



RURAL INDUSTRIES RESEARCH
& DEVELOPMENT CORPORATION

Development of the Deer Industry

**as a Major Australian
Livestock Industry**

**A report for the Rural Industries Research
and Development Corporation**

**by Chris Tuckwell
Rural Industry Developments**

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FOREWORD

The success of the Deer Industry Venison Market Development Towards 2000 program undertaken from 1994 to 1996 saw a change of Industry Research and Development providers.

In 1996 research priorities were focussed on production and industry development issues. That focus led to the employment of a Deer Industry Development Manager whose summary role was to consolidate infrastructure, strengthen supply systems and implement a Quality Assurance program.

The project's primary goal to significantly increase the size of the Australian deer industry was not achieved during the project.

This report provides a detailed account of the Australian deer industry and of the program to provide the basis for industry expansion. Difficulties in achieving industry growth hoped for are examined in detail. Any Industry expansion in the immediate future is likely to be only achieved with difficulty. Factors that influence industry expansion include currency exchange rates, intentional competition and within industry marketing and processing competition.

The report highlights those areas considered by the Principal Researcher as vital to industry growth and even survival.

Summary statistical data provides the most up-to-date industry estimates available on a basis for comparison with a future industry census.

This report, a new addition to RIRDCs diverse range of 400 research publications, forms part of our Deer R&D program, which aims to foster an Australian deer industry as a profitable and efficient mainstream agricultural enterprise.

Most of our publications are available for viewing, downloading or purchasing online through our website:

- downloads at www.rirdc.gov.au/reports/Index.htm
- purchases at www.rirdc.gov.au/pub/cat/contents.html

Peter Core

Managing Director

Rural Industries Research and Development Corporation

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This project could not have been undertaken without the considerable commitment of the project's research officer, Alison Burges. Alison's commitment particularly in respect to data collection and storage far exceeded her contractual obligations. The Australian Deer Industry generally, and me as the project's Principal researcher, are in her debt.

EXECUTIVE SUMMARY

(i) General

Deer are not indigenous to Australia. Although they were introduced in the nineteenth century commercial farming of them did not begin until the early 1970's in Victoria. Although six species of deer were introduced to Australia only four of the originally introduced species have been included in commercial farming systems. Farmed deer in Australia include Red, Fallow, Rusa and Chital (initial imports) and Wapiti that were introduced from Canada in the mid 1980's.

Throughout the Australia Deer Industry's brief history reliable statistics on the size of the deer herd were not available. Best industry estimates suggested that between 220,000 and 250,000 deer were farmed by 1,200 to 1,500 farmers in Australia. Fallow and Red deer were estimated to each make up about 45% of the total population while Rusa and Chital made up the majority of the remaining 10%.

The industry grew rapidly until the early 1990's while returns from breeding stock sales were very high. The growth of the industry declined due to droughts forcing the sales of stock at low prices, increases in live animal exports and the slaughter of breeding females.

The development of international markets for Australian venison, principally due to the efforts of the Venison Market Development Manager, significantly increased demand for slaughter stock. During late 1996 and early 1997 that increased demand was difficult to meet because of the Industry's relatively small production base.

Supply difficulties were exacerbated when the supply of products, particularly venison was maintained by the slaughter of young breeding females. The net result was a depletion in the industry's female breeding herds.

In an effort to maintain existing venison markets in the short term and to increase them in the long term, the industry's top priority became the increase in size and production capacity of the national herd.

This priority led to the appointment of the Deer Industry Development Manager, a position created by the RIRDC funded project on which this report is based. The project had as its prime objective a significant increase (doubling) of the Australian National Deer Herd.

(ii) Industry Manual

Initial project activities were to establish a comprehensive set of industry statistics and to compile a Deer Industry Manual. The manual was completed and well received by industry while the collection of industry statistics was excessively drawn out.

(iii) Industry Statistics

Collection of data was difficult as many industry members could not see the value in the data or were concerned about the use of herd information they considered too personal to make available.

The final data set compiled by the project is a compilation of actual data obtained via the census and estimates obtained through some branches of the DIAA. Our frustration with data collection extended to some branches of the DIAA who were unable to cooperate with the preparation of required estimates. In particular, herd population data from Victoria is composed of a greater percentage of project researcher estimates than other states.

Analysis of the compiled statistics was continually delayed while waiting for the computer program, developed as part of this project, to be debugged. A contract for the program's development was agreed in September 1997 and a debugged program was not provided until April 1999. Industry population estimates provided at industry seminars prior to the completion of the computer program are updated by this report.

Statistics compiled by the project suggest that there are approximately 188,000 deer in Australia. Fallow deer comprise about 49% of this total while Red deer and Red deer hybrids comprise about 39%, Elk/Wapiti about 3%, Chital about 2.5% and Rusa 6.5% respectively.

An approximate distribution of deer by state is: NSW (including ACT) 30%; QLD 11%; SA 15.5%; TAS 8.5%; VIC 26.5% and WA 8.5%.

The majority of deer are held on farms as single species enterprises. Of the 938 farms with deer, only 212 held more than one species.

Data in the body of this report describes the apparent unrealistic distribution of animals, between age groups within breed types, suggested by statistics compiled during this project (See 5.11).

Some key population parameters have been amended from the base statistics to better represent the current industry status. In particular the amended model suggests only 80% of all breeding females are joined in any one year. The total breeding female and adult male populations used are the same as suggested by the statistics, but the distribution of the

population between age groups is adjusted to reflect a stable sustainable population (compare tables 13 and 32).

Using the amended data the report describes the sensitivity of the industry's population to reproductive performance and culling rates of young female stock.

The industry's current population can, at best, be described as stable. However if the overall reproductive performance decreases (less animals joined or less off spring per joining) the population will decline. Similarly, if the rate of culling of young female stock increases above suggested current averages, the total population will decline.

The reciprocal is also true and improvements in overall reproductive performance or decreases in young female culling rates could easily return the industry to a state of rapid growth.

The estimated number of stock available for processing show similar patterns to those described for the total industry population.

(iv) Quality Assurance

The industry Quality Assurance Program began in earnest in May 1998 and is well underway with Facilitators trained and accredited in each state. The program continues to gain momentum and more than 100 farmers have purchased manuals and are at various stages along the road to industry accreditation.

(v) Promotional Literature

A range of promotional literature has been produced by the project. Some of the brochures produced are reprints of venison marketing program literature (after editing) and some are new productions. Brochures produced are held by the Industry Bookshop and are available to industry either free or for a minimal charge, depending on the item.

(vi) Industry Display Kit

An industry promotional display kit produced by the project is also available for field days and conferences.

(vii) Venison

Since mid 1997 the Australian industry has moved from a state of relative buoyancy (average Hot Carcase Weight price for prime venison of about \$5.10/kg and average velvet price of about \$60/kg) to a state of depression. This state of depression has been caused by both internal and external factors that include: (i) the Asian currency downturn; (ii) the industry's lack of competitive advantage in influential markets (particularly in respect to New Zealand

competition), and; (iii) within industry processing and marketing competition for limited product volumes of venison.

These three factors have seen a considerable downturn in farm gate returns since mid 1997. In particular, within industry competition for product has meant that each 'marketer' has only been able to access relatively small volumes of venison. In turn, a relatively large number of Australian 'marketers' each with a relatively small volume of venison have been active in international markets. International clients are quick to recognise their advantage and play Australian 'marketers' off against each other, particularly with respect to the price they eventually pay for the venison. A net result is reduced returns to growers.

The decline in farm gate returns has significantly reduced industry confidence and has seen an increasing number of producers leave the industry and a decreasing interest in new investment in the industry.

To survive the industry needs to increase its production base to achieve profitable production economies of scale and give consumers confidence in its ability to supply known volumes of quality product. In turn, the ongoing production of consistently high quality product will lead to improved grower returns. However an inevitable 'catch 22' exists, as until an improvement of farm gate returns is realised and confidence in the longevity of the returns is developed, the industry is unlikely to attract new producers or encourage existing producers to expand (or even stay in the industry).

There are two immediate factors that the industry should consider in an effort to improve returns to growers. They are to reduce within industry competition for the relatively small volume of venison produced and to improve the average quality of stock committed for processing.

A reduction of within industry competition is dependent on a rationalisation of the number of companies involved in processing and marketing venison products. Specifically, a dramatic reduction of within industry marketing competition for venison product, will reduce the opportunity international clients have to reduce price paid for Australian product and so provide an opportunity to immediately increase returns to producers.

Industry self rationalisation should reduce the number of abattoirs used to process deer. Currently, average deer processing costs (\$/kg HCW) are up to 230% above those incurred to process sheep and cattle. Three processing costs can be reduced by increasing throughput at a small number of abattoirs.

In the long term, an expansion of Australia's deer industry production base will be determined by the industry's ability to convince potential investors of the current economic advantages of deer farming and of the current and future product market opportunities that give confidence for long term investment.

Development of, and entry into, 'new' niche high value markets can provide an improvement in return to producers and be the basis for the development of a new confidence in the long term market opportunities for products of the Australian Deer Industry.

The growth of the new markets must be controlled to match a gradual increase in the industry production base. Niche market development for specific cuts of differentiated venison on a formal contract basis will give further confidence to a small but expanding number of producers whose product meets strict quality standards.

(viii) Velvet Antler

The industry's other major product, velvet antler, continues to be promoted and marketed by the Australian Deer Horn and Co Products Company (ADH). Although not all velvet antler produced by industry is graded and marketed by ADH, the majority of product produced by the Australian industry is sold by the company.

Market development initiatives undertaken by ADH, particularly to China appear to be having a positive influence on prices received for velvet sold by ADH. The velvet antler market is likely to remain volatile but the development of direct markets with China may improve prices to Australian growers and to some degree lessen the volatility of the market.

The Australian Velvet Accreditation scheme continues to have a positive effect on quality which in turn has a positive effect on price paid to growers.

(ix) Future Development

In summary, the major requirements for industry stability and renewed confidence include: (i) a reduction of the number of people and groups competitively marketing Australian product; (ii) grower commitment to ensure animals meet minimum processor specification; (iii) collective commitment of industry to quality assurance programs; (iv) development of strategic alliances between groups of growers and selected processors; and (v) processor commitment to long term market development programs and prompt payment to growers for stock.

1. INTRODUCTION

1.1 Origin

Deer were introduced into Australia during the Nineteenth Century under the Acclimatisation programs governing the introduction of exotic (non native) species of animals and birds into Australia. Introduced animals, representing six species of deer were released at various locations. The animals dispersed and established wild populations at various locations across Australia mostly depending upon their points of release into the wild, and formed the basis for the deer industry in Australia today.

Deer farming in Australia commenced in Victoria in 1971 with the authorised capture of rusa deer from the Royal National Park, NSW. Until 1985 four species of deer, two from temperate climates (reds, fallow) and two tropical species (rusa, chital) were confined for commercial farming. Late in 1985 the relaxation of import protocols saw the introduction of the North American Elk (Wapiti) and large numbers of red deer from New Zealand.

1.2 Industry Structures

The first deer industry organisation was the Australian Deer Breeders Federation that was formed in 1979. The Industry organisation grew and developed into the Deer Farmer Federation of Australia (DFFA) and subsequently evolved into the Deer Industry Association of Australia (DIAA). The DIAA represents all sectors of the Australian Industry and members subscribe either directly or through state organisations, breed societies or processing associations.

The industry has established two product development and marketing companies, the Australian Deer Horn and Co Products Pty Ltd and the Deer Industry Projects and Development Pty Ltd.

(a) Australian Deer Horn and Co Products Pty Ltd (ADH)

ADH was formed with assistance from RIRDC. It collects and markets Australian deer horn on behalf of its members.

ADH promotes the harvest of velvet antler according to the strict quality assurance (QA) program promoted by the industry. The company also plans and co-ordinates regular velvet accreditation courses for Australian deer farmers.

- (b) Deer Industry Projects and Development Pty Ltd (trading as the Deer Industry Company)

DIC undertakes project work to assist the industry achieve its goals as described in the Industry five year plan, or otherwise as required by the DIAA.

1.3 Markets

During the early growth years of the industry market development for its two major products (velvet and venison) was constrained by the size of the herd (supply constraint). As such, market development was restricted to the more easily accessible markets then available (generally domestic).

By 1990, the volume of velvet available from the Australia herds was sufficient for the DFFA to commence the first national velvet pools. The majority of deer farmers co-operatively market their velvet antler through the Australian Deer Horn and Co Products Company.

Markets for venison expanded noticeably under the influence of the Venison Market Development program funded by RIRDC from 1992-96. The significant increase in domestic consumption of venison during this period was bolstered dramatically by the overseas demand for Australian venison which took effect from 1993-94.

However, the rapid increase in exports of venison have been accomplished at the expense of maintaining the size of the national herd, (depletion of female stock through slaughter for venison and live exports). Consequently the DIAA's top industry priority was to increase the national herd size, in an endeavour to maintain, let alone expand, existing venison markets.

1.4 Herd size

Reliable Deer Industry statistics were not available at the commencement of the project, but best estimates within the industry suggested that in 1997, there were 1200-1500 deer farmers farming some 220,000 to 250,000 deer of which fallow and red deer represented about 45% each, with the two tropical species (Rusa and Chital deer) making up the remaining 10%.

Industry estimates suggest that until the early 1990's the rate of the annual increase in the number of farmed deer was up to 25% but after 1993 this rate of increase fell to probably less than 10%. Main reasons for the decline in the deer herd growth rate at such a critical time in industry development were: (i) severe drought conditions affecting up to 1998 eastern Australia during 1993-96 (in some areas the drought lasted until 1998) and (ii) the consequent slaughter of large numbers of breeding females, at very low prices. These factors combined to decrease confidence within the industry. Lack of confidence saw a drop in new investment within the industry and a lack of willingness of established farmers to expand their herds.

With the development of strong overseas markets for venison (RIRDC funded venison market development program) and velvet (Australian Deer Horn and Co Products Pty Ltd) and prospect of better seasons ahead in 1996, the trends described were seen to have been significantly reversed. However the relatively small size of the Australian herd was seen to impose undesirable restraints on the rate at which herd numbers could be expanded to meet the demands for products. For these reasons in 1997 the Deer Industry Association of Australia (DIAA) placed the rapid expansion of farmed deer numbers as its immediate top priority.

2. OBJECTIVES

To develop and implement strategies that will consolidate and expand production of Australian deer products and position the Australian Deer Industry as a commercial livestock industry that compliments Australia's traditional livestock industries.

Specific objectives are:

- To develop a sustainable supply of deer products for national and international markets by increasing the number of deer farmers and the size of their herds.
- To establish an industry data base that includes comprehensive statistics on farm and deer numbers, locations, species, abattoirs, transporters, domestic and export marketers, competitors, etc.
- To establish an industry information centre that will communicate and disseminate information held in the data base to interested consumers, marketers, government agencies and producers.
- To conduct and co-ordinate programs to inform deer industry participants of the need for increased production and attention to quality assurance programs.

3. METHODOLOGY

The project had four major objectives (described in section 2). The project methodology is described by objectives.

Objective 1

To develop a sustainable supply of deer products for national and international markets by increasing the number of deer farmers and the size of their herds.

Strategies to increase industry production related to increasing Australia's national deer herd included:

- (1) Negotiation of the collaboration and co-operation between major regional industry groups and government agencies including the encouragement of a national industry approach.
- (2) Develop and train current and potential producers in objective farm financial analysis that will encourage efficient commercial production of venison and velvet.
- (3) Compile and produce a Deer Farming Production and Investment Manual
- (4) Co-ordination of information transfer through seminars, field days and publications.

Objective 2

To establish an industry data base that includes comprehensive statistics on farm and deer numbers, locations, species, abattoirs, transporters, domestic and export marketers, competitors, etc.

Methods used to establish a comprehensive industry data base were to include collaboration with regional industry groups, government agencies, processors and exporters to develop accurate Australian deer industry statistics.

The project aims to compile information including details of breeds, sex, management programs, processing statistics, abattoir availability, membership of industry groups, production technologies, market access requirements and competitive products.

Objective 3

To establish an industry information centre that will communicate and disseminate information held in the data base to interested consumers, marketers, government agencies and producers.

The project managers recognised that the establishment of a centralised data transfer centre would rely on the development of the Australian Deer industry data base. Strategies to ensure transfer of data to industry were to include:

- (1) The collection, analysis and publication of industry data and information.
- (2) The annual publication of details and progress of industry projects
- (3) Encouragement of researchers to regularly publish reports of their projects, particularly with practical extension articles related to the research.

Objective 4

To conduct and co-ordinate programs to inform deer industry participants of the need for increased production and attention to quality assurance programs.

Strategies that were to be employed to educate members of the deer industry of the need for increased production, efficiency and quality of production were to include:

- (1) Development of alliances between networks of producers, abattoirs, processors and marketers.
- (2) Establish quality assurance specifications for use by industry.
- (3) Establish a venison quality mark.
- (4) Production of appropriate brochures, charts etc to explain and reinforce the quality assurance program.
- (5) Undertake a series of workshops and seminars to train industry participants to produce according to minimum quality standards.

4. RESULTS

Results described are broadly presented according to the objectives described in (2) and (3) above.

