford and Angus cattle in temperate regions (27.6% of total cattle numbers) and the extraordinary expansion of Brahman and Brahman derived cattle in northern Australia (collectively, 37.9% of total cattle numbers). In 1996–97, 20% of the national beef herd was crossbred, with *Bos indicus* × *Bos taurus* most common. The apparent increase in the percentage of pure Brahmans in the national herd (from 9% in 1990 to 18.2% in 1997) may be an over-estimate based on the survey's definition of pure Brahman, or it may reflect the influence of the live cattle export trade's expansion, where high-grade Brahman predominate. Corporate agriculture, through the large northern pastoral companies, had a significant influence on Brahman breed expansion as shown by the fact that Brahman cattle accounted for 18.2%

of the national herd but were confined to only 8% of beef properties.

Historical values to illustrate the shift in breed composition in Queensland since the 1960s, before the expansion of *Bos indicus*-derived cattle, are shown in Table 3. In 1949, the national beef herd approached 14 million heads and, although some 6 million heads were located north of the Tropic of Capricorn, they were predominantly Shorthorn (Kelley 1959, cited by Pattie 1973). In temperate Australian regions, Hereford and Shorthorn breeds predominated, with Herefords accounting for 50% of southern beef cattle (Pattie 1973).

Despite the introduction of Brahman or Zebu-type cattle at the time of first settlement and again in 1843, 1872, the

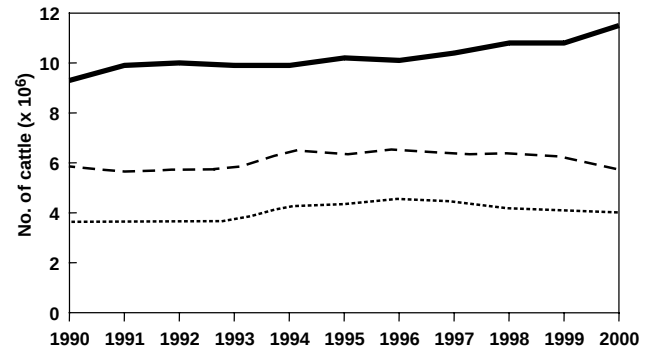
Table 1. Distribution by herd size of specialist beef properties and percentage of specialist beef herds, 1996–97 (major feedlots have been excluded from these data) (source: ABARE 1998)

No. of cattle	New South Wales	Victoria	Queensland	South Australia	Western Australia	Tasmania	Northern Territory	Australia
<i>Specialist beef properties (%)</i>								
<300	12	14	11	3	4	2	<0.5	46
300–550	13	7	6	1	1	1	<0.5	28
550–1000	4	3	3	<0.5	2	<0.5	<0.5	14
1000–2800	2	1	6	<0.5	<0.5	<0.5	<0.5	9
2800–5500	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	2
>5500	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	2
All specialist beef properties	31	26	28	5	7	3	1	100
<i>Specialist beef herds (%)</i>								
<300	3	3	3	1	1	<0.5	<0.5	10
300–550	8	4	3	<0.5	1	<0.5	<0.5	16
550–1000	5	3	3	1	2	<0.5	<0.5	14
1000–2800	3	2	16	<0.5	<0.5	<0.5	1	22
2800–5500	<0.5	<0.5	7	<0.5	1	<0.5	1	9
>5500	<0.5	<0.5	16	1	4	<0.5	8	29
All specialist beef herds	19	11	47	3	8	3	10	100

Table 2. Composition of the beef herd on broadacre farms June 1997 (source: ABARE 1998)

	Composition of Australian beef herds	
	(no. of cattle $\times 10^3$)	(%)
Hereford	3874	19.2
Angus	1687	8.4
Shorthorn	849	4.2
Murray Grey	358	1.8
Other British breed	173	0.9
European breed	121	0.6
Brahman	3659	18.2
Santa Gertrudis	1012	5.0
Other tropical breed	729	3.6
British breed cross	2165	10.7
British $\times$ European	978	4.9
<i>Bos indicus</i> $\times$ <i>Bos taurus</i>	2964	14.7
Other types	1578	7.8
Total	20146	100.0

early 1900s and 1933, this genotype had no serious influence on the Australian herd composition by 1949 (Kelley 1959, cited by Pattie 1973). Although scientists, such as R. B. Kelley, were advocating the expanded use of Brahman crosses in northern environments, the adaptive and productive merits of Brahman $\times$ British and Africander $\times$ British genotypes were not well-documented until the late 1960s (see Rendel 1972). Growth of the grinding beef market to USA was evidently responsible for the expanded use of *Bos indicus*-derived cattle in northern Australia beginning in the 1970s. Then the productive efficiency of these genotypes (e.g. tick and worm resistance) in difficult

**Figure 4.** Changes in numbers of cattle in Queensland (solid line), New South Wales (dashed line) and Victorian (dotted line) cattle herds between 1990 and 2000 (source: MLA 2001).

northern environments added to their popularity during the cattle market collapse in the late 1970s. Further growth of Brahman influence in the 1990s was probably market-driven to supply the live cattle trade to Indonesia or the Philippines.

Composition of the beef herd and cattle turn-off

Changes in the composition of the Australian beef herd are shown in Table 4 (ABARE 1998). A significant shift is evident between 1994 and 1997, with an increase in breeding cows (+5%) in northern Australia, accompanied by a 5.8% reduction in the proportion of steers and bullocks. These values reflect the influence of the live export trade. Although there has been significant growth in this trade since 1990, it still represents only 11% of total annual off-take in 1999 (Fig. 5).

Table 3. Breeds of beef cattle in Queensland, 1930–82 (% of total cattle) (source: Daly 1981, cited by Bailey and Durand 1986)

Breeds	1930	1950	1965	1973	1977	1982
<i>British, European breeds and crosses</i>						
Hereford	26	39	49	27	25	18.8
Shorthorn	72	53	24	15	15	8.1
Angus	0.9	4	0.4	0.8	0.5	0.4
Other British	1.1	<0.1	1.3	0.5	0.4	0.9
European	<0.1	<0.1	<0.1	<0.1	<0.1	0.3
British and European crosses	<0.1	<0.1	13.5	13.3	9.0	6.6
Total British, European (%)	100	96	88.2	56.6	45.9	35.1
<i>Tropical breeds and crosses</i>						
Santa Gertrudis	<0.1	<0.1		2.7	5.2	6.2
Brahman	<0.1	<0.1		2.5	3.8	6.5
Braford	<0.1	<0.1		1.8	3.0	3.5
Droughtmaster	<0.1	<0.1	0.1	1.5	3.0	3.8
Other tropical	<0.1	<0.1		0.3	0.3	0.4
Tropical crosses	<0.1	<0.1	11.6	34.4	38.5	44.5
Total tropical (%)	<0.1	4	11.7	43.2	53.8	64.9
Total no. of beef cattle (million)	4.4	4.9	6.3	9.2	11.0	9.8

Table 4. Age and sex composition (%) of the beef herd on broadacre farms in 1994 and 1997 (source: Martin 1998, cited by ABARE 1998)

	Northern Australia ^A		Southern Australia		Australia	
	1994	1997	1994	1997	1994	1997
Cows and heifers	54.3	59.3	50.9	49.4	51.9	52.3
Calves	20.9	23.0	26.2	28.6	24.6	26.9
Steers, bullocks, speys	21.8	15.0	20.3	20.3	20.8	18.7
Bulls	3.0	2.7	2.6	1.7	2.8	2.0

^ANorth of the Tropic of Capricorn (23.5°S).

Australian beef production

Total annual beef production values back to 1922 are presented in Figure 6. Production peaks in 1978 and 1979 followed the record cattle numbers of 1976 and 1977. Total production again exceeded 2 million tonnes in 1999, the third highest on record. The increase in average carcass weights since 1983 shown in Figure 6 reflects changes in the composition of the kill (fewer lighter cows, more bullocks), recent good seasonal conditions and numbers of grain-finished export cattle.

Australian feedlot sector

In an analysis of the beef supply chain in Australia it is necessary to consider the capacity and throughput of Australian feedlots. The most recent survey values from the Australian Lot Feeders Association (ALFA 2000; Table 5) shows that Australian registered feedlot capacity in September 2000 was 853 000 heads with nearly 50% of cattle in large feedlots (>10 000 heads). Their geographical distribution confirms that this industry is concentrated in northern New South Wales and southern Queensland, in favourable proximity to supply of both store cattle and feed grains.

The extent of feedlot utilisation is best seen by values for cattle on feed in various states during 1999–2000 (Table 6). The high (>80%) utilisation rates in the latter half of 2000 in

NSW and Queensland feedlots confirm the demand for grain-finished product in domestic and export markets. This is further illustrated in Table 7, which shows that in June 2000, 57% of cattle on feed were destined for the Japanese markets and 36% for domestic trade.

Growth of the feedlot sector since 1986 is shown in Figure 7, indicating an approximate 8-fold increase in the size of opening inventories.

Beef processing sector

In Australia, there is an average annual requirement to process some 8 million heads of cattle. Twenty years ago there were 475 plants processing red meat in Australia. By 1990, this value had fallen to 390 and further rationalisation has since occurred. Recent beef abattoir closures include Guyra, Aberdeen, Beaudesert, Gunnedah, South Burnett and Blayney. The majority of closures have been in Victoria (154 down to 107) and New South Wales (139 down to 90) in the period 1980–90.

The list of Australia's largest current meat processors is shown in Table 8. A significant recent feature of the industry has been the expanded daily throughput of cattle in the Australian Meat Holdings (AMH) facility at Dinmore (Queensland), the Consolidated Meat Group (CMG) plant at Rockhampton and Teys Bros plants at Beenleigh and

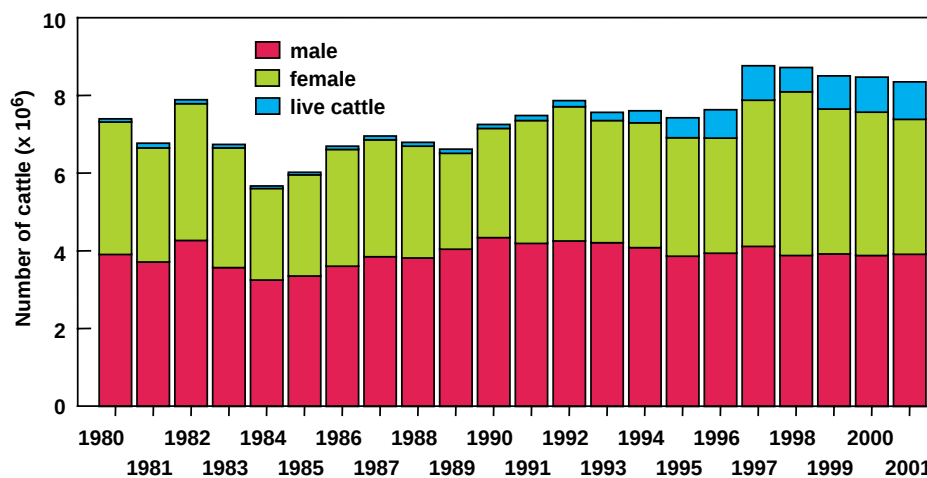


Figure 5. Numbers of cattle turned off from Australian herds between 1980 and 2000 (source: ABS and MLA forecast value for 2001).

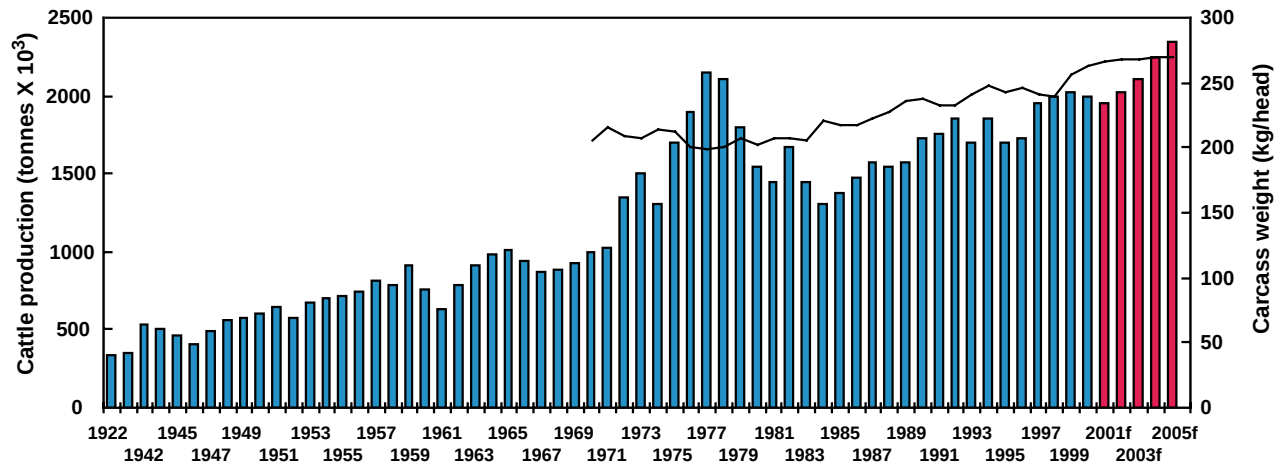


Figure 6. Beef production measured as carcass weight (tonnes) and average carcass weight (kg/head; solid line) from 1922 to 2004 (adapted from Australian Bureau Statistics; forecasts values in red for 2001 to 2005 by Meat and Livestock Australia).

elsewhere. These larger and more efficient plants have the capacity to process a large portion of Queensland and northern New South Wales cattle.