4.1 Objective 1 Increase production by increasing the size of the national herd

4.1.1 An important activity undertaken to achieve objective one was to develop a Deer Farming and Investment Manual.

A modular format for the manual was proposed and accepted by the board of the Deer Industry Company (DIC). The project has produced a set of seven, high quality, publications. They contain comprehensive data on deer farming, numbers and species of deer farmed, management requirements, choice of animals, layouts, entry costs, products, markets, analyses of profitability comparing different deer enterprises, sources of further information etc. Manual titles with a brief description of their contents are:

(a) **Australian Deer Industry Manual No 1: Investment and Economics**

First in a series of publications that collectively make up the Australian Deer Industry Manual, each focussing on a particular aspect of the industry. No 1 provides up-to-date information on economic issues including the presentation of budgets to provide a reasonable guide to estimate outcome from various deer enterprises.

(b) **Australian Deer Industry Manual No 2: Fencing and Handling yards**

Provides up-to-date information on the true costs of fencing and handling facilities for deer farming. Demonstrates that these costs need not be the prohibitive establishment cost once thought. Also provides tips and hints on how to minimise costs while constructing deer-proof fencing.

(c) **Australian Deer Industry Manual No 3: Classification and Species Selection**

Provides up-to-date information on each of the species of deer farmed in Australia and their genetic relationships. Briefly

describes the origins of deer farmed in Australia, their appearance and basic biological differences

- (d) **Australian Deer Industry Manual No 4: Deer Health**
Provides up-to-date information on aspects of deer health including bacterial diseases, viral infections, external and internal parasites and metabolic diseases. Also describes management programs for disease control and prevention.
- (e) **Australian Deer Industry Manual No 5: Deer Velvet Antler**
Provides up-to-date information on velvet growth and handling and requirements for commercial harvesting. Also refers to the National Velvet Accreditation Scheme, an extensive training program that deer farmers are encouraged to undertake.
- (f) **Australian Deer Industry Manual No 6: Pasture Assessment and Grazing Management**
Provides information on the assessment of pastures and grazing, with helpful advice on managing stock. Topics include pasture assessment, production from pasture, GrazFeed production targeting, and grazing management.
- (g) **Australian Deer Industry Manual No 7: Management Guide**
This volume sets out general information on the management of the commercially important species in Australia. Explains the industry quality assurance program and the National Velvet accreditation scheme, both of which should be adopted by all deer farmers.

The manuals which are sold by the Deer Industry Book Shop, DIC and some branches of the DIAA, have been very popular.

Complimentary copies of manuals were sent to State Departments of Agriculture, other government agencies (eg Austrade) bank managers, stock and station agencies, colleges, universities, interpretive centres, farm advisers, Branch committees and appropriate media.

- 4.1.2 An important project objective was to collect, analyse and publish information on industry statistics.

An industry census form was prepared and released at the National Deer Industry Conference in Adelaide in September 1997.

Prior to the release of the census collection forms, details about the survey and its importance were provided to industry via press releases, reports in the Australian Deer Farmer Magazine and reports in the RIRDC deer industry Newsletter.

A contract was negotiated with Mr Tony White from Undaware Pty Ltd to develop a computer data base program to store and analyse information collected by the census.

The Deer Industry Development Manager (DIDM) attended each DIAA branch meeting throughout Australia to explain proposed activities for the two years of the project and to highlight the importance of the census.

To our prolonged frustration Undaware Pty Ltd did not finish the development (program debugging) of the data base computer program for the census data until April 1999. Until then, the Deer Maintenance Systems or DMS program, did not analyse and provide all reports as required. While the latest version of DMS appears to store data correctly and produce accurate reports, some of the original program parameters were not pursued as they became unnecessary in the absence of useful census data.

Industry response to the census was poor, especially as a significant effort was undertaken to explain the importance of the census for future marketing and industry development programs. A total of 1,633 census forms were provided to all known deer farmers and those known to have previously owned deer.

Responses from the census suggest that there are currently (September 1997) 1,238 deer farms in Australia. Of those, 393 (32%) people responded to the census. Of the respondents, 50% (197) were members of the DIAA.

As responses to the census were poor and in recognition of the importance of the need for this information, we attempted to compile accurate industry estimates by all available avenues. One of the

attempts at obtaining information was to provide the executive of each state branch of DIAA with a list of deer farmers who were known not to have responded to the census. Each executive was asked indicate those farmers from the list who no longer farmed deer and to estimate deer numbers for others on the list.

However some people who did not respond to the census (and some who did) believed that the confidentiality with respect to whether individuals did or did not respond to the census was compromised.

Although this action was seen by some as compromising the confidentiality of the census, information provided for the census directly from respondents to the DIC remained confidential at all times.

Apologies have been made directly to those who voiced their concerns, and it has been stressed that the confidentiality of all data related to every respondent to the census data has been maintained.

Actual data from the census suggest that the 393 individuals who responded to the census own (September 1997) 93,901 deer. Estimates compiled from a range of sources suggest that there are (September 1997) a further 545 deer farmers who own 94,059 deer. An estimated total population of 187,960 deer.

The 393 respondents to the survey represented the ownership of 93,901 deer and the DIAA respondents (197) represented 69,317 (73.8%) of those deer.

Assuming that those who responded to the census are a representative sample, data suggests that in September 1997 the DIAA represented the ownership of approximately 74% of the Australian deer herd.

4.1.2.1 Deer numbers for each state provided in Table 1 below, are provided as a combination of actual (respondents) data and estimates.

Table 1a - Estimated Total Deer Number (September 1997)

Species	Number	% of Total
Red and red hybrids	73,868	39.3%
Fallow	91,912	48.9%
Elk	5,827	3.1%
Chital	4,135	2.2%
Rusa	12,217	6.5%
TOTAL	187,960	100%

Table 1b - Deer numbers in each state (September 1997)

	Red and Hybrids	Fallow	Elk	Chital	Rusa	Total
NSW	20,295	31,890	948	992	2,048	56,173
QLD	7,154	2,977	41	1,590	8,641	20,403
SA	9,888	14,504	1,707	1,524	1,591	29,214
TAS	-	1,600	-	-	-	16,000
VIC	26,233	20,439	3,053	11	-	49,736
WA	10,328	6,076	1	-	29	16,434
TOTAL	73,898	91,886	5,750	4,117	12,309	187,960

Table 1c - Distribution of deer by breed and State (Sept. 1997)

	Red & Red Hybrids	Fallow	Elk	Chital	Rusa	Total
NSW	36.1%	56.8%	1.7%	1.8%	3.6%	29.9%
QLD	35.1%	14.6%	0.2%	7.8%	42.3%	10.9%
SA	33.9%	49.6%	5.8%	5.2%	5.5%	15.5%
TAS	0.0%	100.0%	0.0%	0.0%	0.0%	8.5%
VIC	52.8%	41.1%	6.1%	0.0%	0.0%	26.5%
WA	62.9%	37.0%	0.0%	0.0%	0.1%	8.7%
TOTAL	39.3%	48.9%	3.1%	2.2%	6.5%	100%

A summary of the distribution of deer by breeds and between States is presented in Tables 1d, 1e and 1f.

Table 1d - Estimated number of breeding females (at least two years old)

Species	Number	% of female population
Red and red hybrids	32,699	36.7%
Fallow	45,619	51.2%
Elk	2,803	3.1%
Chital	1,988	2.2%
Rusa	6,030	6.8%
TOTAL	89,139	100%

Table 1e - Distribution of breeding females (female deer at least two years of age) by State

	Red and hybrids	Fallow	Elk	Chital	Rusa	Total
NSW	9,101	16,012	486	478	1,022	27,099
QLD	3,156	1,431	19	835	4,299	9,740
SA	4,213	6,373	809	671	697	12,763
TAS	-	8,021	-	-	-	8,021
VIC	11,500	9,878	1,489	4	-	22,971
WA	4,629	3,904	-	-	12	8,545
TOTAL	32,699	45,619	2,803	1,988	6,030	89,139

Table 1f - Breeding females as a percentage of the deer population

	Red and hybrids	Fallow	Elk	Chital	Rusa	Total
NSW	44.8%	50.2%	51.3%	48.2%	49.7%	48.2%
QLD	44.1%	48.1%	46.3%	52.5%	49.8%	47.7%
SA	42.6%	43.9%	47.4%	44.0%	43.8%	43.7%
TAS	0%	50.1%	0%	0%	0%	50.1%
VIC	43.8%	48.3%	48.8%	36.4%	0%	46.2%
WA	41.3%	64.3%	0%	0%	41.4%	52.0%
TOTAL	44.2%	49.6%	48.7%	48.3%	49.0%	47.4%

In the future the DMS program can be used to provide estimates of other data on location of deer within each state, area of land set aside for deer farming, location of breeding stock, etc.

The collection of census data required liaison and consultation with government agencies and other groups. Despite difficulties in collection of data, particularly from within the industry, the data compiled by the project is suggested to be more accurate and up to date than any other collected by or on behalf of industry.

4.1.2.2 Farmer/Species Relationships

Data about farm and species relationships obtained from census respondents is assumed to be representative of the total industry. Data in table 2a and 2b below are provided as an overall industry estimate that combines actual (respondent) data and extrapolated estimates for the remainder of the industry.

Table 2a - Number of farms with only one species

Species	NSW	QLD	SA	TAS	VIC	WA	TOTAL
Red & Hybrid	78	38	36	-	179	50	382
Fallow	57	7	53	69	108	12	306
Elk	1	-	2	-	2	-	5
Rusa	5	24	-	-	-	-	29
Chital	4	-	-	-	-	-	4
TOTAL	145	69	91	69	289	62	726

Table 2b - Number of farms with more than one species

	NSW	QLD	SA	TAS	VIC	WA	TOTAL
TOTAL	52	55	29	0	64	12	212

4.1.2.3 Average Weight of Slaughtered stock

Data provided by census respondents allows the calculation of average live weight of animals, by age, that were sold for processing. Table 3 below shows the average live weight of animals sent for processing as provided by census respondents. Insufficient data on pure Elk/Wapiti processing was available from census responses for inclusion in the table.

Table 3- Average liveweight of slaughter stock from census responses.

Age sold	Red		Hybrid		Fallow		Rusa		Chital	
	M	F	M	F	M	F	M	F	M	F
0-1	99.5	72.4	97.9	81.7	44.7	37.0	70.0			
1-2	111.1	81.9	124.9	105.7	54.8	44.6	78.8	66.5	44.0	
>2	142.6	88.5	161.4	121.0	57.7	44.3	87.0	77.0	65.0	41.0

(M = male; F = female)

4.1.2.4 Average velvet production

Velvet production information provided by census respondents has been averaged according to age groups within breeds. Summary data is provided in Table 4 below. Data for Rusa and Chital deer has not been included because insufficient information was available.

Table 4 - Average annual velvet production of deer from census responses.

Age Group	Velvet Production (Kg)			
	Red	Hybrid	Elk	Fallow
0-1	0.51	0.37	1.47	0.12
1-2	1.04	1.23	1.38	0.26
2-3	1.38	1.72	1.71	0.45
3-4	2.16	2.82	4.10	0.44
4-5	2.58	3.56	4.81	0.54
5-6	2.10	4.30	5.53	0.47
6-7	2.44	4.65	7.00	0.65
7-8	2.10	4.23	5.70	1.00
8-9	3.41	4.10	6.00	0.75
9-10	2.30	4.50		0.75
11-12	2.79			
12-13	2.20	5.50		
13-14				
Average	1.57	2.18	3.46	0.45

4.1.2.5 Average weaning rates

The number of respondents that provided average weaning rate data to the census was small and the data provided was not always complete. Therefore any assessment of the average weaning rate data compiled by the census reports must be interpreted with great caution. Average weaning rate data derived from census respondents is provided in Table 5 and separated into averages for first time breeder's (maidens) and mature breeders.

Table 5 - Average weaning rates from census responses.

State	Red		Hybrid		Fallow		Rusa		Chital		Elk/Wapiti	
	Maiden	Mature	Maiden	Mature	Maiden	Mature	Maiden	Mature	Maiden	Mature	Maiden	Mature
NSW	72.3%	85.9%	72.8%	84.7%	74.1%	84.5%	91.3%	87.2%	71.7%	77.0%		50.0%
QLD	67.3%	83.3%			76.7%	86.3%	83.4%	85.0%		75.0%		
SA	79.3%	87.6%		84.5%	73.5%	83.6%	75.0%	100%		20.0%	62.0%	60.5%
TAS					77.5%	89.4%						
VIC	77.5%	90.7%	71.1%	85.6%	75.4%	83.7%					65.0%	74.6%
WA	76.3%	88.5%			79.2%	90.0%						
Ave	75.0%	88.0%	71.6%	85.3%	75.4%	89.4%	85.2%	86.6%	71.7%	68.3%	64.4%	68.0%

The average weaning rates, across all breed types from census responses for maiden females is 75.2% and for mature females is 85.4%. However venison processors suggest that the average number of deer processed annually in Australia is about 20,000 to 25,000 animals. If the average industry weaning rates are as high as data from the census suggests, either the national deer herd should be expanding at least 12 to 15% per annum or the number of stock processed annually by the industry should be greater than currently estimated or recorded.

It is my opinion that average industry weaning rates for maiden females and mature females is closer to 65% and 75% respectively.

4.1.3 Data Collection

The co-ordination and ongoing input into data collection and dissemination to industry has been a major priority of the project. In particular regular reports are provided to the RIRDC newsletter and to the Australian Deer Farmer Magazine.

The Deer Industry Development Manager attended meetings of all state branches and presented data on the progress of the project generally and of specific information on aspects of data collection.

Summary data has been presented at the 1998 National DIAA Annual General Meeting for discussion and dissemination more broadly to industry.

4.1.4 Industry Display Kit

The program has produced a promotional display kit for use by industry at its field days, seminars and conferences.

The kit is portable and comprises a collapsible frame with detachable display boards. The display of 12 removable posters which adhere to the display boards provide a high quality text, picture and geographic summary of the industry in Australia.

The display can be updated, amended or added to as necessary in the future or for particular purposes.

4.1.5 Promotional literature

Venison promotional material produced by the Venison Market Development Program has become increasingly unavailable since the program finished. Some of the information contained in the original brochures was outdated so it was considered inappropriate to simply reproduce them.

Further, most of the original art work used in the development of the brochures, could not be located even after considerable time was invested in attempting to trace the original work (printing had been undertaken at various locations, domestically and internationally and the person responsible for the production had passed away).

In co-operation with the Australian Venison Processors Association, the most appropriate brochures were selected for editing and reprinting. Original documents were scanned, edited and reprinted. They will be made available to individual processors on an 'at cost' basis.

Other promotional brochures produced included one related to Quality Assurance, one related to velvet antler and one that provides general industry information.

Computer files used to produce these brochures are now stored on duplicate computer compact discs so will be always available for future reference.

4.1.6 International Conferences

The 2nd World Deer Farming Congress was held in Limerick, Ireland from 24 to 28 June, 1998. While some technical issues were addressed, most of the conference papers were related to issues of product pricing, marketing, marketing access and welfare.

The 4th World Deer Biology Congress was held in Kaposvar, Hungary from 30 June to 4 July, 1998. This well-planned congress addressed technical issues of deer production including nutrition, reproduction, management, processing, velvet production and deer welfare among others. Some conference papers addressed aspects of management of feral populations and their influence on local environments.

Conference reports submitted to, and printed by RIRDC provide a summary of all conference papers and an executive summary highlighting the major issues of each conference.

A major outcome of the Irish conference was an agreement to establish an International Deer Secretariat and an international public Internet site for the free exchange of technical information on Deer.

There were many interesting papers in the Hungary conference and an interesting survey of recent improvements in deer nutrition were a highlight. The increasing need to consider deer welfare as part of industry Quality Assurance programs was highlighted toward the end of the congress.

Two general summary implications can be drawn from the two congresses. They are that (i) the Australian deer industry needs to identify and develop small niche markets for its venison products that minimise direct competition with New Zealand; and (ii) Quality Assurance programs that include animal welfare standards should be adopted across the industry to improve market access and the long term profitability of all sectors of the industry.

4.2 Objective 2 - To establish a comprehensive industry data base

The project has developed a comprehensive data base of industry contacts. The easily updateable data base maintains contact lists for industry groups and specialists including:

Abattoirs	Bureau of Statistics
Agricultural Departments	Consultants
Australian Deer Farming Magazine	DIAA National Council
Australian Deer Horn and Co Products	DIAA affiliated organisations
Australian Fallow Deer Network	DIAA Branches
Australian Warham and Woburn Society	Deer Industry Company
AQIS	Researchers
Australian Customs	Service providers
Boning Rooms	Various government departments

4.3 Objective 3 - Establishment of an information transfer centre

The office of the Deer Industry Company is now established as a first point of contact for people seeking technical information on the Australian deer industry.

As the DIC office is jointly the office for the Deer Industry Quality Assurance Board, it also maintains information related to the QA program and is the first contact for industry people who wish to become involved in the program.

4.3.1 Industry contacts

The office has established a data base of industry contacts (see 4.2 above) and has purchased commercially available software and developed a research reference data base. The data base, when complete will contain a reference list of all research related to deer that has been undertaken in Australia. It is likely the data base will be expanded to include Bibliographical details of other research undertaken in other parts of the world.

4.3.2 Research Reference Data Base

The project has successfully negotiated, on behalf of the DIC and DIAA, to access a similar data base compiled by Dr Geoff Asher in New Zealand. The New Zealand data base is a compilation of all deer research undertaken at Invermay in New Zealand. It has been provided at no cost following DIC and DIAA written assurances that data will not be used for any commercial gain and that appropriate copy right laws are respected when using the data.

Information compiled by the DIC company is regularly reported in industry publications and is provided directly to DIAA branches.