There is evidence (Booz *et al.* 1993) that in 1993, 'best-in-class' Australian beef processing plants (111 c/kg) were less efficient than those of Argentina (105 c/kg), Canada (65 c/kg), Ireland (86 c/kg), New Zealand and USA (40 c/kg). In that study, the cost of processing in the best

USA plant (40 c/kg) was significantly lower than in Australia (111 c/kg). Not all of the processing cost difference (i.e. between USA and Australia) can be attributed to the inefficiency of Australian processors. Part is due to higher input costs such as meat inspection and industry levies. Other differences can be attributed to factors inherent in the Australian industry, in particular the high proportion of grass finished cattle with lower average carcass weights than USA grain finished animals (Industry Commission 1993). There are no analyses to show if reforms instituted in some Australian plants since 1993 have improved the international competitiveness of Australian processing plants.

Table 5. Australian feedlot capacity, September 2000 (source: Australian Lot Feeders Association 2000)

Feedlot capacity (no. of head/feedlot)	Number of cattle (no. of head/year)	Percentage of total
0–500	74113	8.7
500–1000	98625	11.6
1000–10000	281954	33.0
>10000	398435	46.7
Total	853127	100.0

Markets for beef and live cattle

Domestic

The domestic market for beef products accounts for about 37% of total Australian beef production and remains our largest single market. Per capita consumption of beef has declined in this country since 1939 (Fig. 8), with the

Table 6. Feedlot capacity and utilisation in some Australian states during 1999–2000 (source: Australian Lot Feeders Association 2000)

	New South Wales	Victoria	Queensland	South Australia	Western Australia	Total
<i>Feedlot capacity</i>						
Sept. 2000	294165	63857	403602	46040	45463	853127
June 2000	294462	70350	390976	46421	44335	846544
Sept. 1999	306687	60050	404833	55436	46181	873187
<i>Actual no. of cattle on feed</i>						
Sept. 2000	222597	35569	341657	31858	12358	644039
June 2000	237189	40448	334490	34529	26115	672771
Sept. 1999	201345	20128	281228	34514	16138	553353
<i>Utilisation (%)</i>						
Sept. 2000	76	56	85	69	27	75
June 2000	81	57	86	74	59	79
Sept. 1999	66	34	69	62	35	63

Table 7. Market destination for cattle from Australian feedlots 1999–2000 (source: Australian Lot Feeders Association 2001)

Market destination	June 2000		March 2000		June 1999	
	(no. of cattle)	(%)	(no. of cattle)	(%)	(no. of cattle)	(%)
Japan	346 545	56.9	383 120	59.5	321 357	62.0
Korea	26 525	4.4	19 937	3.1	13 942	2.7
Other export	10 618	1.7	6 378	1.0	3 449	0.7
Domestic	220 146	36.2	231 038	35.9	175 394	33.9
Unknown	4 675	0.8	3 566	0.6	4 002	0.8
Total	608 509	100.0	644 039	100.0	518 144	100.0

exception of a brief return to record consumption levels (about 65 kg/head.year) during the period 1976–79 when oversupply caused a major decline in beef prices. Although per capita consumption has stabilised at about 36–38 kg/head.year in recent times, the Meat and Livestock Australia (MLA) forecast through to 2004 (Fig. 8) suggests a further decline in beef consumption before the next cycle of increased cattle supply causes a drop in beef prices that will again stimulate beef demand.

Beef market share of Australian meat consumption

Figure 9 shows that between 1974 and 1996, beef's share of the Australian meat market dropped from 58 to 38%, primarily as a result of increased consumption of poultry and pigmeat. It is said (Meat and Livestock Industry Reform 1996) that the poultry industry has made substantial productivity gains and its product has become progressively cheaper and more consistent in quality than beef. Expanded consumption of pig meat is harder to explain. Since 1986, the number of Australian pig-meat producers has halved, yet production has increased by over 40%. The majority of the Australian pig-meat industry is now under the control of vertically integrated companies or alliances. Despite competition from imported (Canadian) pig-meat, the

Australian industry has survived and achieved a modest increase in its share of Australian meat consumption (Fig. 9).

Retail outlets for beef

Butcher shops have been the traditional outlets for beef in Australia but supermarkets have taken an increasing share of the market between 1987–88 and 1992–93. Values more recent than 1992–1993 are not available. The 2 largest supermarket chains in Australia are now the largest retailers of red meat in the country (MLA 2001 pers. comm.). Supermarkets show different preferences for grain-finished beef in each state (Table 9; Meat Research Corporation 1995), reflecting the consistency of product quality achieved by grain-finishing in climatic areas where grass-fed production is too unreliable to guarantee customer satisfaction. Feedlots would not exist unless consumers were prepared to pay for grain-fed product.

Food service sector

In 1987, the Food Service Sector (restaurants, clubs, hotels) was estimated to account for 30% of domestic beef consumption (Industry Commission 1993). It is difficult to obtain values for 2001. The expansion of the restaurant industry, especially in Sydney, Melbourne and Brisbane, coupled with the 'Asian merge' of cooking styles (i.e. Asian

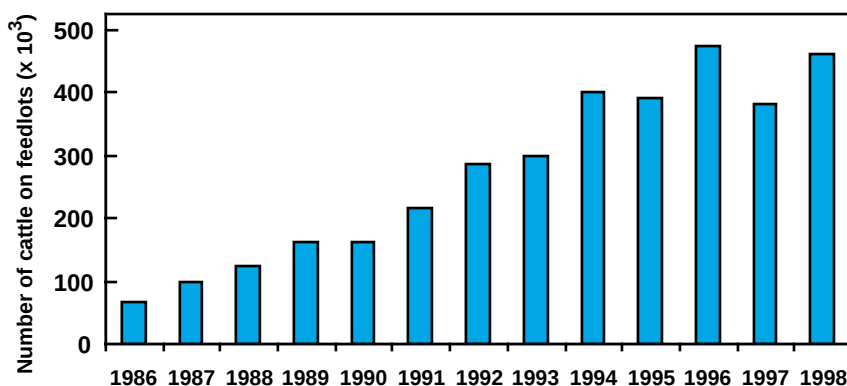


Figure 7. Opening inventories of cattle on Australian feedlots from 1986 to 1998 (source: ABARE 1998).

cooking uses cheaper, forequarter cuts of beef; western style dishes use more expensive primal cuts) in these outlets, sees beef on most menus, leading to continued use of beef in these outlets. Take-away food outlets have also grown exponentially in Australia in the last decade and a proportion of these specialise in beef products. In an average year, McDonald's utilises 23 million kg of beef in its Australian outlets (McDonald's Corporation 1999). Another area of growth arising from Australia's ageing population is that of institutions such as hospitals and retirement villages, where beef products form a component of prepared meals.

Consumer attitudes to Australian beef

The 1994 US International Beef Quality Audit (Meat and Livestock Industry Reform 1996) surveyed customers' views of US, New Zealand and Australian product in markets where these countries compete. Respondents indicated that (i) 3% were not satisfied with the tenderness and flavour of US beef, (ii) 14% were not satisfied with New Zealand beef

and (iii) 23% were not satisfied with the eating quality of Australian beef.

Domestic market surveys show that some Australian consumers are more influenced by eating quality (65%) than price (28%) when deciding on beef purchases (Meat and Livestock Industry Reform 1996). This seems hard to reconcile with the popular view that mincemeat (a cheaper beef product) is the largest selling beef product in the large Australian supermarkets. It may be necessary to survey a larger population of beef consumers, especially from lower socio-economic groups, to get to the truth about price *versus* eating quality influences on purchasing habits.

During the development phase of the Meat Standards Australia (MSA) grading scheme based on eating quality, MLA surveyed Australian consumers (Polkinghorne *et al.* 1999) 38% of which considered beef quality to be a problem, (ii) 59% were unable to select tender beef, (iii) 81% said price did not relate to beef quality, and (iv) 90% believed fat equalled poor quality.

Table 8. Australia's largest meat processors (by throughput) for 1999 (source: MLA 2000b)

Rank in 1999	Rank in 1998	Organisation	Throughput ETCW in 1999 ^A	Throughput ETCW in 1998	Throughput ETCW in 1999 (%) ^B	Number of plants, 1999	Turnover (\$m)	Turnover in previous year (\$m) ^D	No. of employees in 1999
1	1	Australia Meat Holdings Pty Ltd	340000	255 000	11.42	4	1527	1256	2600
2	2	Nippon Meat Packers Australia Pty Ltd	160000	163 000	5.38	3	575	506	1200
3	3	Consolidated Meat Group Pty Ltd	155000	139 000	5.21	3	420	463	1600
4	6	Teys Bros (Holdings) Pty Ltd	134400	99840	4.52	3	415	325	1200
5	8	Bindaree Beef Pty Ltd	119900	87000	4.03	2	300	200	780
6	4	Queensland Abattoir Corporation	100000	125000	3.36	3	41	41	530
7	5	SBA Foods Pty Ltd	90000	110000	3.02	3	130	250	650
8	9	Cargill Foods Australia Ltd	83000	68500	2.79	2	200	171	750
9	11	Fletcher International Exports Pty Ltd	70000	52000	2.35	2	160	130	1200
10	23	Southern Meats Pty Ltd	57800	31000	1.94	2	117	113	510
11	10	Northern Co-operative Meat Co Ltd	55500	66000	1.86	2	61	40	700
12	14	Mudgee Regional Abattoir	48000	46000	1.61	1	28	22	380
13	17	Rockdale Beef Pty Ltd	47750	40500	1.60	1	160	154	420
14	—	WA Meat Marketing Co-operative Ltd	47000	—	1.58	2	75	—	700
15	15	EG Green & Sons Pty Ltd	45000	45000	1.51	1	103	—	520
16	20	Bunge Meat Industries Pty Ltd	41000	33500	1.38	1	n.a.	170	160
17	—	n.a.	39000	—	1.31	—	—	—	—
18	18	Hurstbridge Abattoir (Australia) Pty Ltd	37837	39975	1.27	1	47	47	110
19	—	n.a.	37000	—	1.24	—	—	—	—
20	21	MC Herd Pty Ltd	36000	33000	1.21	1	105	90	350
21	—	n.a.	34000	—	1.14	—	—	—	—
22	19	G & B Gathercole (Vic) Pty Ltd	33500	34789	1.13	3	n.a.	n.a.	220
23	—	Australian Food Corporation Pty Ltd	31000	—	1.04	1	n.a.	n.a.	230
= 24	13	Castricum Bros Pty Ltd	30000	37000	1.01	1	75	92	350
= 24	24	Kilcoy Pastoral Co Ltd	30000	30160	1.01	1	85	67	290
Combined totals of top 25			1902687		63.93	46	4667	4139	15450

^AThroughput based on estimated tonnes carcass weight (ETCW) processed at plants under common ownership or control at 31 December 1999.

^BKill share based on estimated meat production (all species) for 1999 of 2 976 323 t (ABS).

^CTurnover values relate to 1998–99 for company's ranked (1) (6) (7) (11) (12) (13) (16); 1999–2000 for (2) (4) (5) (8) (9) (10) (15) (18) (20) (24); 1999 for (3) (14).

^DTurnover values for previous year are those shown in the 'TOP 25' published in FEEDBACK, August–September 1999 (in most cases 1997–98). n.a., data not approved by company.

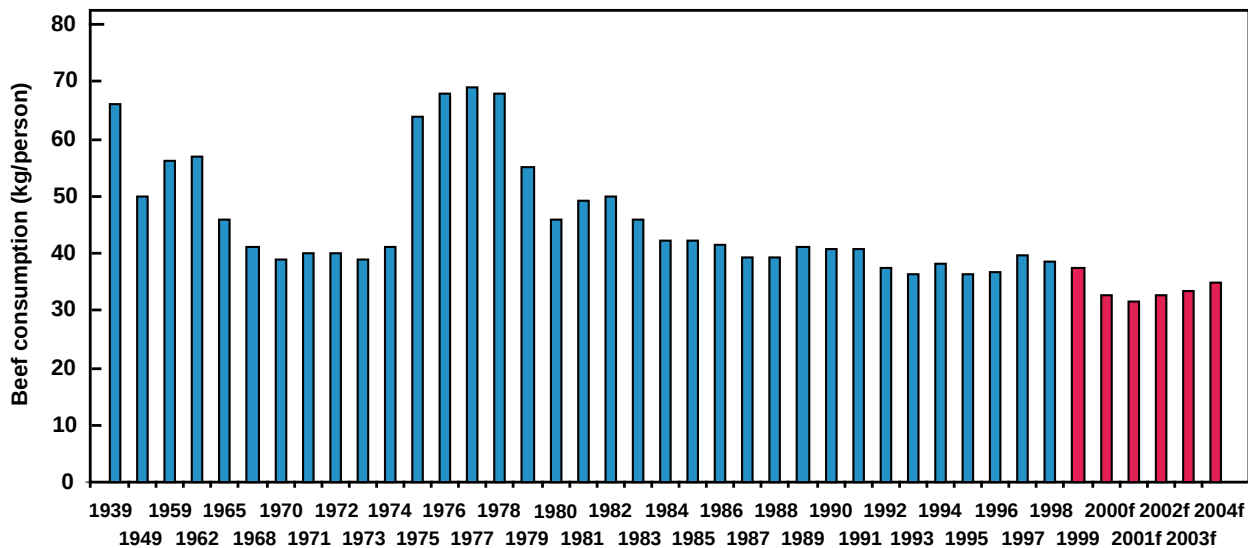


Figure 8. Beef consumption in Australia between 1939 and 2004 (adapted from Australian Bureau Statistics and forecast values in red are from Meat and Livestock Australia).

Beef retailers also recognise a problem with consistent supply of beef of acceptable palatability to meet market specifications. The expansion of Australian feedlots partly resulted from this supply problem, as well as to produce grain-fed beef for the premium export markets.