4.3.3 Venison production, carcase weight and value

In January and February 1998 the Deer Industry Development Manager successfully negotiated the co-operation of the majority of venison processors/marketers in Australia to regularly contribute data on price and weight of animals processed on a monthly basis. Each processor was asked to provide: (i) basis, details of the volume of venison processed by species and within weight ranges; (ii) a Hot Carcase Weight (HCW) price for each category, net of the industry levy and delivered to the abattoir.

Although not all processors agreed to provide data for the data base, we are confident that the greatest majority of venison processed in Australia is accounted for.

Co-operators provided data on the basis that their individual data was kept confidential and all information was released to the industry as combined average data only.

Some processors withdrew their co-operation during the year generally citing that the extra workload for little or no apparent benefit as their main reason. Their withdrawal was disappointing as only now, after we have a full seasons data, is it of significant industry, processor and producer benefit - if they choose to use it.

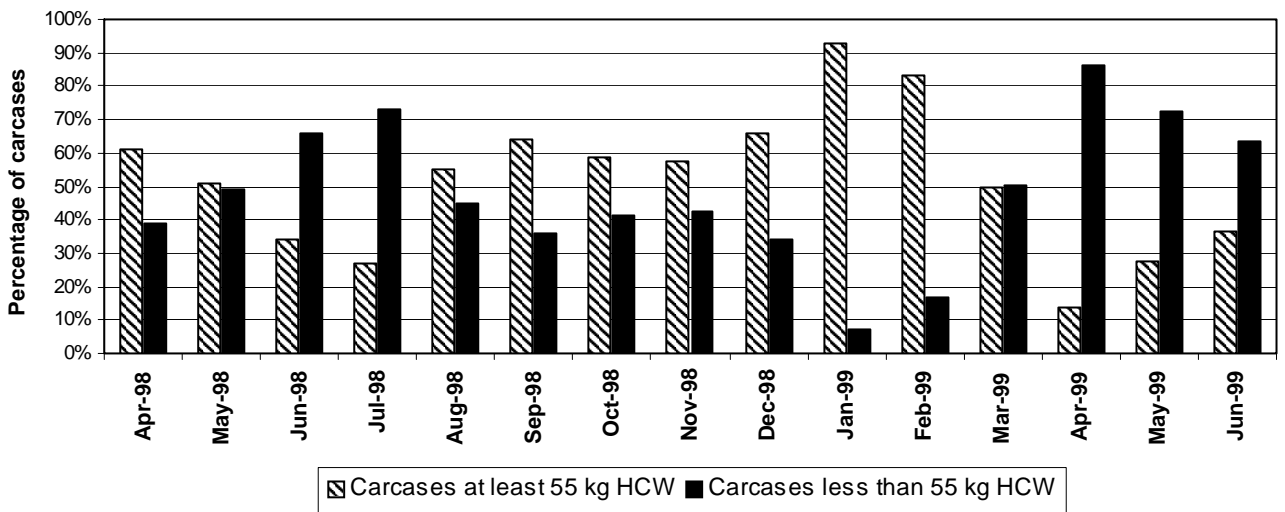
Although collection of the data is time consuming and to some extent inefficient, we are hopeful that the processors will continue to provide this invaluable data.

Data collected has been routinely reported in the RIRDC newsletter and in the Australian Deer Farming Magazine.

Data collected shows some predictable trends, particularly with respect to liveweight. However the percentage of processed stock that have a HCW that is less than a weight that could be regarded as 'ideal' is cause for concern.

Table 6 (see Appendix) and graph 1 show the percentage of red and red hybrid deer carcasses that are greater than 55kg and those that are less than 55kg. Table 7 (see appendix) and graph 2 show the percentage of fallow deer carcasses that are less than 23kg, from 23 to 26kg and greater than 26kg. Data for other species is not provided as insufficient data is available.

Graph 1. Percentage of Red deer (including hybrids) carcasses in weight ranges



Graph 2. Percentage of Fallow deer carcasses in weight ranges

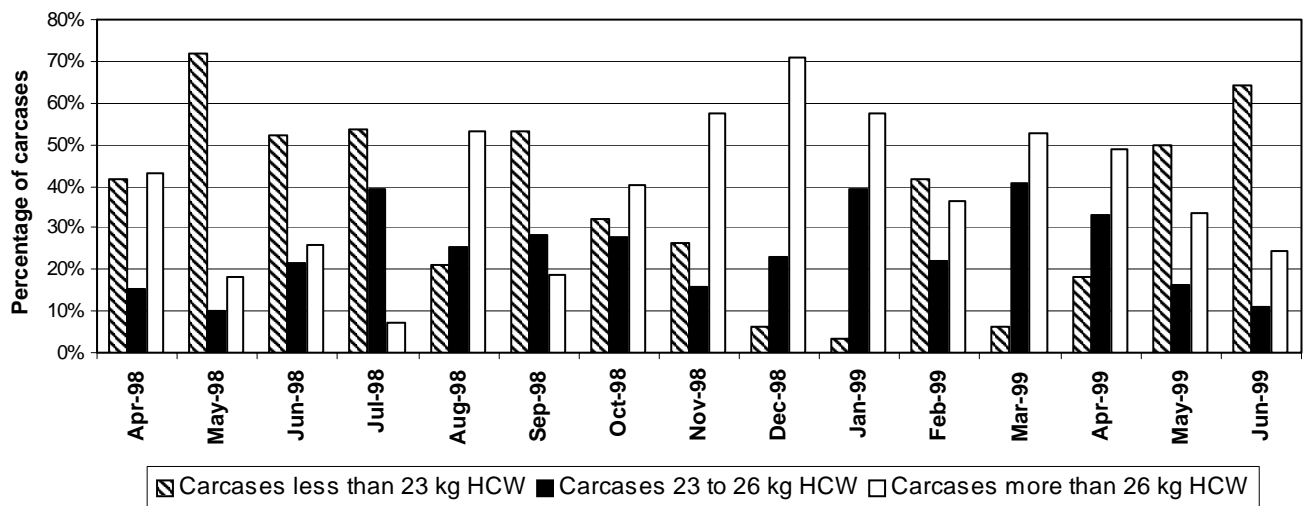
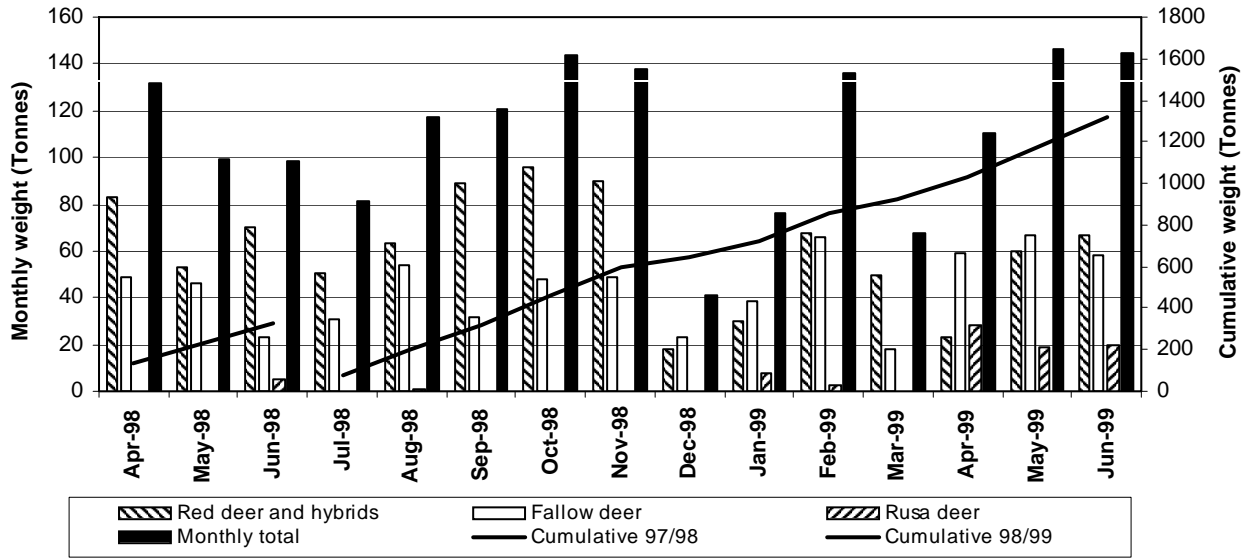


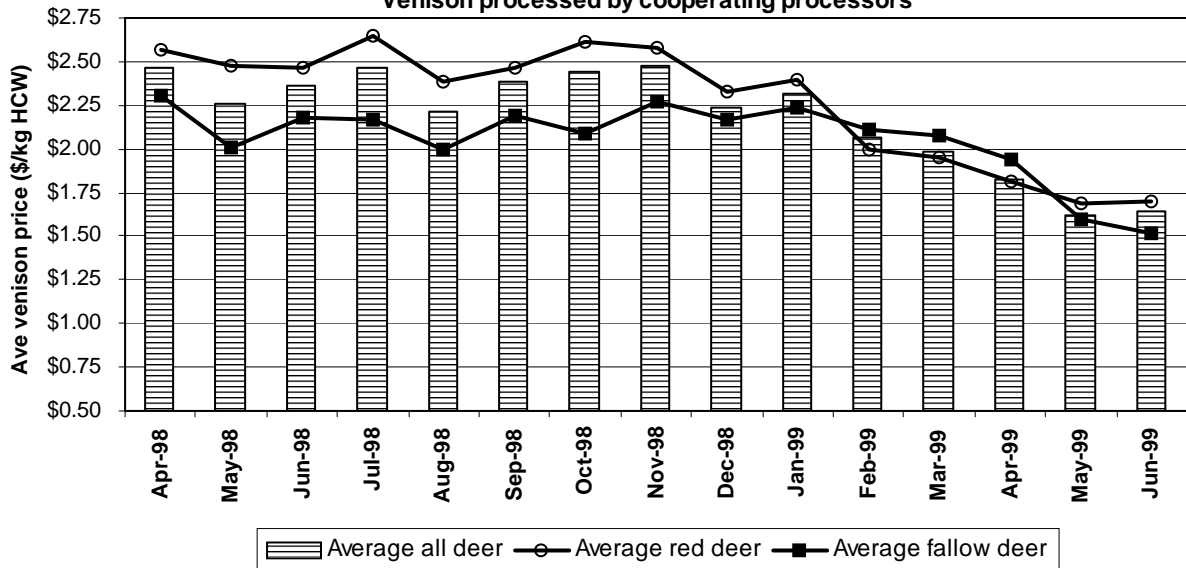
Table 8 (see Appendix) and graph 3 show the volume of venison processed by co-operating processors. As previously indicated not all Australian processors contribute to the data, but summary data supports our view that the data collected represents the greatest percentage of product processed in Australia.

Graph 3. Volume of venison processed by cooperating processors



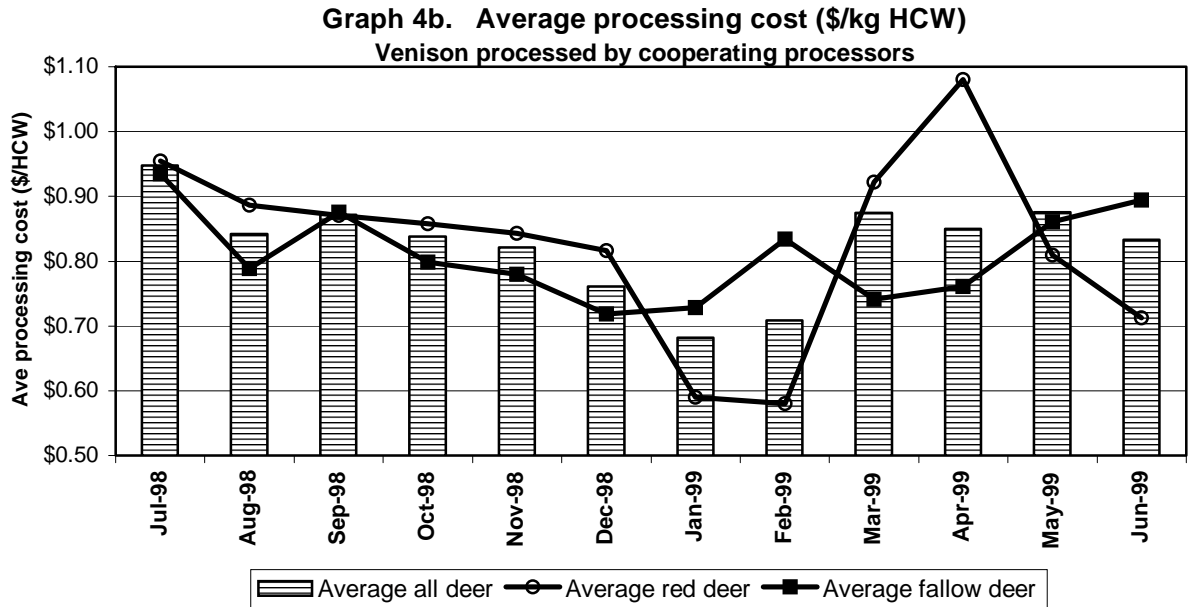
The total volume of venison processed by cooperating processors during the year July 1998 to June 1999 was 1,323 tonnes. Table 9 (see Appendix) and graph 4a show the average venison price (HCW less the industry levy, delivered to the abattoir) for all carcasses for each species. **These data do not include processing and transport cost deductions.**

**Graph 4a. Average venison price (HCW less industry levy)
Venison processed by cooperating processors**



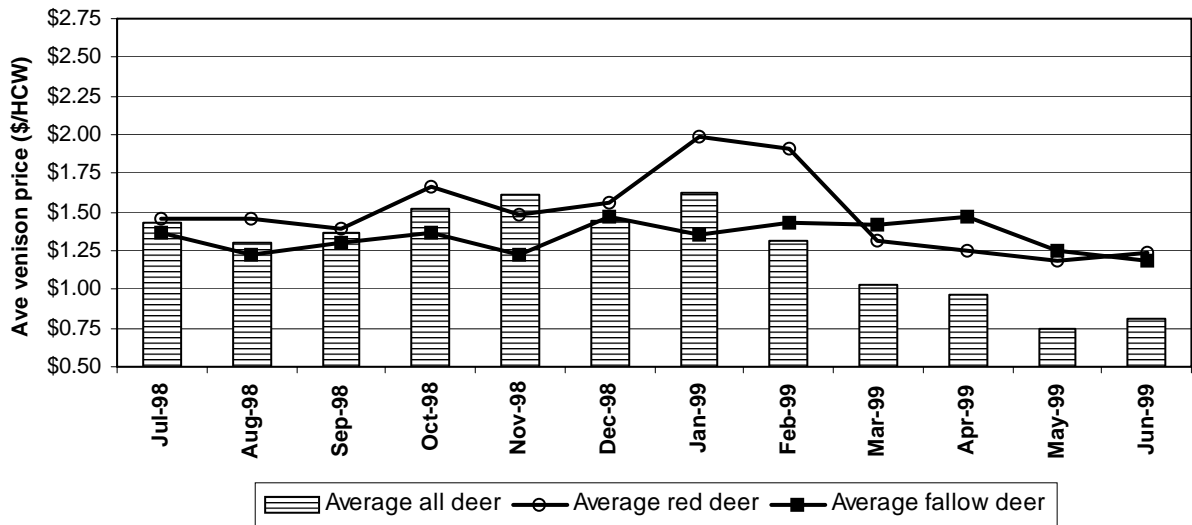
An average estimate of processing cost for fallow deer is \$20 per head, for red and red hybrid deer \$50 per head and for rusa deer \$40 per head.

Graph 4b shows how the average processing cost (\$/kg HCW) varies between months for each species. This monthly variation is directly related to the monthly average HCW for each species varies (see graph 6 and table 11). **Note: These 'average' processing costs take no account of boning and packaging costs.**



Graph 4c uses the same data used to create graph 4a and table 9 (see appendix) but it reduces the value of the venison by the cost of its processing (see graph 4b). **Note there are still no deductions for transport made in these price averages.**

Graph 4c. Ave venison price (\$/kg HCW less industry levy and ave processing cost)
Venison processed by cooperating processors

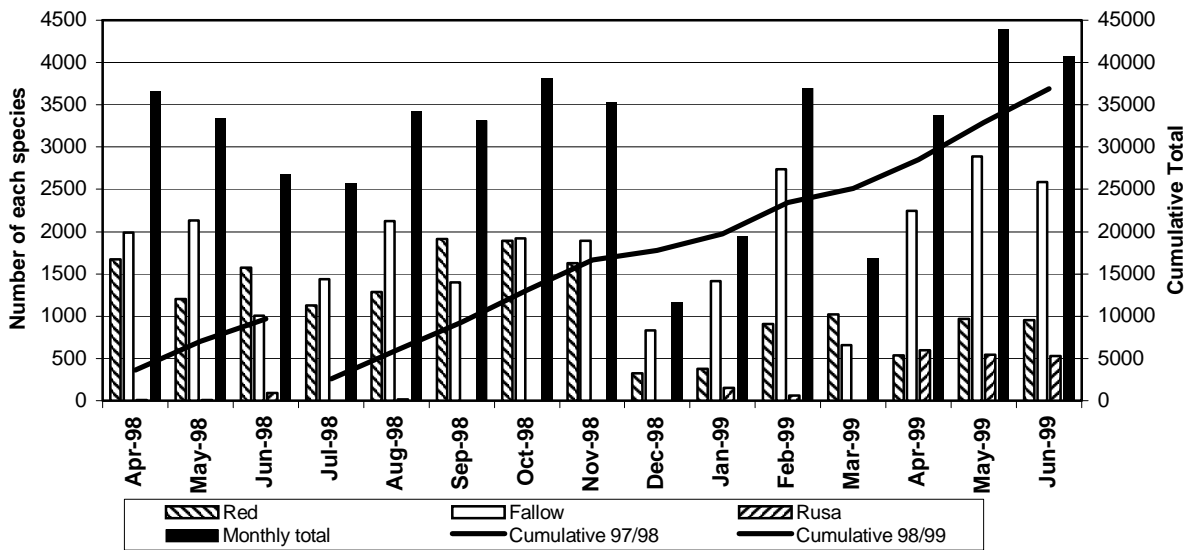


The actual number of animals processed has not been recorded by this project (processors were only asked to provide the total HCW, by species within weight ranges and not the number of stock processed) so an estimate the number of animals that have been processed has been made.