MSA grading scheme

The Australian beef industry has directly confronted consumer attitudes to the eating quality of beef. In a landmark development begun in 1997–98, scientists, including a number from the CRC, linked with leading beef

industry practitioners to develop the world's first grading scheme to differentiate beef products based on eating quality rather than description (Polkinghorne *et al.* 1999). The MSA scheme is soundly based on the world's largest bank of consumer (beef) taste panel information. A successful commercial trial was carried out in Brisbane in 1998. Yet the industry adoption of the scheme appears to have fallen below expectations, at least in states other than Western Australia where it has achieved outstanding success (D. Pethick pers. comm.). The MSA scheme has identified the key factors that contribute to eating quality. These eating quality indicators

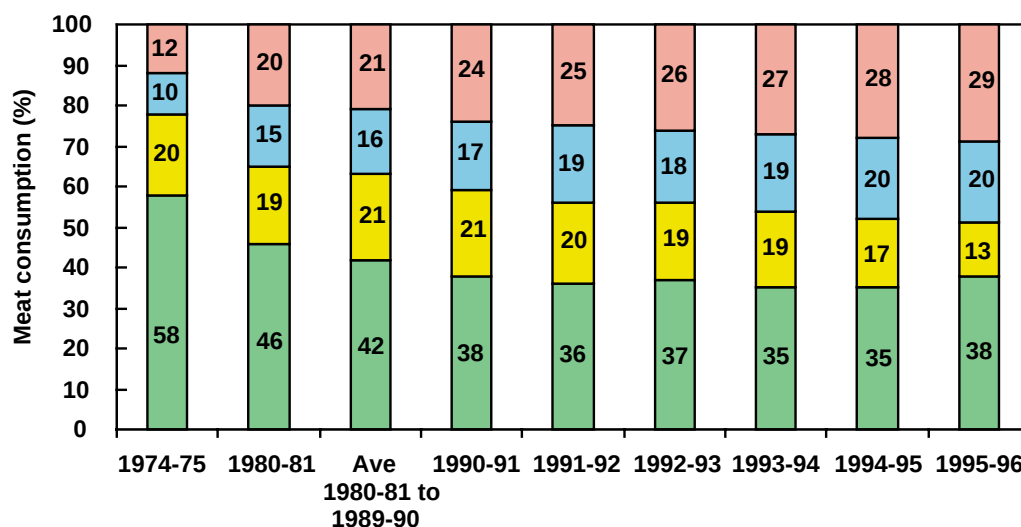


Figure 9. Market share of meat consumption (orange bar, poultry; blue bar, pig meat; yellow bar, lamb and mutton; green bar, beef and veal) by livestock species, 1974–1996 (source: Australian Meat and Livestock Corporation 1996).

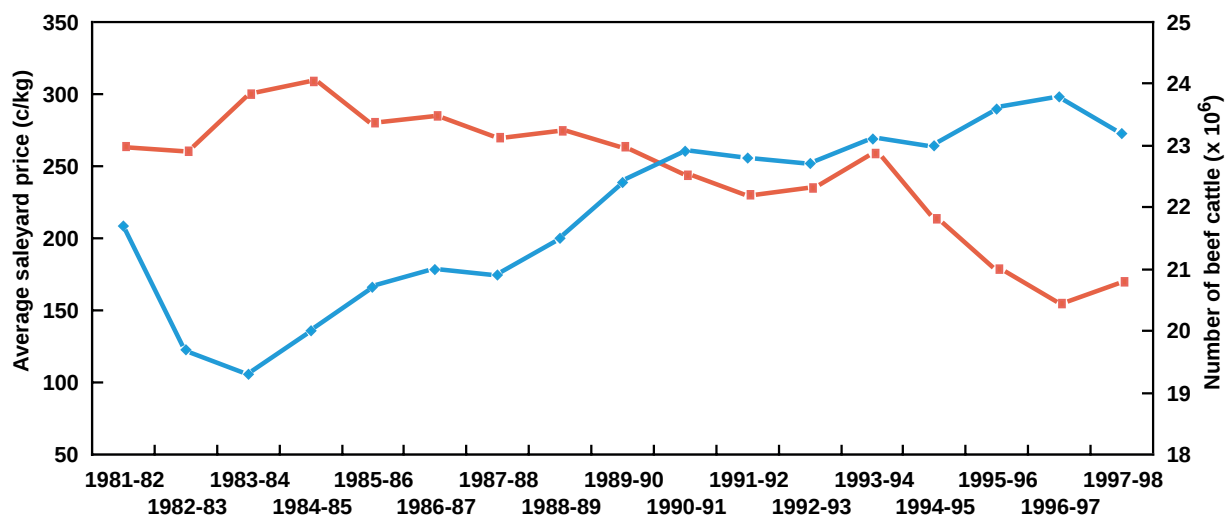


Figure 10. Changes in average saleyard price (■) relative to the number of beef cattle (◆) in the Australian beef herd between 1981–82 and 1997–98 (values at 31 March each year; source: ABARE 1998).

Table 9. Percentage grain-fed beef sold by major supermarkets in each state (source: Meat Research Corporation 1995)

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

include: (i) cut, (ii) cooking method, (iii) breed, (iv) maturity, (v) weight for maturity (WAM), (vi) carcass-hanging method, (vii) marbling and (viii) ageing.

Consumers were surveyed after the pilot marketing scheme, with the following result: (i) 86% were so pleased

with MSA beef, they repurchased; (ii) 20% were so pleased, they repurchased 10 or more times; and (iii) 94% were either satisfied or very satisfied.

Beef prices and industry profitability

Prices for Australian beef cattle are influenced by Australian cattle supply (e.g. number of beef cattle; Fig. 10) but also by supply and demand forces in countries importing Australian beef or competing with Australia in the global beef market.

It is clear from Figure 11 that real beef prices have declined since 1980. Profitability values for the beef industry at the end of 2000 appear to have improved considerably following above average rainfall, relatively short supply of cattle, record store cattle prices, a large feedlot inventory, record beef exports and increased domestic beef sales. Recent analyses (MLA 2001; Figs 11 and 12) show that

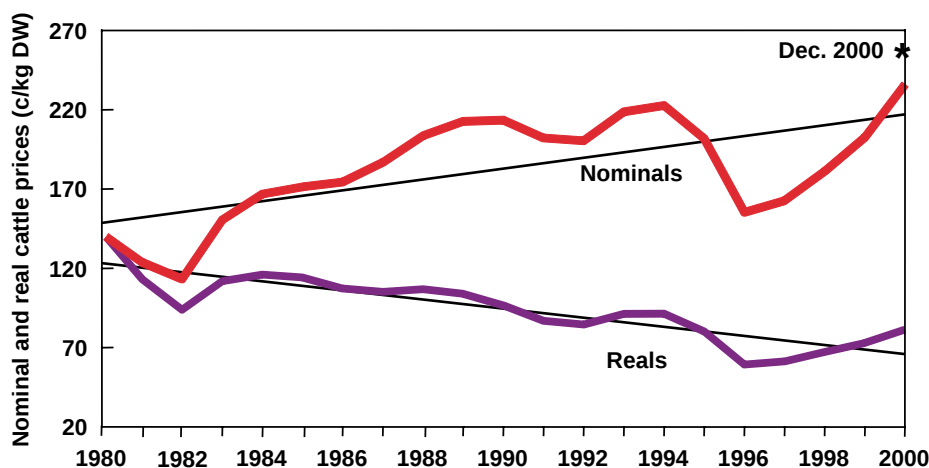


Figure 11. Changes to nominal and real prices for Australian cattle since 1980 (source: MLA 2001).

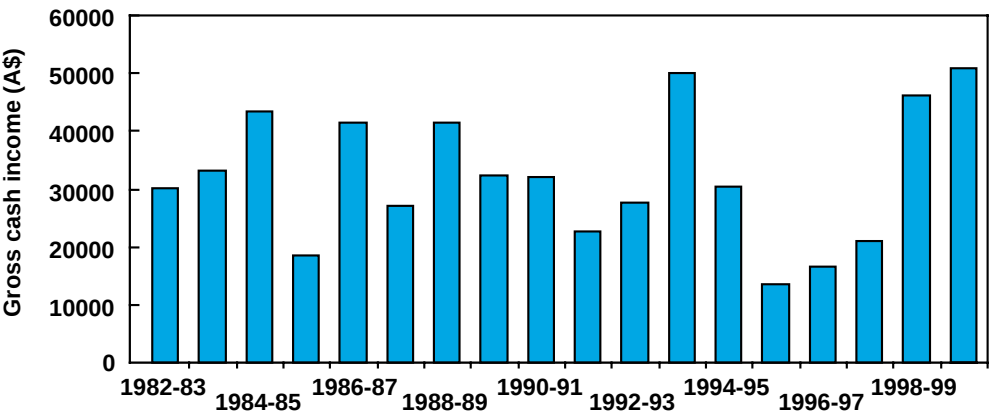


Figure 12. Average beef farm gross cash income in 1999–2000 dollars.

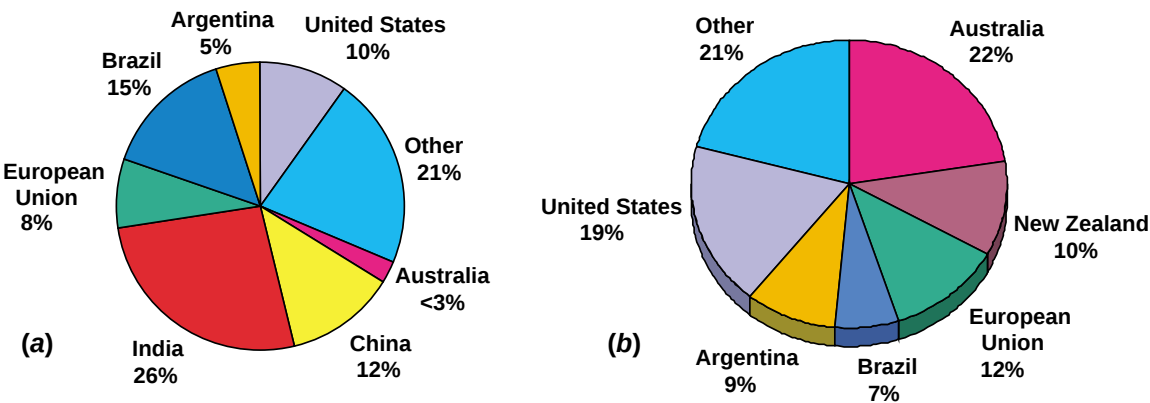


Figure 13. World cattle numbers (total world cattle number is 1.05 billion) and world beef trade (total world beef trade is 5105 kt) (source: Australian Meat and Livestock Corporation, pers. comm. 1996).

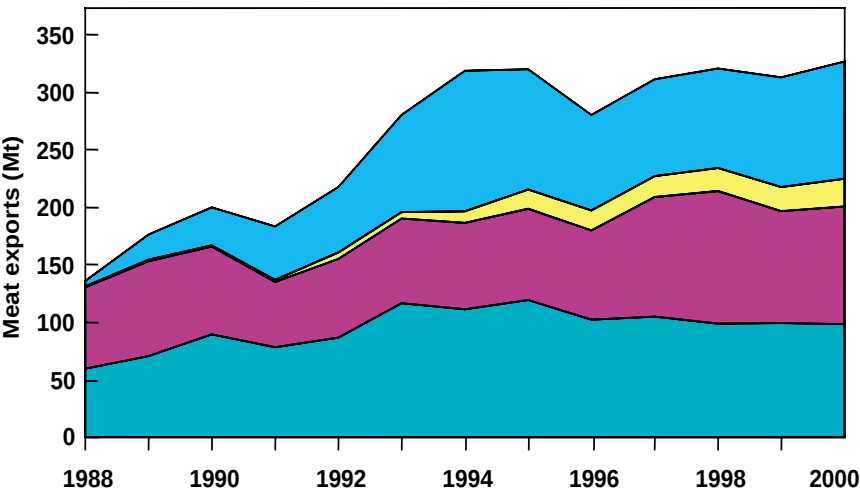


Figure 14. Changes in Australian exports of chilled or frozen grass- and grain-fed beef to Japan since 1988 (source: Meat and Livestock Australia 2001). Green area, chilled grass-fed beef; purple area, chilled grain-fed beef; yellow area, frozen grain-fed beef; blue area, frozen grass-fed beef.

Table 10. Australian exports of beef and veal ($t \times 10^3$, shipped weight) (source: MLA 2001)

Values in parentheses are forecast values for 2000 and 2001

Export destination	1995	1996	1997	1998	1999	2000	2001
Japan	320	281	312	321	313	(326)	(320)
US	211	180	221	285	291	(352)	(366)
Korea	64	58	61	34	79	(73)	(65)
Canada	33	29	35	39	43	(41)	(36)
Taiwan	32	24	35	34	35	(29)	(27)
South-east Asia	37	49	65	32	44	(38)	(43)
Indonesia	10	17	24	2	12	(13)	(18)
Philippines	15	20	27	20	20	(14)	(14)
Singapore	5	5	7	6	6	(4)	(4)
Malaysia	6	6	6	5	5	(6)	(6)
Thailand	1	1	1	1	1	(1)	(1)
Other Asia	6	6	5	8	4	(5)	(6)
Hong Kong	4	4	3	6	3	(4)	(4)
China	2	2	2	2	3	(2)	(2)
Eastern Europe & CIS ^A	13	18	19	43	11	(3)	(5)
European Union	8	10	11	10	9	(6)	(7)
Other ^B	25	40	38	50	33	(28)	(25)
Total	749	695	802	856	868	(902)	(900)

^AEastern Europe & CIS includes Poland.^BMain countries in Other are Papua New Guinea, South Africa, Middle East.

gross farm income for the average beef farm reached A\$50000 in 1999–2000, but real indexed prices for cattle have continued a negative trend since 1980.

Export markets

Australia has only 2.5% of world cattle numbers yet supplies 23% of world beef trade (Fig. 13). The diversity of Australia's production base provides beef products to suit the market specifications of 110 countries across the globe. In 1999, when Australian production of beef reached a near record 2 million tonnes carcass weight, 63.5% of this was exported (MLA 2000a). This confirms the overall importance of beef exports to the Australian beef business system.