The project recorded the total HCW (Hot Carcase Weight) of each species within defined weight ranges. An assumption that the average HCW for each weight range is a HCW equal to the mid point of the range (range of 40 to 44.9kg has a mid value of 42.45kg) was made. On this basis, an estimate was made of the number of animals processed to produce the known volume of HCW. The number of stock processed was estimated for each weight range by month.

Graph 5 and Table 10 (see Appendix) show the estimated number of red (including hybrids), fallow and rusa deer processed.

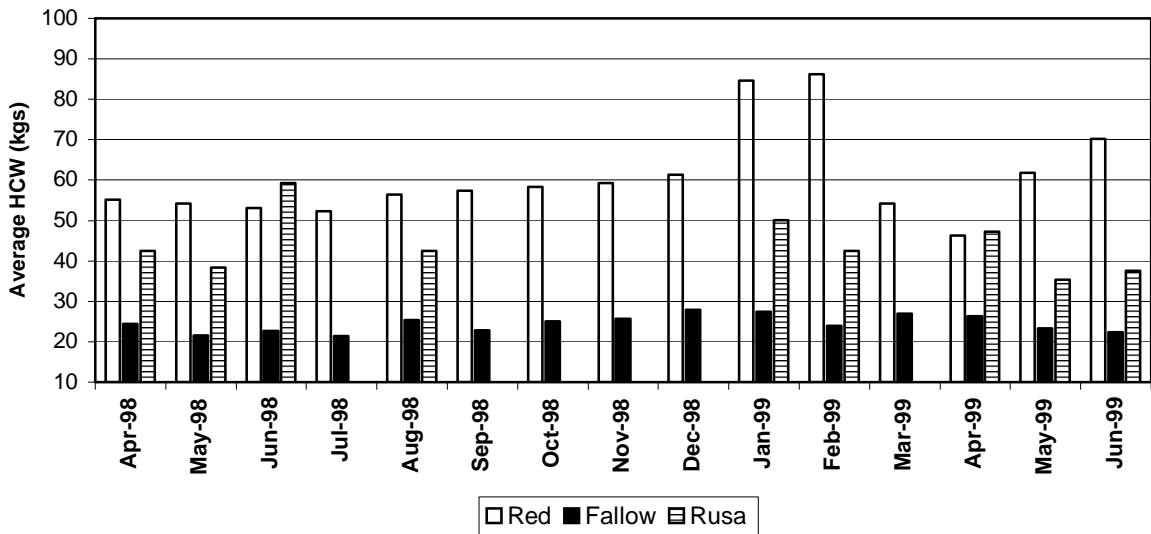
Graph 5. Estimated number of deer processed by cooperators



The total number of deer processed by cooperating processors during the year July 1998 to June 1999 was 36,647 animals. Hot Carcase Weight data collected and recorded as described above also allows the calculation of average Hot Carcase Weight, by month for both Red and Fallow deer.

Graph 6 and Table 11 (see Appendix) shows an estimated average hot carcase weight for both red (including hybrids) and fallow deer.

Graph 6. Estimated average HCW of deer processed by cooperators



The average hot carcass weight (for the period shown on the graph) is 24.2kg for fallow, 57.1kg for red (including hybrid) and 42kg for rusa deer.

4.4 Objective 4 - Quality Assurance (QA)

Background

The Deer Industry QA program comprises the Deer Farming Best Practice Program, The Deer Transport Best Practice Program and the Venison Markets and Processors Specification Manual. Deer Industry Best Practice Program Manuals were developed from the Cattle Council of Australia's Cattle Care manual and the New Zealand Deer Quality Assurance Program.

Development of the program was undertaken by a private consultant (Mr Trevor Rankin) with funding assistance from the Department of Industry, Science and Tourism. The Deer Industry Association of Australia acknowledges the Cattle Councils contribution in developing its program.

The overall aim of the program is to provide industry clients with an assurance of the quality of products marketed by the Australian deer industry by encouraging all facets of the production chain to meet minimum quality standards.

Complimentary copies of manuals were provided to each branch of the DIAA, state Department's of Agriculture and various contributors.

Manual's continue to be amended and updated as new knowledge and improved technologies are available. For example a new Deer Transport Declaration has been developed for inclusion in the manual. The new declaration aims to ensure AQIS transport requirements related to EU markets are met.

Training

Facilitators from each state were trained at a specially convened meeting in Adelaide at the end of September 1997. After finalisation of amendments to the manuals, the program was released to industry in February 1998.

The Deer QA Board

The Deer Industry Company (DIC) is responsible for the management of the Deer Industry Quality Assurance Program. DIC established a Deer Quality Assurance Board to oversee operations of the program and to report to the Deer Industry Company. All matters related to Deer Industry Quality assurance are referred to the Board.

Facilitator Assessment

To ensure transparency of the program, level two accreditation assessment of facilitator properties is undertaken by the Deer Industry Development Manager in co-operation with other facilitators. Facilitators properties cannot be assessed by other facilitators.

The industry currently boasts twelve QA facilitators that have achieved various levels of training and a further 3 to 5 people have expressed interest in undertaking the training.

The real Industry Participation implementation of the program began in May/June 1998 and to date, 88 of 1200 known deer farmers (7.5%) have purchased manuals. Fifteen of the applicants have received level three (self assessment) accreditation and six of those people have progressed to level two (external assessment) accreditation. There are thirteen transporters who have purchased registered manuals.

It is expected that industry acceptance of the program will continually increase. That expectation is suggested by the industry's continued adoption of the velvet accreditation scheme. The scheme was introduced in 1993 and to date more than 25% of farms are accredited.

Costs

Deer Farming and Deer Transport best practice manuals cost \$100.00. To encourage participation with the program manuals were discounted to \$50.00 until December 1998 for farming manuals and until June 1999 for transporter manuals.

Property inspection fees are set at \$200.00 and fees are paid directly to the Board. The Board reimburses \$150 of this fee to facilitators.

Mileage costs are set at a maximum of \$0.50¢ per kilometre and are negotiated directly between each facilitator and their client.

Emphasis

To date the major emphasis has been on farmers and encouragement for them to participate in the program. While emphasis on this aspect will continue, an important and immediate need is to increase encouragement of deer transporters to adopt the program. Only one deer transporter has achieved level 3 accreditation and none have achieved level two.

Farmers are encouraged to where possible use only accredited deer transporters or at least accredited cattle transporters.

Reporting

A new regular feature of the Australian Deer Farming magazine is a section on Quality Assurance. Included with this section is a regularly updated list of accredited properties and transporters.

QA Mark

As part of the program and an obvious extension to it, the Deer Industry has developed a QA mark that will be used to identify farms, transporters, processors, product etc that meets requirements of the program.

The process used to select the mark included selection of six (6) alternative draft options by the committee of the Deer Industry Company. The selected drafts were presented to the 1998 National Industry AGM for comment. The AGM selected a preferred design which was enhanced according to directions. A final design was

selected by the Deer Industry Company committee in connection with the DIAA executive.

The process of registration of the marks on behalf of the DIAA has been initiated.

Workshops/Training

Several training workshops with individual branches have been undertaken to provide DIAA members with the opportunity to discuss QA and to better understand the need for the industry to embrace the program.

The training discussed, in detail, requirements of the program and the objectives of those who chose to consider accreditation.

Brochures

A quality assurance brochure has been produced by the Deer Industry Company. The brochure is based on the QA brochure produced by the Venison Market Development Manager (Lynelle Tume) as part of her project.

The brochure will be used to promote the industry QA program to existing and prospective industry participants and also to promote the industry's QA program to its industrial clients for venison and deer antler.

Specifications

Specifications for use of the QA mark are yet to be developed. It is planned to develop the specifications in a new RIRDC funded project that is planned to begin in July 1999.

5. DISCUSSION OF RESULTS

5.1 Industry Growth Estimates

Analysis of comments provided on census forms and verbal communications, suggest that many industry people thought the industry census form was too complicated. The census was designed to objectively compile a significant volume of previously unavailable data quickly, so it sought a wide range of detailed information from census recipients.

In retrospect, the census sought to collect too much data too quickly and any future industry census should be based on less detailed, less demanding data collection forms.

Some industry people were reluctant to complete census forms because they believed that the data was already available. Which some State governments do (or did) collect some industry statistics, data collected relates to population numbers only. Further, some state data collection had been undertaken immediately prior to the release of industry census forms, so some saw the industry census as a repetitive exercise.

Any future industry census should attempt to minimise these negative influences to encourage industry cooperation.

The poor response to the census means that information available for forward predictions of population trends is less accurate. Members of the industry have difficulty in understanding that because the industry is small, relative to other livestock industries, it is important that all stock are accounted for when estimates of likely future production are developed.

Nevertheless, actual data collected by the census has been combined with estimated data to allow some general estimations of likely herd growth and future availability of animals for processing.

Although there are many factors that can affect population growth, there are two factors that most influence the rate of growth of the Australian deer industry and the availability of animals for processing: (i) average reproductive performance and; (ii) rate that females are consigned for processing (culled).

In the context of this report, average reproductive performance refers to the number of offspring weaned divided by the total number of breeding females that exist in the population. Therefore the average reproductive performance is affected by many things including the percentage of the female population that are joined in any year.

Table 12 (see Appendix) and graph 7 show a predictive estimate of the rate of growth of the Australian industry using statistical data compiled by the project. Estimates assume that all females of breeding age are joined each year, the average weaning rate of mature females of all species is 75%, for 3 year old breeding females is 70% and for first time breeders for all species is 65% (weaning rate is described as the average number of offspring weaned divided by the number of females mated). The estimates assume an average annual female culling rates for yearlings, two year olds, and three year olds for all species of 30%, 15%, 13.5% (fallow) 35%, 50%, 62.5% (red), 30%, 55%, 13.5%(rusa) 30%, 15%, 15.5% (chital) and 0%, 30%, 23.5% (elk/wapiti). These culling rates were used as experience suggests, they are reasonable and because these rates allow a computer model to accurately match predicted number of animals for processing in 1998/99 (from 1997/99 population data) with the actual number processed in 1998/99.

Average weaning percentage data is based on: (i) experience; (ii) information from growers and New Zealand data, and; (iii) population models developed to estimate herd growth. The rates described align predictions of a population growth model with industry data (combination of estimate and actual).

Culling rate data is similarly based, and also determined by activity on actual farms and by the number of female stock slaughtered.

Final population statistics developed from the industry census and other estimates and use as the basis for predicting industry population trends, are provided in tables 13a, 13b, 13c, 13d, 13e and 13f in the Appendix.

Graph 7. Estimated rate of growth of the Australian deer population
(see 5.1 for reproductive and culling rate assumptions)

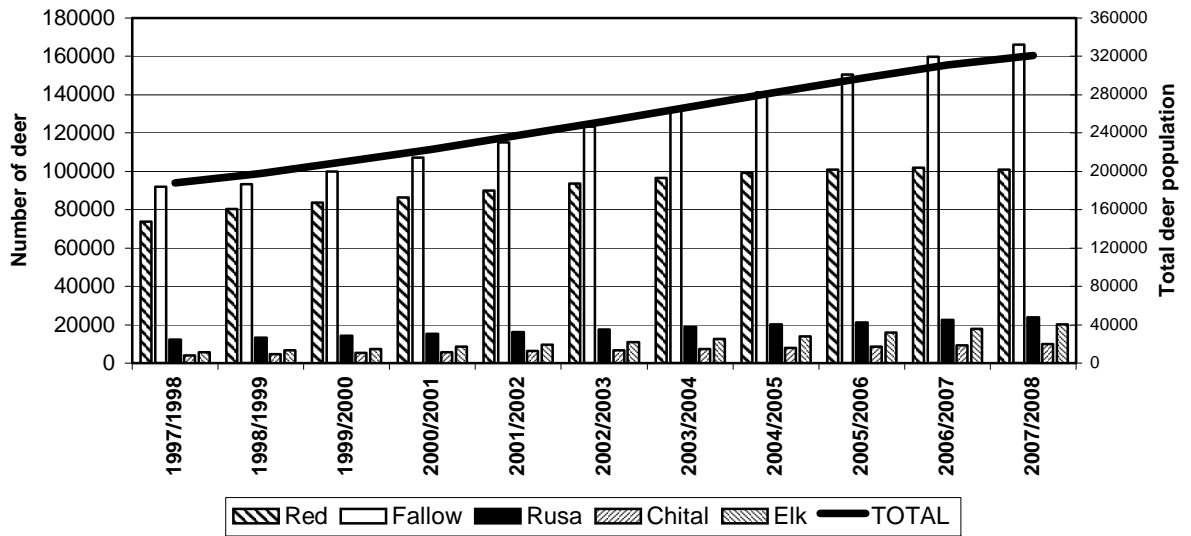
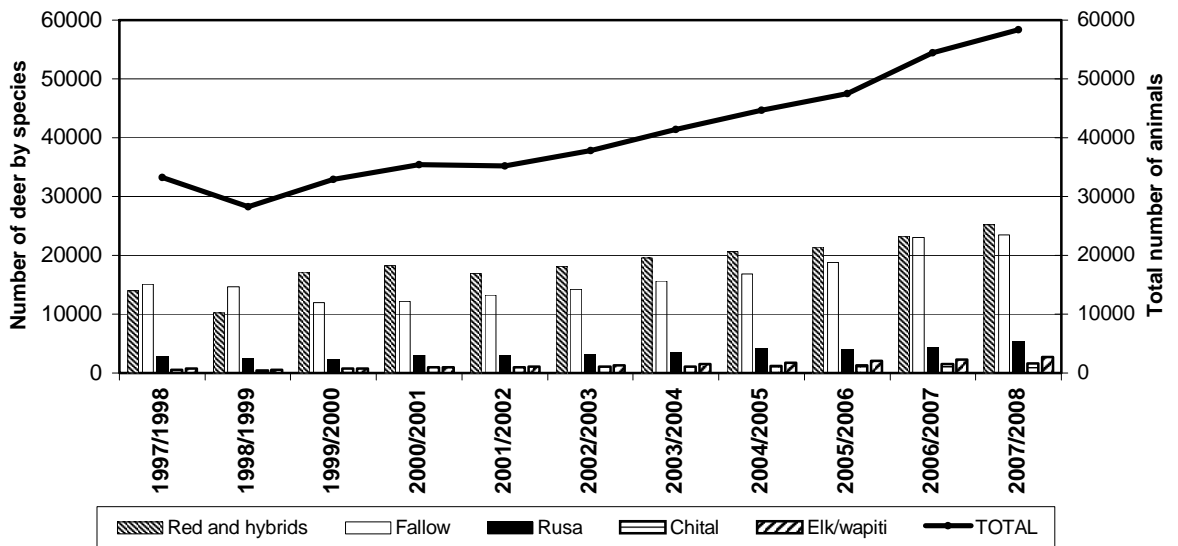


Table 14 (see Appendix) and graph 8 show a predicted estimate of the number of stock that are likely to be available for processing. These estimates are based on the same weaning and culling assumptions used to create Table 12 (see Appendix) and graph 7.

Graph 8. Estimate of the number of deer available for processing
(see 5.1 for reproductive and culling rate assumptions)



5.1.1 Amended industry growth estimates

The industry statistics developed from data compiled by the project show unlikely rates of population growth (about 6.5% per year to 2005) and number of deer available for processing (in excess of 30,000 animals per year and increasing).

Information provided by Australian venison processors suggests that an average of between 20,000 and 25,000 deer are processed annually by the Australian industry. This project reports that about 81,000 breeding female deer exist throughout the industry.

If the estimated number of breeding females and the reproduction rates assumed are relatively accurate, either: (i) the rate of herd growth should be greater than that apparent (between 5% and 10% per year) or; (ii) the number of animals killed each year should be significantly greater (than records indicate) and increasing, or; (iii) the real average reproductive performance of the herd is significantly less than that suggested above.

The structure (age and sex) of the population suggested by combined census and other estimates is impossible to model using any combination of reproductive, culling and death rates. This shows some inaccuracies of data collection and perhaps current herd numbers do not reflect the usual stable industry herd statistics.

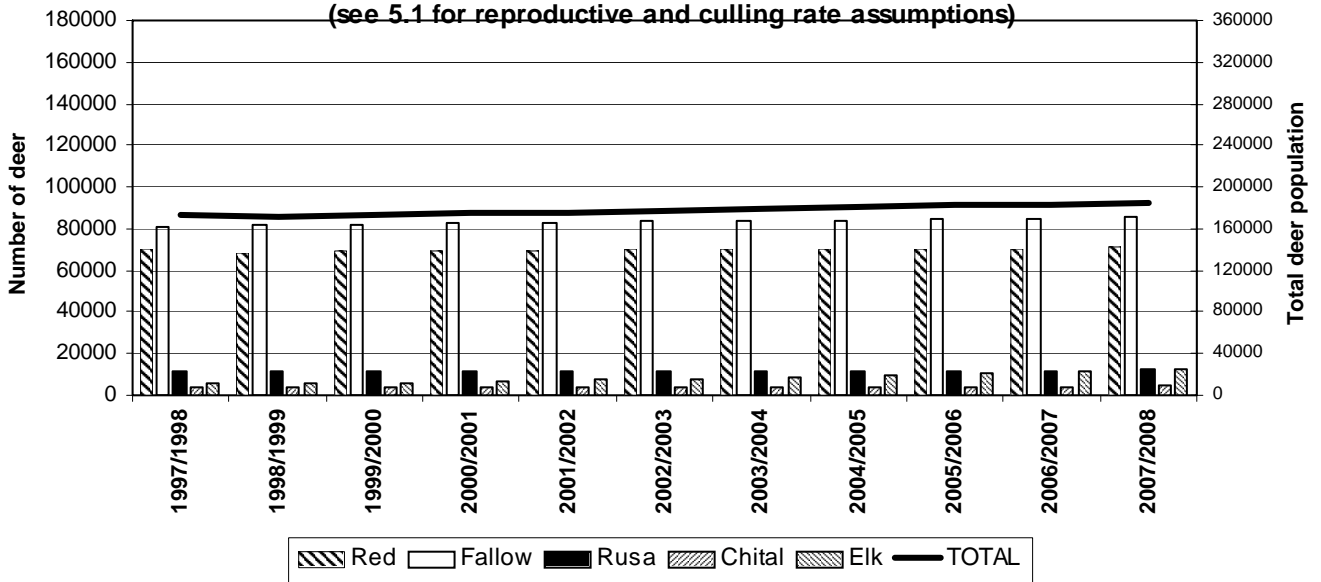
There is much anecdotal information from industry that over recent years many breeding females have not been joined. An amended population model has been developed in an attempt to better reflect the current industry status. The amended model assumes that breeding female numbers are as determined by this project but that only 80% of available breeding are joined each year.

It also assumes that the number of breeding females reported by the census is correct and that average reproductive rates previously used are accurate.

This amended model appears to better represent the current industry statistics particularly with respect to the number of deer processed annually.

Table 15 (see Appendix) and graph 9 show how the industry population may change using this data while table 16 (see Appendix) and graph 10 estimate the number of stock available for processing.

Graph 9. Estimated rate of growth of the Australian deer population - AMENDED MODEL



Graph 10. Estimate of the number of deer available for processing - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)

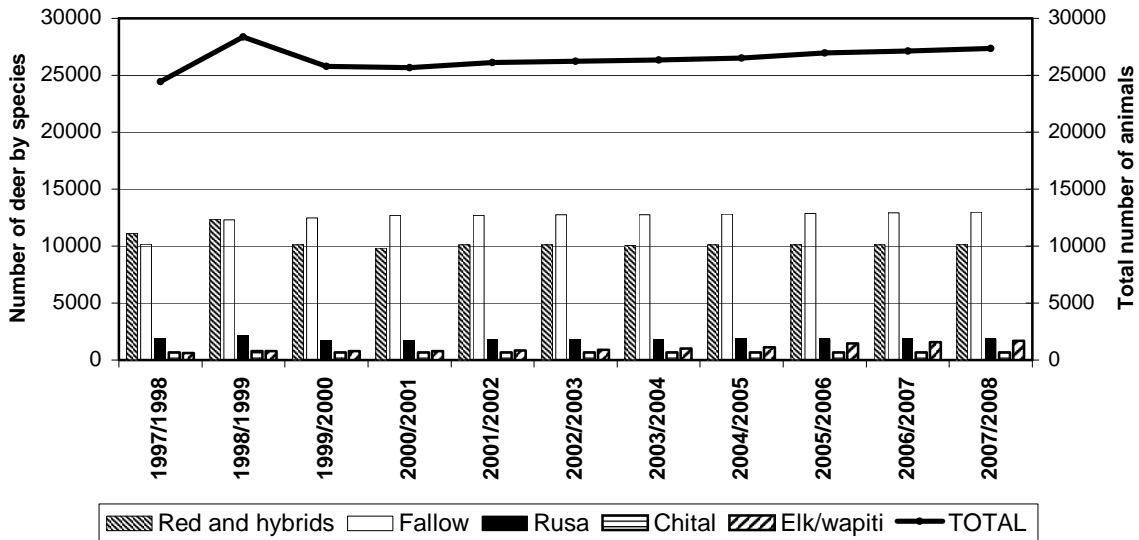


Table 17 (see Appendix) and graph 11 show how changes in average reproduction rate may influence the industry's growth. The 20% variation effectively allows consideration of a situation where all available breeding females are joined.

Graph 11. Effect of reproductive rate on deer population estimates - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)

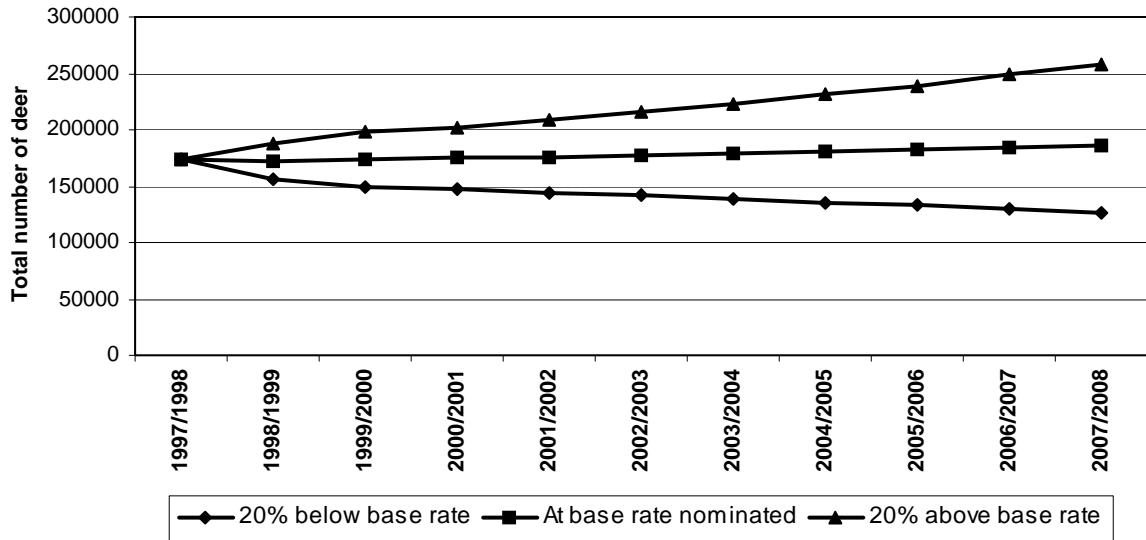
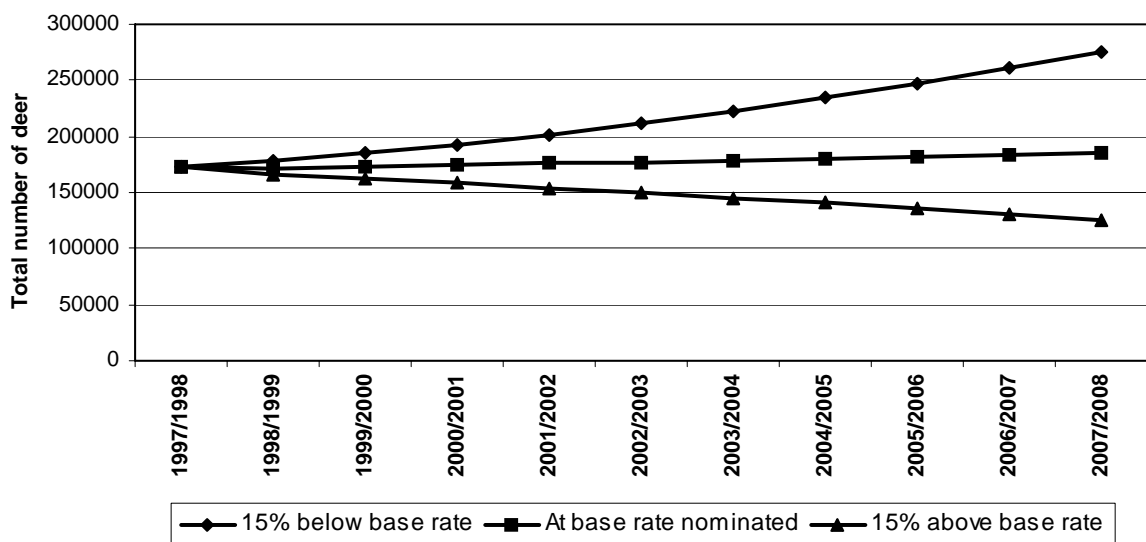


Table 18 (see Appendix) and graph 12 show how the culling rate of 2 year old females can affect the industry's growth.

Graph 12. Effect of culling rate on deer population estimates - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)

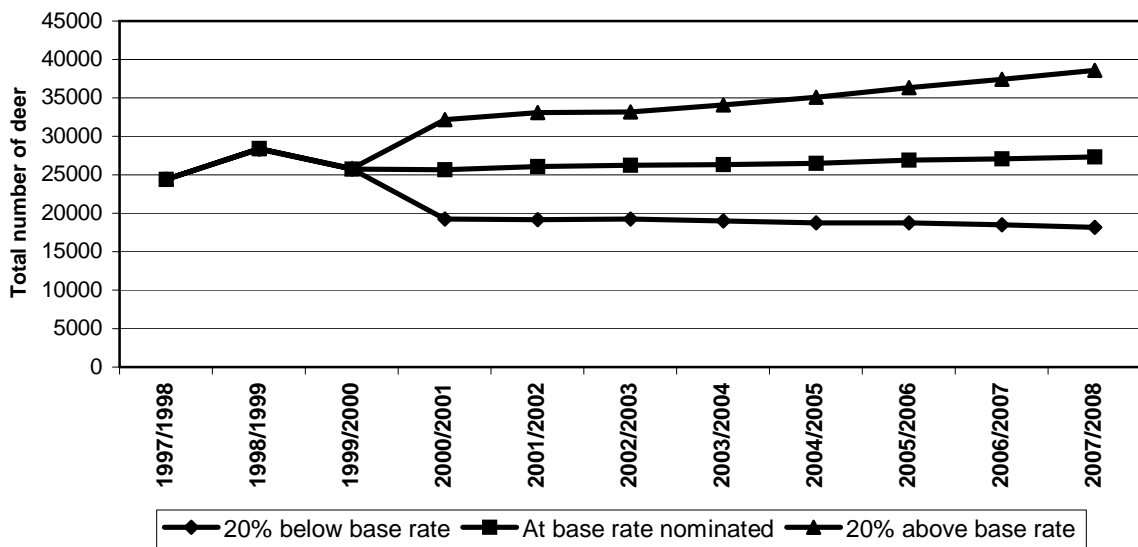


With an acceptance that this new model more closely resembles the current Australian deer industry, the affect of changes in reproduction and culling can be estimated. A 20% increase in average annual reproductive performance

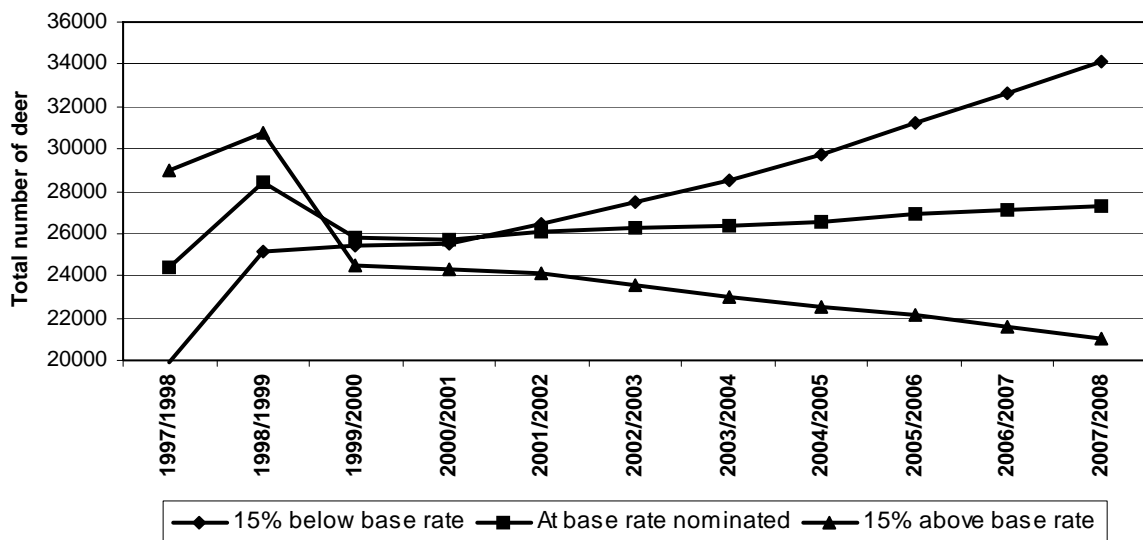
effectively estimates a situation where all breeding females are joined each year.

Tables 19 and 20 (see Appendix) and graphs 13 and 14 respectively, show how the number of stock available for processing may be affected by changes in the reproductive (weaning rate) rate of two year old females and average annual culling rate respectively.

Graph 13. Effect of reproductive rate on deer for processing - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)



Graph 14. Effect of culling rate on deer for processing - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)



Estimates in tables 15 to 16 and graphs 9 to 10 clearly highlight the importance of reproduction performance and culling rate on the ability of the Australian

Deer Industry to grow and expand. Data used as current or base reproductive performance is considered a reasonable estimate of current industry reproductive averages although some producers achieve much better performance in some years. Current industry averages are low and any improvement will significantly improve the industry's expansion. However, as demonstrated by the tables and graphs any decrease in performance will significantly reduce the industry's ability to expand.

Similarly, changes to the rate of culling of young females (1 and 2 years old) from the population are likely to have either major positive or negative effects on industry growth.

Tables 19 and 20 and graphs numbered 13 and 14 show a similar pattern with respect to the estimated number of animals available for processing. Data provided in these tables and graphs are an essential component of market development planning and strongly influence investment in transport, processing and packaging sectors of the industry. The usefulness of the data is directly related to its accuracy. About 50% of the information used to make up this data set are estimates, so tables and graphs should be interpreted with that fact in mind.

5.1.2 Breeder Replacements

A reciprocal of the rate at which young breeding females are culled is the number of young females that need to be introduced into the herd annually to achieve a desired rate of growth.

Table 21 and graph 15 show the effect of reproduction rate on the number of two year old red deer females accepted into the breeding herd.

Graph 15. Effect of reproductive rate on replacement red deer female - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)

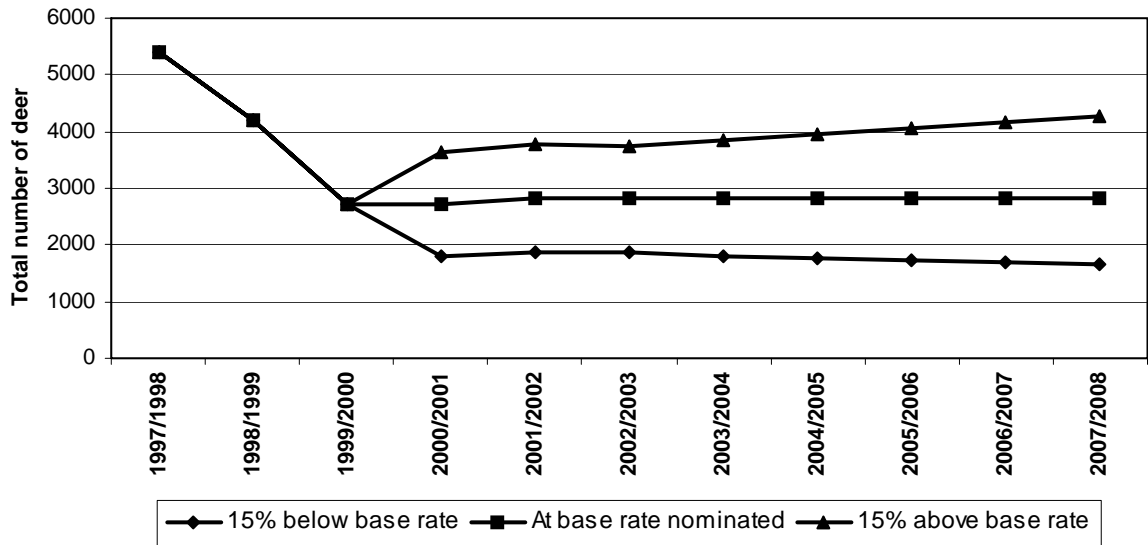
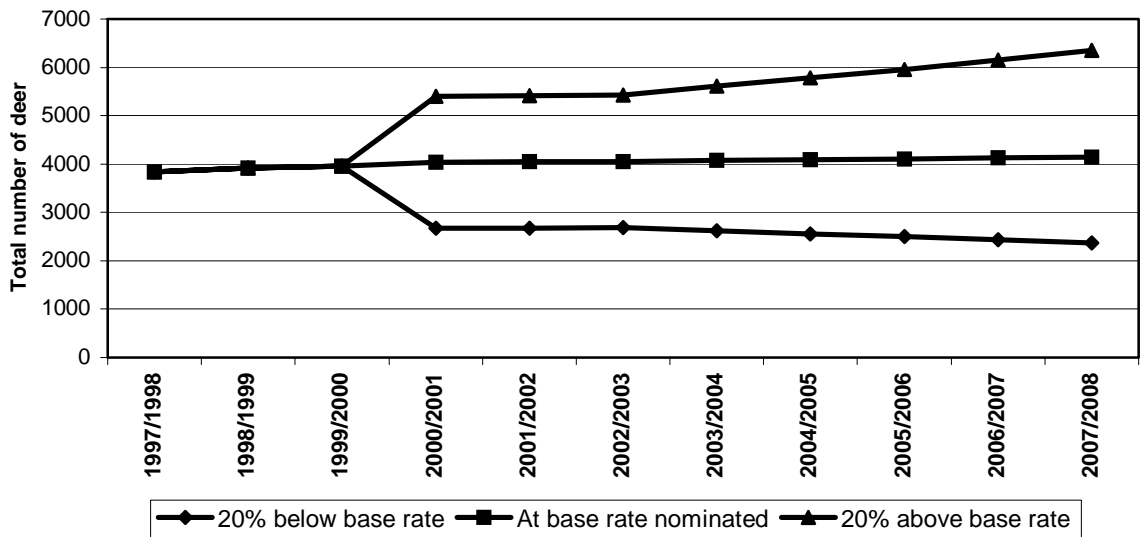