Major export destinations for Australian beef in recent years are shown in Table 10 (MLA 2001). Japan was the largest importer during 1995–99 but was exceeded by exports to the USA in 2000 (352000 t). This reflects the static Japanese economy and the recent resurgence in Australian exports to USA since 1997. In terms of dollar value, exports to Japan remain our premium beef market. Korea is Australia's third largest export market and this has grown by 23% since 1995. Canada is next in importance, importing 43000 t in 1999. Further analysis of exports to the 3 regions now follows.

Exports to Japan

Disaggregation of the 313000 tonnes of beef exported to Japan in 1999 is shown in Figure 14. About 2-thirds of this trade was in the form of chilled beef. Chilled grain-fed beef

exports grew by 11% in 1998–99. Projections for Japan (MLA 2000a) are for little change in beef imports from Australia during 2000, reflecting slow recovery in consumer demand and slow decline in domestic Japanese beef supply. In 1999, USA had 48% of Japanese beef imports and Australia 46%.

Exports to the USA

The USA takes the majority of Australia's manufacturing beef and this product dominates total exports to that country. Exports to the USA reached 352000 t in 2000, and prices received were highest since 1992 (MLA 2001). There was also growth in exports of chilled high-quality beef to the USA but the 6759 t exported was only 2% of total exports to that country.

Exports to Korea

The Korean economy was quickest to recover from the Asian economic downturn in 1997. This is reflected in a growth in the demand for beef, where Australian beef exports to Korea doubled between 1998 and 1999 to 79000 t. The Korean beef market was liberalised in January 2001 and should lead to further export opportunities for Australia, in a market free from government controls over beef import and distribution, and impeded only by a tariff. Both grass-fed and grain-fed beef exports from Australia should benefit.

Live cattle exports

There has been an extraordinary growth in live cattle exports since 1980 (Fig. 15). Improved management systems

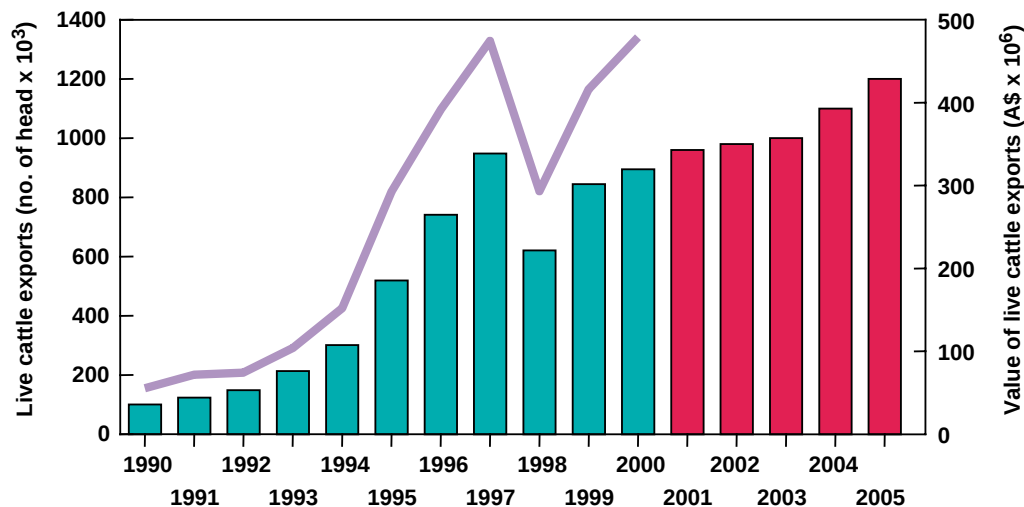


Figure 15. Changes in Australian live cattle exports (solid bars, no. of cattle; solid line, dollar value of cattle) since 1990 (source: Meat and Livestock Australia 2001).

(e.g. fences) due to the brucellosis tuberculosis eradication program and accelerated use of *Bos indicus* breeds have increased the availability of cattle suited to live export from northern Australia. Age of turn-off from northern herds has reduced as a consequence.

Recovery of some Asian economies has been rapid following the collapse of the Indonesian market in 1998 (Fig. 15). Table 11 illustrates that the Philippines, Malaysia, Egypt and the Middle East are now important destinations for Australian live cattle. The trade with Egypt was initially based on *Bos taurus* breeds from southern Australia, but since 1999, *Bos indicus*-derived cattle have been successfully exported, particularly in the northern summer periods when heat stress may impact on British cattle during a lengthy sea voyage.

Table 11. Australian live cattle exports (number of heads) (source: MLA 2000a)

AFFA data have been used before and including 1997, ABS data since 1998. Values in parentheses are forecast values for 2000

Export destination	1996	1997	1998	1999	2000
Indonesia	377131	387444	41174	150000	(170000)
Philippines	203010	253215	215961	270000	(250000)
Malaysia	44842	64120	43587	66000	(65000)
Japan	15039	19533	17148	12000	(11000)
Libya	7712	97525	120717	25000	(40000)
Egypt	49310	41523	119579	230000	(230000)
Middle East	10853	4375	33003	43408	(50000)
Others ^A	15188	14901	29166	28592	(24000)
Total	723085	882636	620335	825000	(840000)

^AMain countries in Other are Brunei, Mexico and China.

Disaggregation of markets for Australian beef and required cattle numbers

A feature of the modern Australian beef industry is that we now have diverse breed types (Table 2), suited to different climatic regions. (Fifty years ago the national herd was composed of almost 100% British breeds like Shorthorns and Herefords.) Australian beef cattle do not produce beef of equal quality, reflecting their genetics, their age at slaughter and their production environment, including nutrition. The challenge is to match the Australian herd, including its genetics, to the markets available for our beef products. This can be difficult, given that a change of breeding direction takes a minimum of 22 months for a domestic weight carcass and 30 months for an export, grain-finished carcass. That is to say a breeding decision today (e.g. a new sire or breed type) will not influence the market for at least 22–30 months.

Prediction of market shifts would assist in planning breeding directions or production system changes such as how many cattle to grain feed. There has been only 1 attempt to disaggregate the Australian beef market and to predict cattle numbers to supply each segment. Unfortunately, this was carried out in 1994 (see Meat Research Corporation 1995) and, although out of date, it provides the best snapshot of the destination of grain-fed beef exports and an overall summary of domestic *versus* export markets and grass-fed *versus* grain-fed production. The study used the Global Meat Industry (GMI) model to predict beef demand in 2000 and 2005 (Table 12). The values for 2000 appear to match up well with actual 2000 values reported by Meat and Livestock Australia (2001).

Data, such as in Table 12, should be useful in setting breeding directions for some components of the Australian beef herd. For example, if the demand for Japanese B3-graded product in 2005 is indeed as predicted in Table 12,

then breeding herds should gear up now to ensure that we produce 209 000 high-marbling Angus, Shorthorn or Murray Grey steers ready to go on long feeding programs in 2004. Is the Australian industry capable of breeding these animals? It is a serious concern that there has not been a thorough census of the Australian beef cattle herd since 1987 (P. A. Rickards pers. comm.). Such a census should be carried out immediately if we are to answer the Japanese B3 question posed above.