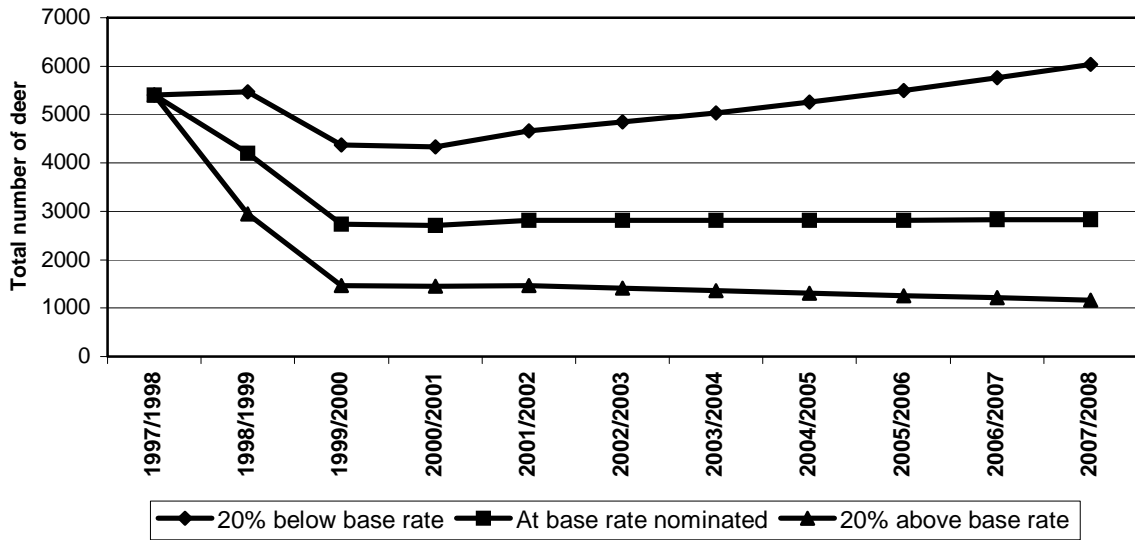
Table 22 and graph 16 show the effect of reproduction rate on the number of two year old fallow deer females accepted into the breeding herd.

Graph 16. Effect of reproductive rate on replacement fallow females - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)

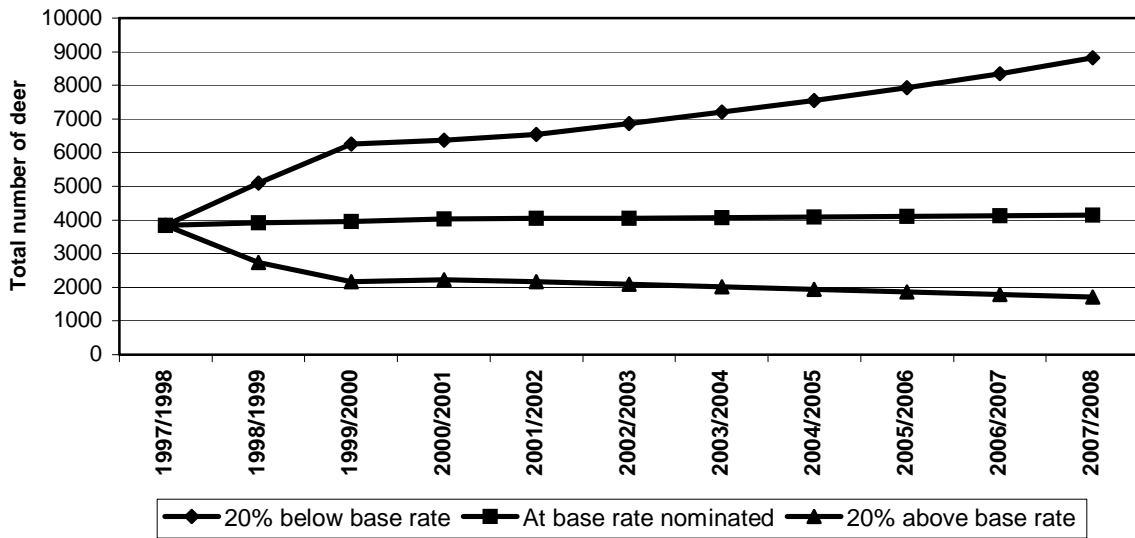


Tables 23 and 24 (see Appendix) and graphs 17 and 18 show how the rate of culling of juvenile females may affect the number available as replacement breeding animals and as a consequence the ability of the herd to expand.

Graph 17. Effect of culling rate on replacement red deer females - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)



Graph 18. Effect of culling rate on replacement fallow females - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)



These data emphasise the influence of reproduction performance and culling rates on likely herd growth. They also provide some guide estimates of the actual matter of female breeders that should be introduced to the national breeding herd annually to achieve a nominated level of populated growth.

Further analysis of the data suggests that to maintain the current rate of growth of the industry (based on assumptions related to average culling and reproductive performance previously described 5.1) a number equivalent to between 25 and 30% of adult breeding females should be introduced into the

female breeding herd each year. Therefore herd growth will require the retention rate above 25 to 30% of 2 year old breeders annually.

5.2 Improvement of Grower Returns

Data collected on venison pricing clearly highlights the difference in farmer returns for under finished stock compared to stock of 'ideal' weight. While seasonal influences in growth rates of deer cannot be ignored and must be taken into account when considering this data, it is all too easy to say that "its seasonal and we can't improve it". Research data from around the world suggests with appropriate feed management and considered use of genetics, the difficulties in maintaining body weight and growth rates during the winter (especially for male stock) can be minimised.

Tables 25 and 26 (see Appendix) and graphs 19a, 19b, 20a and 20b compare the average price paid to growers (\$/head) based on payments for HCW less the industry levy, delivered to the abattoir. The dramatic difference in the prices paid to farmers for stock above and below 'ideal' carcass weights is obvious. When these price differences are considered in conjunction with the percentage of carcasses within weight ranges (see Results Section 4.33) a new perspective on low grower returns is obvious.

The total farm gate HCW value (\$/kg HCW less industry levy but no deductions for processing or transport) of venison produced by cooperating processors from July 1998 to June 1999 was AUD\$2.8 million) average of \$2.12/kg HCW less the levy). If all red deer carcasses less than 55kg were increased to a minimum of 55kg and all fallow deer carcasses less than 23kg increased to 23kg the value of venison produced by the industry would be significantly greater than that indicated above.

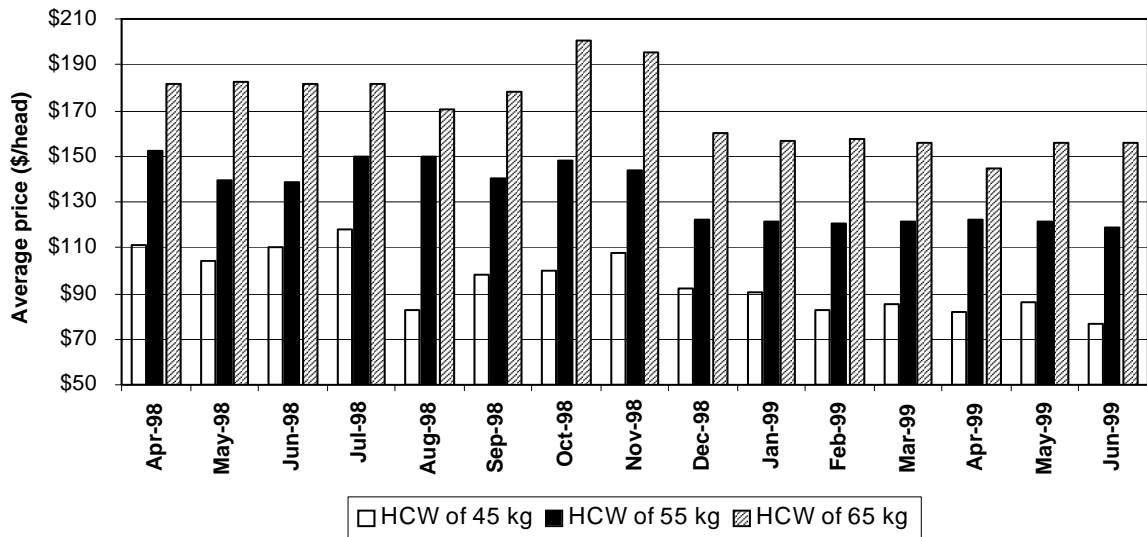
Assume all red deer venison carcasses less than 55kg are to be 55kg and the HCW price for that venison is the same as that for 55kg red deer carcasses. Also assume that all fallow carcasses less than 23kg are 23kg and the price for that venison is the same as that for 23kg fallow venison carcasses.

This improvement in carcass weights will increase the average carcass weight for red and red hybrid deer to 60.2kg/head (4.5kg/head up from actual figures). Similarly the average HCW carcass weight for fallow deer would increase to 26.0kg/head (1.5kg/head above actual figures).

This improvement in carcase weight would increase the total value of venison produced by cooperating processes to AUD\$3.2 million (AUD\$0.4 million above actual data).

Increases in carcase weights described would represent an increase in the average venison price (HCW less industry levy) across all venison processed from \$2.12 to \$2.26 per kg HCW. Obviously larger improvements in average live weight will see increased improvements in returns.

Graph 19a. Average farm gate HCW price (price less industry levy) for red and red hybrid deer



Graph 19b shows the farm gate value (Hot Carcase Value less average processing cost) for deer with different HCW. The average processing cost for red and red deer hybrids is estimated to be \$50 per head.

Graph 19b. Ave fam gate HCW value (price less industry levy and processing cost) for red and red hybrid deer

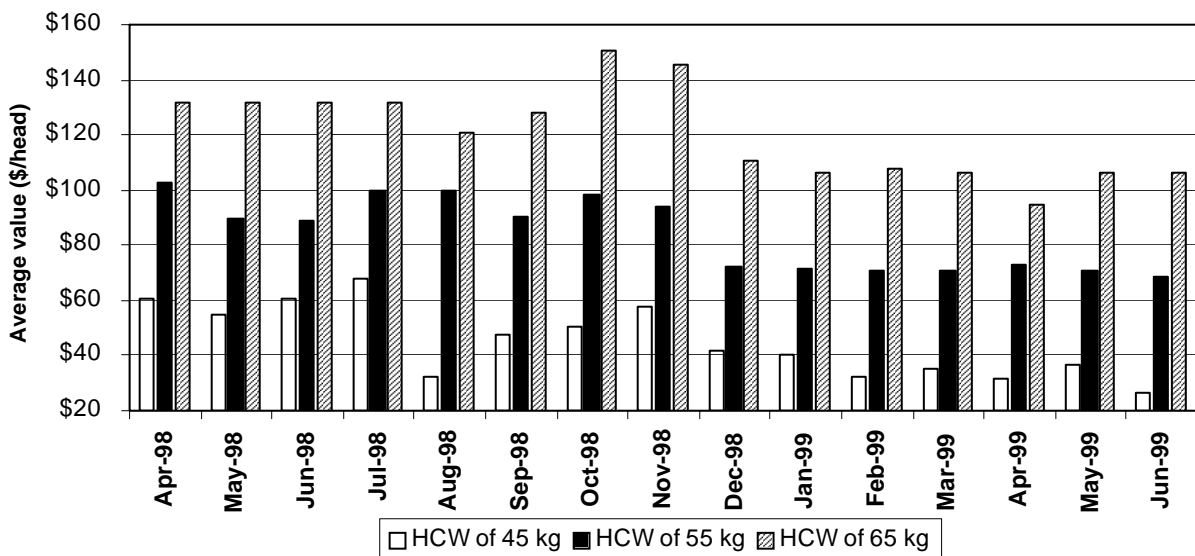
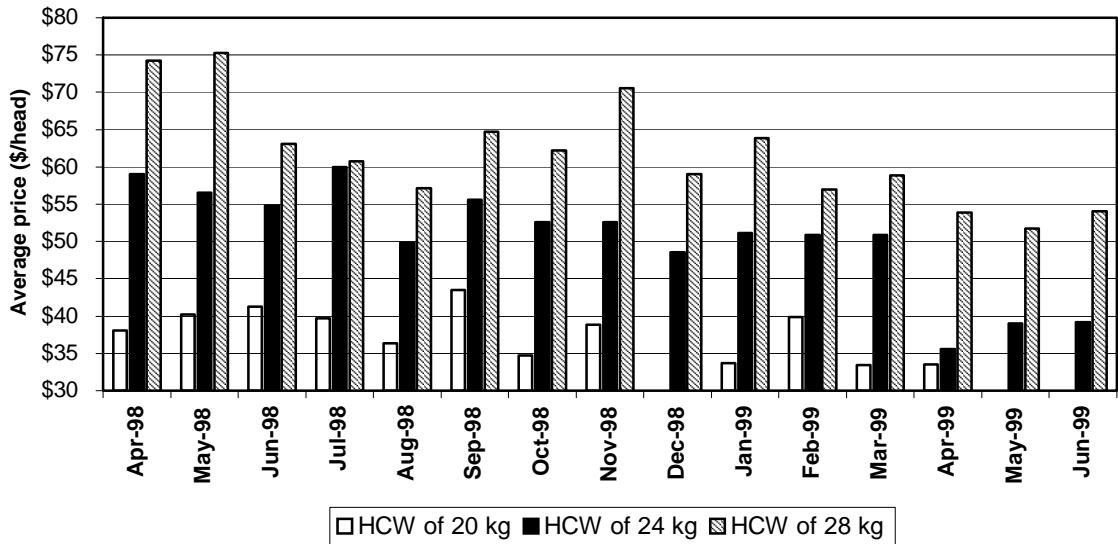


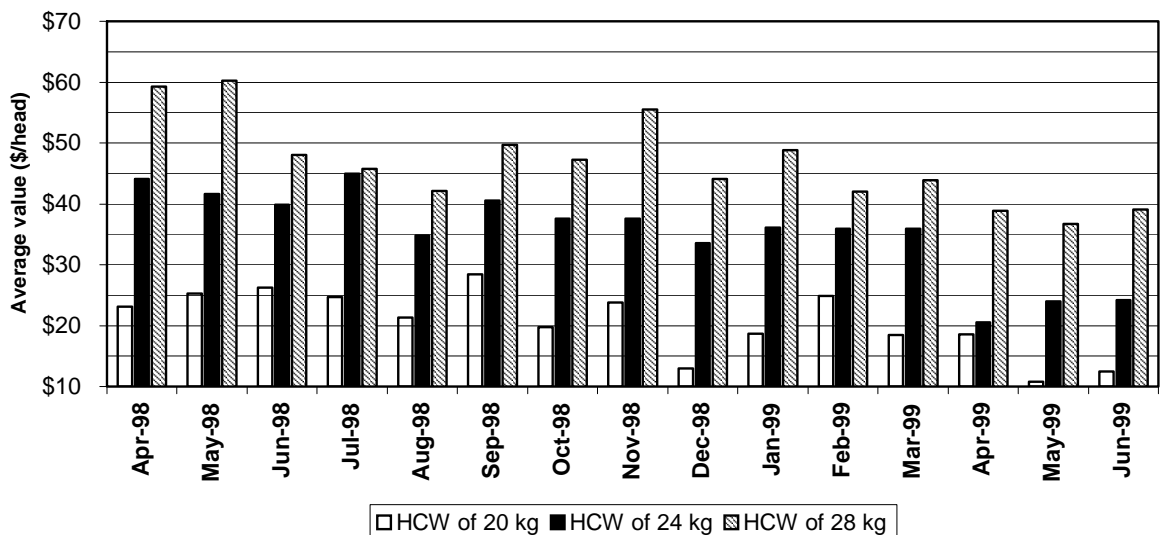
Table 26 (see Appendix) and graph 20 show average per head price for fallow deer at different HCW.

Graph 20a. Average farm gate HCW price (price less industry levy) for fallow deer



Graph 20b shows the farm gate value (Hot Carcase Weight value less average processing cost). The average processing cost for fallow deer is estimated to be \$20 per head.

Graph 20b. Ave farm gate HCW value (price less industry levy and processing cost) for fallow deer



The average processing cost (\$/kg HCW) for 45kg, 55kg and 65kg HCW red deer is \$1.10/kg, \$0.91 and \$0.71 per kg HCW respectively.

For fallow deer of 20kg, 24kg and 28kg HCW the average processing cost is \$0.75, \$0.63 and \$0.54 per kg HCW respectively.

When these average processing costs are considered, the average farm gate returns for the industry during the 1998/99 year are reduced from approximately \$2.8 million to \$1.7 million and the average carcass value for the period drops from \$2.12/kg HCW to \$1.29/kg HCW.

An average cost of processing beef is \$0.33/kg HCW (210kg carcass at \$70/head) and for lamb \$0.325/kg HCW (24.0kg carcass at \$7.80/head). The value of skins and other by products of sheep and cattle are retained by the abattoirs.

The only opportunity that exists to reduce average processing costs for deer appears to be by concentrating throughput in few abattoirs.. The opportunity to increase average returns by decreasing average processing costs while increasing average carcass weight of animals processed are clearly demonstrated in graphs 19a, 19b, 20a and 20b.

Although this data does not present a complete picture (there are many other marketing and market influences that affect returns) this apparent poor quality of production significantly affects grower returns. When considering average HCW data, animal sex must also be considered especially for fallow deer, as females are significantly smaller than males of the same age.

5.3 Quality Assurance (QA)

The industry QA program is under continuous review as new information and technologies become available.

Although many in the industry are sceptical about its benefit, because it is difficult to demonstrate immediate financial benefit from 'yet another expense', more than 7.5% of deer farmers have taken up some commitment to the program in approximately 10 months.

We are hopeful that the slow but ongoing increase in the number of registered manual holders will continue.

New QA facilitators continue to be trained and as the network of available facilitators provides opportunities for growers to become accredited more cheaply (reduced travel costs associated with accreditation) more growers are likely to favourably consider accreditation.

5.4 Processor/Market Influence on Industry Growth

It is not unreasonable to say that there are too many people and groups competing for the limited venison production of the Australian Deer Industry. Over recent years the number of animals purchased is estimated to have ranged from 18,000 to 32,000 and averaged about 20,000 annually. Average annual venison production is approximately 1,000 tonnes.

Many of those involved in 'marketing' Australian venison could better be described as 'spot sellers' as very little investment in developing long term alliances between growers, processors and consumer clients is made. These people and groups search for product orders and then seek supply from producers to fill an order.

This activity means that producers are continuously badgered by different 'marketers' to provide animals which in turn leads to producers playing different 'marketers' off against each other in order to maximise their return. The lack of preparedness of producers to develop any loyalty to a 'marketer' means in turn that the 'marketers' have no confidence in supply of product to meet their market.

'Marketers' also compete against each other in the client market place with relatively small variance of product available to potential consumer clients. Potential consumer clients then play 'marketers' off against each other to minimise the price they need to pay for the venison they need. In turn, the lower prices are passed back to producers.

However, as explained earlier, not all of the downward pressure on prices results from excessive and inappropriate within industry marketing competition. Data presented about carcass weights earlier in this document shows that significant number of carcasses available to 'marketers' are of less than what could be considered 'ideal' weight.

'Marketers' who purchase stock know that a significant percentage of what they buy will be under 'ideal' weight and so they discount all prices accordingly. Producers say that they will not incur the expense of feeding stock to 'ideal' liveweight until the 'marketers' can guarantee a minimum price. Producers ask for better product to be able to return better prices (a classical chicken and egg situation).

In my opinion it is the producers who must take the greatest percentage of the risk with this end of the industry chain. Those people involved in product marketing must be able to demonstrate their ability to provide consistently high quality product before potential consumer clients are likely to pay premium prices.

The common practice of 'marketers' delaying payment to producers for up to 12 months must be seen as unacceptable by the industry. At present many 'marketers' take stock from growers with a promise to pay at some time in the future when the product is sold. The 'marketer' is at limited financial risk if the product is not sold and therefore there is no real pressure to ensure the product is properly marketed within a reasonable time frame.

In my opinion those involved in marketing the industry's product must share the risks associated with marketing and that means involvement in market development and in the payment for stock with time frames accepted as normal by other livestock industries.

Producers can assist by developing strategic alliances with processors where agreements to supply are established according to specifications that are mutually acceptable. Agreements might detail animal age, sex, breed and weight specifications for producers and minimum price payments for 'marketers'.

A small number of 'marketers' will be in a significantly better position to develop long term clients markets if they are able to have confidence in the estimated volume of stock available for processing for at least 12 months in advance. Further, if the quality is consistent, producers returns are more likely to improve.

Agreements would mean that processors must take a risk to guarantee a minimum payment (albeit a relatively low price but with the hope of an

improved return) and producers must guarantee to provide a known number of stock that meet agreed specifications.

5.5 Velvet antler production

The majority (estimated to be 50 to 70%) of velvet antler (deer horn) produced by the Australian deer industry is sold through the velvet pools managed by the Australian Deer Horn and Co Products Company (ADH).

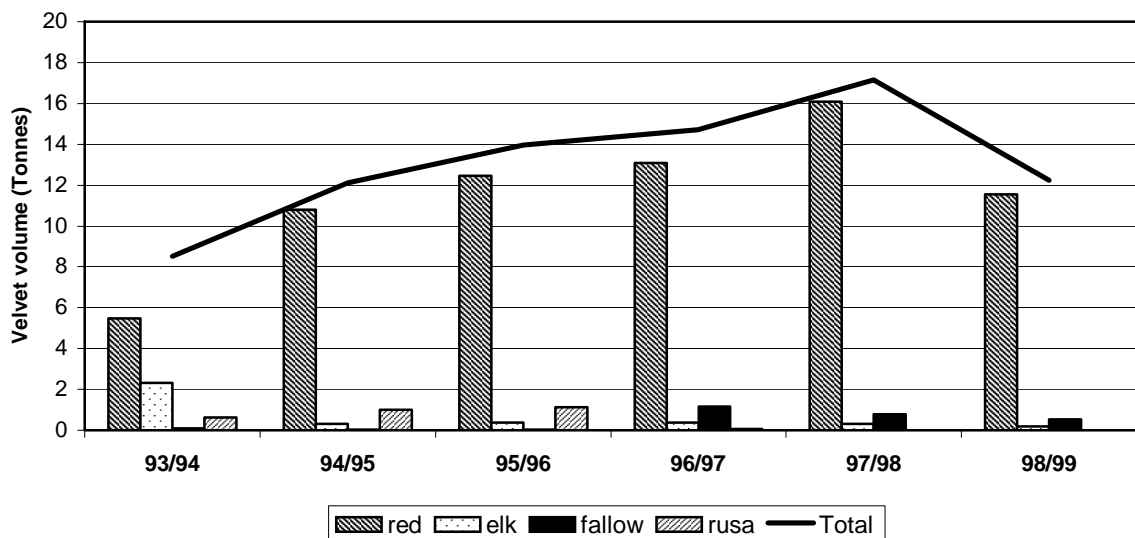
Prices paid by international buyers for velvet antler produced by the Australian industry are strongly influenced by, and closely linked, to prices paid to New Zealand deer farmers.

Most of the velvet antler produced by the New Zealand industry is sold to Korean buyers who purchase most of the worlds unprocessed antler. Although prices received for Australian velvet antler are linked to New Zealand prices, ADH has been fostering strong relationships with Chinese buyers of deer antler. This developing relationship has, in recent sales, seen prices paid for Australian velvet sold by ADH slightly above that paid for New Zealand antler.

The work undertaken by ADH is seeking new buyers of Australian product appears to be beginning to have a positive impact. The Australian industry should be encouraged to continue its development of these direct supplier/client relationships for its relatively small value of product.

Graph 21 and table 27 (see Appendix) shows how the volume of velvet antler sold by ADH has grown since the 1993/94 season.

Graph 21. Volume of velvet processed by ADH



The fall in the total volume of velvet processed by ADH from the 1997/98 pool to the 1998/99 pool, is a reflection of: (i) fall in production as a consequence of the 1997/98 prices; and (ii) an assumed increase in the volume of product sold outside the pools in a belief of an opportunity to earn better returns from private sales.

The significant price improvement from 1997/98 to 1998/99 for product sold by ADH and the general belief that prices for the 1999/2000 season will be greater than for the 1998/99 season, suggest that the volume of velvet sold by ADH will increase in 1999/2000.

Its difficult to estimate how the extent of the increase may be affected by the increased animals slaughtering during 1998/99.

On average, approximately 88% of all velvet antler sold by ADH has been produced by red deer and red deer hybrids. About 5.0% has been produced by Elk/Wapiti, 3.5% by Fallow deer and 3.5% by Rusa deer.

The Deer industry's Velvet Accreditation Scheme that was developed in cooperation with the Australian Veterinary Association is designed to ensure that those people directly involved in the removal of velvet antler from deer are appropriately trained and competent to remove the antler. Accreditation includes training in the use of drugs, animal welfare, harvesting techniques, and quality assurance handling of velvet that has been harvested.

A measure of the success of the scheme, in terms of the quality of the velvet sold by the industry operated velvet pools (ADH), is the change in percentage of velvet classified in higher and lower value categories.

Of the red deer velvet antler sold by the pools (now managed by ADH) from the 1993/94 season, approximately 21% was classified within the top three grades (A, B & C). Of the remainder, approximately 19% was classified in the next two grades (D&E) and more than 36% was classified as either damaged, overgrown or hard horn.

The Red deer velvet antler sold by ADH from the 1998/99 pools can be regarded as significantly better quality. Almost 50% was classified as either A, B or C grade, only 11% was classified as either D or E grade and only 20% was classified as damaged, overgrown or hard horn. These data show a

significant increase in the percentage of velvet sold that is graded into the top three grades and a reciprocal decrease in the less desirable qualities.

This attention to quality improvement combined with the ADH program to develop long term client relationships with Chinese buyers must hold the velvet antler aspect of the industry in good stead.

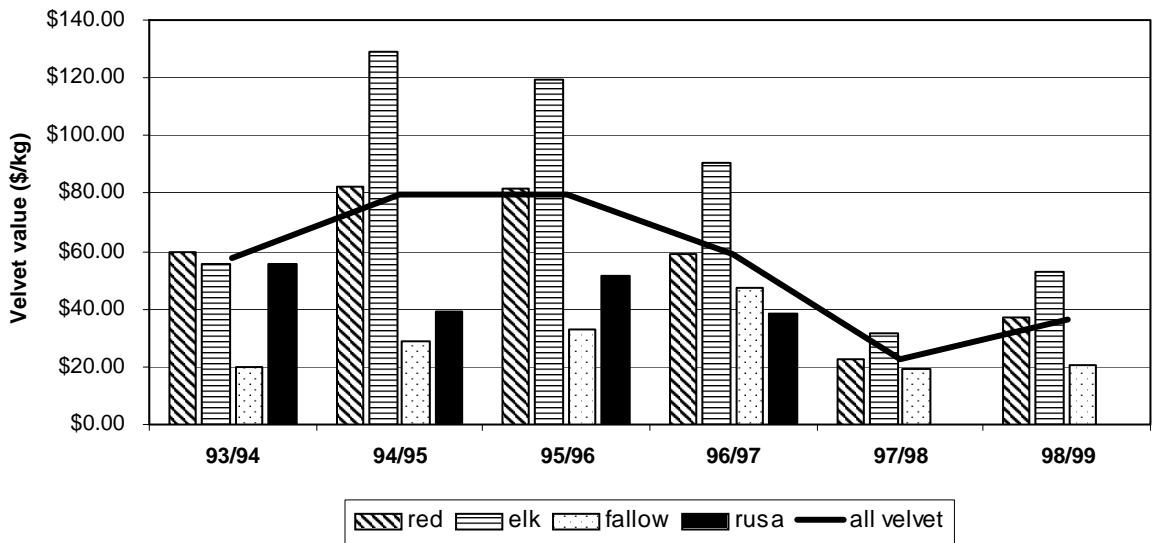
However, the velvet antler section of the deer industry is likely to remain volatile. The intentional production of velvet antler, and its availability to national markets, has risen dramatically in recent years. The increase has been principally due to New Zealand's continually increasing production and the availability of Russian velvet since the fall of communism.

Production can be reduced quickly by slaughtering excess stock and increased again relatively quickly by retaining males. When velvet antler prices fall the number of male animals slaughtered dramatically increases (during the 1998/99 year New Zealand is reported to have increased the volume of venison processed by 40% over the previous year). After a short lag period, the demand for velvet increases and farmers begin to retain animals for velvet production.

Graph numbered 22 table numbered 28 (see Appendix) show how the average price for Red, Elk and Fallow deer velvet antler have changed since 1993/1994.

The increase of approximately 70% in the average price for Red deer velvet from the 1997/98 to the 1998/99 season is encouraging and most observers suggest that average prices for the 1999/2000 season are likely to rise further.

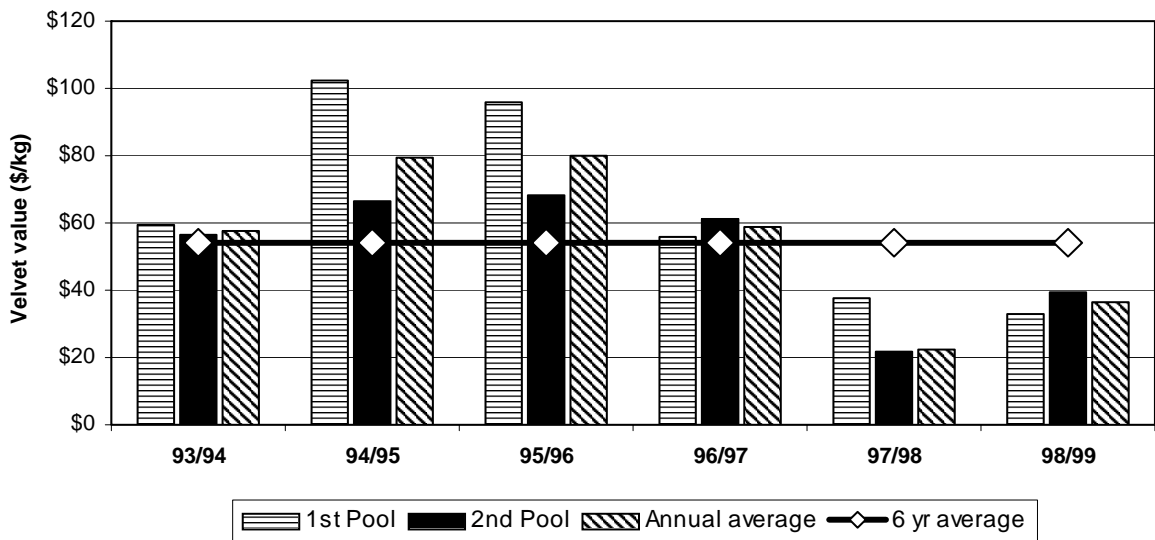
Graph 22. Average value of velvet processed by ADH



Although velvet antler prices have decreased over recent years, it is interesting to note that the 6 year average price for all velvet sold by ADH remains close to \$55/kg.

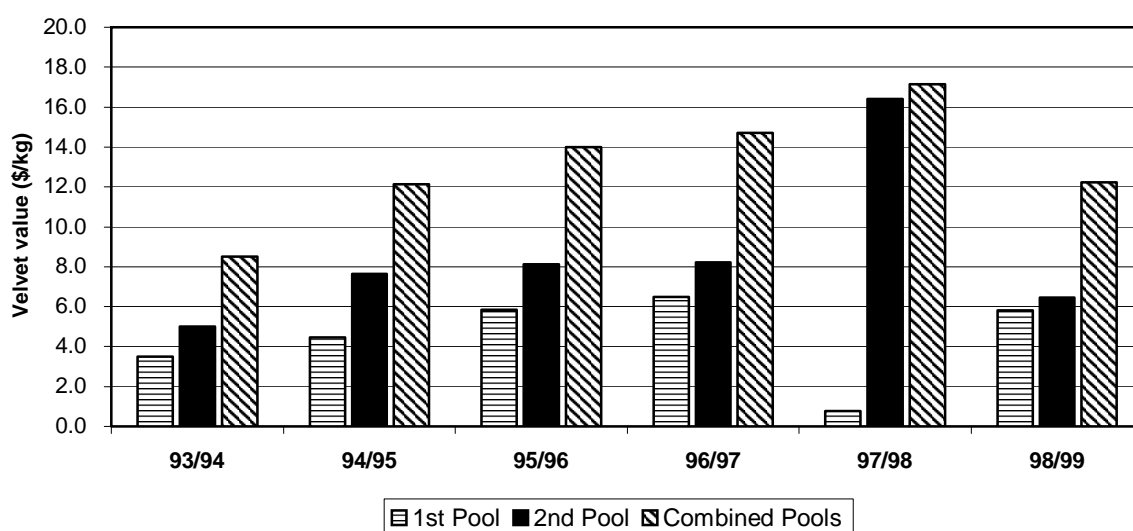
Graph number 23 and table number 29 (see Appendix) show the variation in average prices between pool in each year and the average price for all velvet in each year relative to the six year average price for all velvet sold by ADH.

Graph 23. Variation in average value of all velvet processed by ADH



Graph number 24 and table number 30 (see Appendix) shows the variation in the volume of velvet processed by ADH between pools in each year and between years.