A secondary benefit of the results in Table 12 is that the survey exposed the fact that in 1994 there were 819 000 heads of domestic market cattle finished in opportunity or 'grain-supplemented' facilities not recorded in the registered feedlot sector. The comparable value for 2000 was predicted to be 839 000 heads. This is significant additional marketing information (i.e. about grain-fed cattle for the domestic trade) that only comes to light from the survey carried out in the Meat Research Corporation (1995) project. Is there any

Table 12. Baseline values (i.e. the most likely outcome) for beef demand (pcw) and cattle numbers required for different markets, 1994–2005 (source Meat Research Corporation 1995)

pcw, 'production carcass weight' used to express carcass weight of slaughtered animals required to supply the shipped weight of a particular market segment plus trim that should be diverted to another market

Market segment	1994	2000	2005	Change 1994–2000 (%)
<i>Domestic beef (pcw) (kt)</i>				
Grain-fed >70 days	82	84	86	3
Grain-fed supplemented	170	175	179	3
Grass-fed	425	436	447	3
Total domestic	677	694	712	3
<i>Export beef (pcw) (kt)</i>				
Grain-fed Japanese B3	45	52	54	16
Grain-fed Japanese B2	90	104	108	16
Grain-fed Japanese B1	82	96	99	16
Grain-fed Japanese yearling	27	32	33	16
Grain-fed Japanese subtotal	244	283	293	16
Grain-fed Korean quarter	14	25	32	75
Grain-fed Korean full set	2	3	4	75
Grass-fed total export	882	1070	1209	21
Total export	1141	1380	1538	21
<i>Australian beef (pcw) (kt)</i>				
Grain-fed	511	569	594	11
Grass-fed	1306	1505	1656	15
Total	1818	2074	2250	14
<i>Domestic cattle (no. of head $\times 10^3$)</i>				
Grain-fed >70 days (50% heifer)	394	404	414	3
Grain-fed supplemented (50% heifer)	819	839	861	3
Grass-fed	2418	2479	2544	3
Total domestic	3631	3722	3819	3
<i>Export cattle (no. of head $\times 10^3$)</i>				
Grain-fed Japanese B3	174	202	209	16
Grain-fed Japanese B2	287	333	345	16
Grain-fed Japanese B1	162	188	195	16
Grain-fed Japanese yearling	110	128	132	16
Grain-fed Japanese subtotal	733	851	881	16
Grain-fed Korean quarter (40% heifer)	50	88	116	75
Grain-fed Korean full set (40% heifer)	6	11	14	21
Grass-fed Total	3842	4662	5268	21
Total export	4631	5611	6279	21
<i>Australian cattle (no. of head $\times 10^3$)</i>				
Grain-fed	2001	2192	2286	10
Grass-fed	6260	7141	7812	14
Total	8262	9333	10098	13

reason why the GMI model and the survey carried out in that project could not be run every year or every 2 years?

Discussion

This paper was written to provide readers of the Special (CRC) Edition of the *Australian Journal of Experimental Agriculture* (AJEA) with an overview of the Australian beef industry: its historical development and structure; its cattle population, distribution and breed composition; growth of the feedlot sector; its meat processing plants; domestic and export markets; beef consumption patterns and competing products; and the industry's shift towards meeting consumer specifications. This has been achieved using the latest information available.

The information reviewed provides the background for the 22 papers in the AJEA describing the CRC's results dealing with the genetic and non-genetic factors affecting beef quality. This review should give the reader a better appreciation of why the CRC's research program was initiated: to assist industry to meet the carcass and meat quality specifications of domestic consumers and to compete successfully in export markets by meeting exacting customer requirements.

A list of major events influencing beef markets that emerged during review of historical developments in the beef sector are given in Appendix 1.

Australia's commitment to research and development, mostly funded by beef industry levies has played a significant part in dealing with some of these events. Transport technology (e.g. chilled beef shipments), disease eradication (brucellosis tuberculosis eradication program; foot and mouth disease-free status), pasture improvement, abattoir accreditation, cattle breed introductions, live cattle trade expansion, consumer surveys, BREEDPLAN launch, genetic and nutritional strategies for feedlot expansion, food safety resolution, MSA grading scheme and molecular genetic technologies all resulted from scientific problem solving. Science and technology have also made small incremental improvements to the efficiency of beef production and processing that are more difficult to quantify.

As the global beef business becomes more competitive and consumer demands more exacting worldwide, the outcomes of new technologies will become more important for Australia. The progressive loss of Australia's market share to USA in the Japanese beef trade is a good example. Australia's emphasis on beef quality will be a crucial factor in defending our mantle as the world's number 1 beef trader.

Acknowledgments

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Appendix 1. Major events that have influenced beef markets

Year	Event
1930s	Technology for shipping chilled beef to UK developed
1938–45	Trade disruption caused by World War II
1950–56	Growth, then restriction, of UK beef market
1960s	Licensing of Australian abattoirs to supply USA markets
1960–70	Brucellosis tuberculosis eradication campaign to eliminate brucellosis and tuberculosis
1975–76	Beef cattle numbers reach record 33 million
1976–78	Beef market collapse in Australia
1974	Competition from chicken starts to erode beef markets
1975	Commencement of expanded use of <i>Bos indicus</i> breeds in northern Australia
1980	Live cattle trade begins following brucellosis tuberculosis eradication campaign and <i>Bos indicus</i> expansion
1980	Japanese market for Australian beef commences
1982	Linear decline in Australian beef consumption commences
1985	Australian Meat and Livestock Corporation launches 'New Direction' for beef marketing, including first consumer surveys about beef quality
1985	BREEDPLAN beef genetic improvement scheme begins
1986	Expansion of Japanese markets for high quality grain-fed beef
1986	USA beef exports begin world-wide expansion, presenting serious competition for Australia in Japan and Korea
1987	Australian feedlot sector reaches 100000 head on feed
1988	Supermarkets begin to take an increased share of domestic beef sales
1991	Liberalisation of Japanese beef market commences
1992	The Cooperative Research Centre for the Cattle and Beef Industry (Meat Quality) begins study of genetic and non-genetic factors affecting beef quality
1994–95	Severe drought, grain shortage and lowest-ever cattle prices in Australia
1995	Live cattle exports reach 500000 head
1996–98	(Further) serious abattoir closures occur and workplace reform begins
1997	Meat and Livestock Australia initiates development of Meat Standards Australia Scheme
1998	<i>E. coli</i> food safety issue affects beef consumption in USA, Japan and Australia
1998	Pilot commercial launch of Meat Standards Australia beef in Queensland
1999	Bovine spongiform encephalopathy begins to impact on beef consumption in Europe with transient effects in Japan
1999–2000	Foot and mouth disease-free status in Brazil and Argentina and Brazilian currency decline leads to increased sales of South American beef to Canada
2000	Sequencing of human genome completed; bovine molecular genetics enhanced
2001	Liberalisation of Korean beef market completed
2001	Foot and mouth disease outbreak in Britain and Europe