Graph 24. Variation in volume of velvet processed by ADH

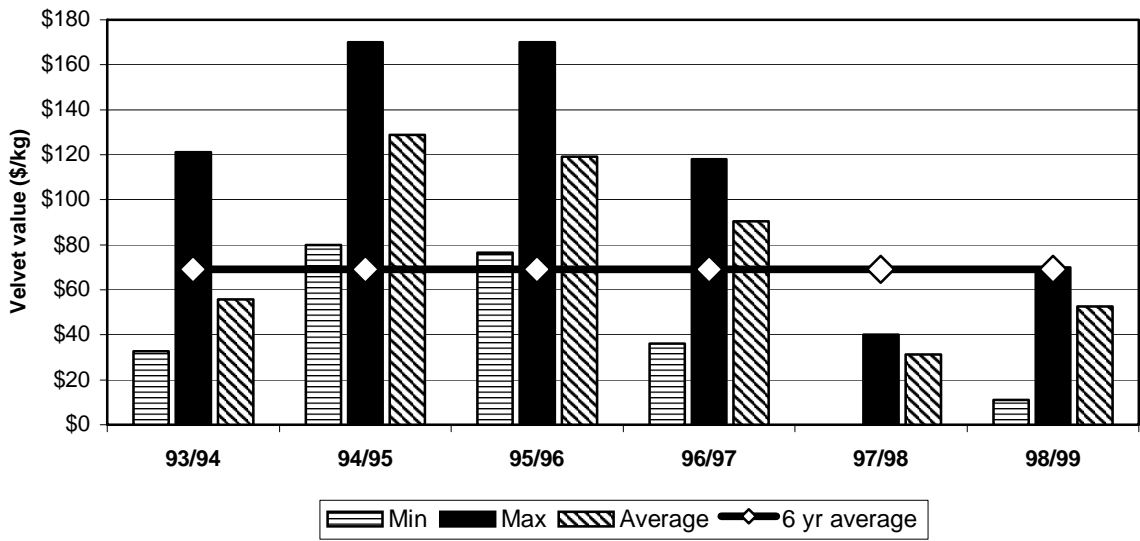


It is worthwhile to consider the range of prices for velvet sold through the industry pools since the 1993/94 season.

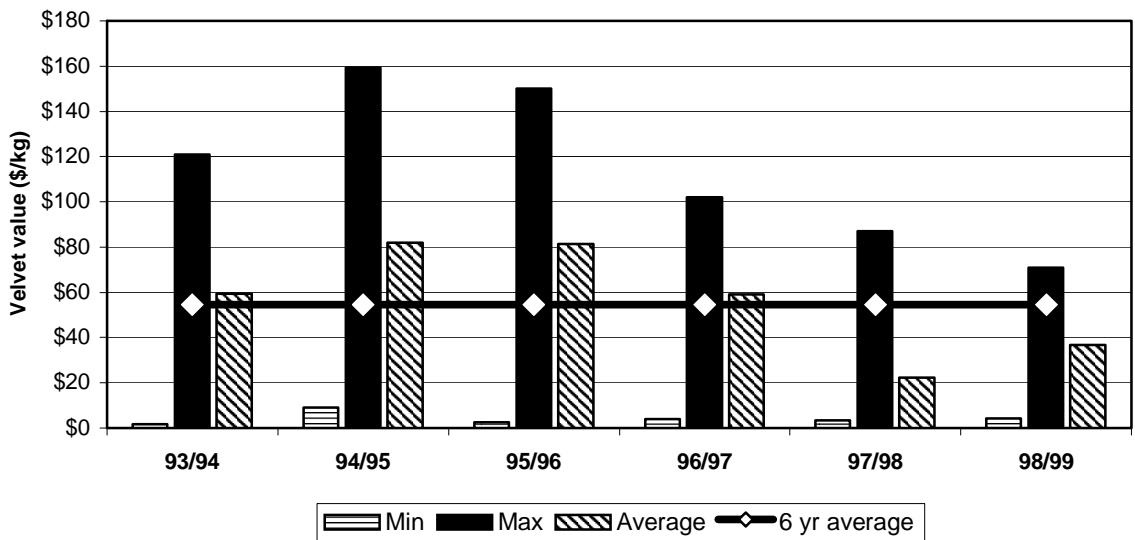
Data presented in graphs 25 to 27 and table number 31 (see Appendix) demonstrate that the minimum price paid for velvet varies little for each species between years while the peak prices change significantly.

The data shows the relative value of velvet for the three major Australian velvet producing species and of interest is the consistently higher prices of Elk/Wapiti velvet when compared to Red Deer Velvet sold through the Australian velvet pools. In particular, the minimum price paid for Elk/Wapiti velvet in each year is significantly greater than the lowest price paid for Red Deer velvet. This factor must be considered with caution as often lower grades of Elk/Wapiti velvet are included in red deer velvet grades.

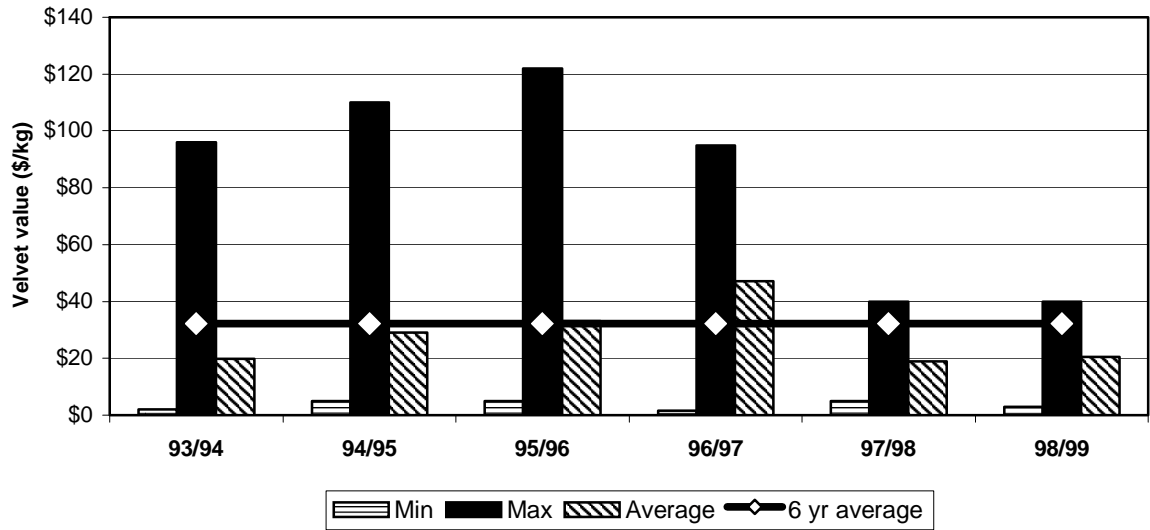
Graph 25. Variation in average value of elk/wapiti velvet processed by ADH



Graph 26. Variation in average value of red and hybrid velvet processed by ADH



Graph 27. Variation in average value of fallow velvet processed by ADH



6. IMPLICATIONS

Although data collected on the industry herd, its structure and its reproductive performance are not perfect they do allow the development of production forecasts.

As described in the results and discussion sectors of this report, herd growth and production estimates can be significantly affected by average reproductive performance of the national herd and the rate at which female stock are culled from the herd.

The industry's future is, in part, dependent on its ability to increase its base level of production. (Currently the industry produces approximately 1,000 tonnes of venison annually, compared with New Zealand production of approximately 10 to 15 thousand tonnes annually.)

However, existing deer farmers are reluctant to expand (many are reported to be leaving the industry) and more particularly, new industry entrants are reluctant to invest in the industry. This lack of confidence in the industry generally results from the relatively low returns producers receive for their stock and the general lack of confidence in the industry's ability to profitably market its venison products.

There are two principal factors that the industry should consider in an effort to improve returns to growers. They are to reduce within industry price competition and to improve the average quality of stock committed for processing.

The industry's immediate future is dependent on a rationalisation of the number of companies involved in processing and marketing its products. Rationalisation and specifically, a dramatic reduction within industry marketing competition for venison product.

Collectively, the industry's producers can play a major role in rationalising the number of the marketers of its venison products. In particular, collective development of strategic alliances with marketers to supply stock which meet defined specifications for an extended period. In return, the marketers must undertake to share the marketing risks and be prepared to pay growers a minimum return within a defined period with the understanding that growers will receive subsequent payments when all product is sold.

The risk producers must accept is that animals must be fed to ensure they reach target specifications within presented time frames.

These actions will provide a basis for improvement in farmer returns, confidence in long term markets and hopefully encourage new investment in the industry.

This project has produced promotional material that can be used by the DIAA to assist the industry's expansion. Information newly available includes updated and brochures on:

1. Venison (6 separate brochures)
2. Deer horn (velvet antler)
3. Quality assurance
4. The Australian Industry

All of these brochures are available (at cost) to marketers who wish to use the data as part of a market development program. These brochures, along with the Deer Industry Manuals produced by the project, provide a basis of sound objective data that can be used to attract new interest and investment in the industry.

The Quality Assurance program undertaken by the industry provides markets with detail about the quality of the products, the commitment to animal welfare and humane slaughter and hygienic processing of carcass. Although this commitment to quality assurance may not specifically provide new market opportunities, it is fair to say without the commitment, access to most international and domestic markets will be severely restricted.

Industry's commitment to its Quality Assurance Program is demonstrated by its intention to: (i) continue training of new facilitators, and (ii) to coordinate programs that educate the deer industry on the necessity for increased production of products that fulfil all international requirements of quality control

Data bases created by the project provide industry with an ongoing ability to collect and report data of importance to various sectors of the Industry. Ideally the industry should undertake a census of itself in 2002 (5 years after the census undertaken by this project) to objectively assess changes in its structure. However, it would be unwise to attempt the census without first obtaining commitment of industry to support it. The cost in both time and monetary terms for undertaking a census can be significant. Without strong industry commitment the cost benefit of such activity would be questionable.

The industry quality mark developed by this project has been registered by the Deer Industry Company on behalf of the DIAA. A new project to begin 1 June 1999 will develop specifications for use of the mark. Use of the mark will be provided to individual producers, transporters and processors under licence by the DIAA. Industry is hopeful that the mark will become increasingly recognised in international and domestic markets as a symbol of quality that is backed by a commitment of all sectors of the industry to ensuring that products consistently meet or exceed consumer expectations.

7. INTELLECTUAL PROPERTY

There are no commercially significant developments or outcomes from the project that require a consideration of intellectual sharing.

8. RECOMMENDATIONS

The expansion of the industry in Australia will continue to be dependent on promulgation of positive market information. Positive market information will only become available when all negative aspects of production and marketing are minimised and clients develop confidence in the Industry's ability to develop long term supply contracts for high quality products.

Cooperation between production and processing sectors must be encouraged and developed quickly and openly. Data bases of industry statistics must be maintained and be accessible. Without doubt promotion and adoption of quality assurance programs are an integral part of this development.

The Deer Industry Company suggests a logical and necessary extension of the 1997-1999 RIRDC funded project 'The Development of the Deer Industry as a Major Australian Livestock Industry.'

A new project to begin after June 1999 would aim to development and implement strategies that will consolidate and expand production of the Australian deer products and position the Australian Deer Industry as a commercial livestock industry that compliments Australia's traditional livestock industries.

An increase in deer numbers is critical to market consolidation and development. The apparent decline in the size of the national breeding herd must be arrested quickly.

To ensure growth of international market outlets the Australian industry must actively adopt and promote its quality assurance program that is aimed to give consumer confidence in Australia's production.

Data produced by this project shows a considerable decline in farmer returns for venison over the past 12 months. Although a major reason for the decline can be traced to factors beyond industry control, the data on venison production clearly shows that aspects of poor carcase quality can be improved by Australian producers. New Zealand information presented at the

1998 Industry AGM discussed the benefit of cooperative alliances between producers and processors in that country. It appears reasonable that strategic alliances compel producers to ensure animals offered for sale meet minimum quality standards and compel processors to develop long term business relationships with clients based on supply of quality products at mutually acceptable prices.

To survive, Australia's deer farmers need to receive relatively high returns, compared with other livestock species, for the meat they produce. Consistently high returns are only achievable when direct competition in markets is minimised. Quality Assurance programs are developed and adopted, and strategic supply alliances that guarantee clients consistently receive products that meet all of their specifications is implemented.

Cooperation between production and processing sectors must be encouraged and developed quickly and openly. Data bases of industry statistics must be maintained and be accessible. Without doubt promotion and adoption of quality assurance programs are an integral part of this development.

If the industry is unable to develop long term market outlets quickly, based on QA and processor/producer supply that gives price confidence to its farmers, its domestic expansion and immediate future are in doubt.

Strategies that should be considered by a new project include:

1. Maintenance and expansion of data bases developed during this project;
2. The encouragement, facilitation and development of strategic alliances between producers and processors to assist their commitment to each other and to the industry Quality Assurance program;
3. The development of documentation for the licensed use of the Deer Industry Quality Assurance mark;
4. A continuation of the regular and open reporting of market information to industry.

A new project should continue this project's commitment of regular industry reporting through the RIRDC newsletter and the Australian Deer Farming magazine.

9. COMMUNICATIONS STRATEGY

Information generated by this project has been made available to industry through regular reports in the RIRDC Deer Industry Newsletter and in the Australian Deer Farming Magazine.

Reports and a summary of activities have been provided to two National AGM's throughout the course of the project and at two AGM's for most of the DIAA branches.

Summary information provided in this report will be presented in at least one report (it may be several separate reports) to the 1999 National Deer Industry Conference and AGM in September.

This RIRDC report will be provided directly to the secretary of each DIAA branch and affiliated organisations and will be available from RIRDC for individual members of industry and the public.

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11. APPENDIX 1

Table 6. Percentage of red and red deer hybrid carcasses within weight ranges

	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Carcases less than 55 kg HCW	38.9%	49.4%	66.0%	73.3%	44.9%	35.9%	41.6%	42.3%	33.9%	7.0%	16.7%	50.1%	86.0%	72.5%	63.5%
Carcases at least 55 kg HCW	61.1%	50.6%	34.0%	26.7%	55.1%	64.1%	58.4%	57.7%	66.1%	93.0%	83.3%	49.9%	14.0%	27.5%	36.5%

Table 7. Percentage of fallow deer carcasses within weight ranges

	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Carcases less than 23 kg HCW	41.8%	71.7%	52.4%	53.6%	21.3%	53.1%	31.9%	26.4%	6.0%	3.4%	41.5%	6.3%	18.1%	49.9%	64.3%
Carcases 23 to 26 kg HCW	15.1%	10.0%	21.7%	39.2%	25.4%	28.3%	27.8%	16.0%	23.2%	39.2%	22.3%	40.8%	33.2%	16.5%	11.1%
Carcases more than 26 kg HCW	43.1%	18.4%	25.9%	7.2%	53.3%	18.5%	40.3%	57.6%	70.8%	57.3%	36.2%	52.9%	48.7%	33.6%	24.6%

Table 8. Volume of venison processed by cooperating processors

	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Red deer and hybrids	83.3	53.1	69.9	50.9	63.0	88.6	95.6	89.5	18.0	29.8	67.9	49.9	23.3	59.8	66.1
Fallow deer	48.4	46.0	22.9	30.7	53.8	31.9	48.1	48.5	23.2	38.7	65.6	17.8	59.0	67.1	57.9
Rusa deer	0.2	0.4	5.5	0.0	0.5	0.0	0.0	0.0	0.0	7.6	2.4	0.0	28.1	19.2	19.8
Monthly total	131.9	99.6	98.4	81.6	117.4	120.5	143.8	138.1	41.2	76.1	135.9	67.7	110.4	146.1	144.3
Cumulative 97/98	131.9	231.5	329.9												
Cumulative 98/99				81.6	198.9	319.4	463.2	601.3	642.5	718.6	854.5	922.2	1032.6	1178.7	1323.0

Table 9. Average venison price (HCW less the industry levy, delivered to the abattoir) for all carcasses for each species processed by cooperating processors

	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Monthly average all red deer	\$2.57	\$2.48	\$2.47	\$2.65	\$2.39	\$2.46	\$2.62	\$2.58	\$2.33	\$2.39	\$2.00	\$1.95	\$1.81	\$1.69	\$1.70
Monthly average all fallow deer	\$2.30	\$2.01	\$2.18	\$2.17	\$2.00	\$2.19	\$2.09	\$2.26	\$2.16	\$2.23	\$2.11	\$2.08	\$1.94	\$1.60	\$1.52
Rusa	\$2.50	\$2.92	\$1.79	\$0.00	\$4.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2.48	\$2.50	\$0.00	\$1.60	\$1.44	\$1.77
Monthly average for all deer	\$2.47	\$2.26	\$2.36	\$2.47	\$2.22	\$2.39	\$2.44	\$2.47	\$2.24	\$2.32	\$2.06	\$1.98	\$1.83	\$1.62	\$1.64

Table 10. Estimated number of red deer (including hybrids) and fallow deer processed by cooperators

	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Red	1510	980	1319	971	1117	1543	1642	1510	294	352	787	921	504	968	949
Fallow	1988	2132	1009	1435	2123	1398	1921	1893	834	1411	2735	658	2243	2887	2590
Rusa	4	10	49	0	10	0	0	0	0	134	51	0	494	543	526
Monthly total	3502	3122	2376	2406	3250	2941	3563	3403	1128	1898	3573	1579	3240	4398	4065
Cumulative 97/98	3502	6624	9000												
Cumulative 98/99				2406	5656	8597	12160	15563	16691	18588	22162	23741	26981	31503	35568

Table 11. Estimated average HCW (kgs) for red deer (including hybrids) and fallow deer processed by cooperators

	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Red	55.2	54.2	53.0	52.4	56.4	57.4	58.3	59.3	61.3	84.7	86.2	54.2	46.3	61.8	70.2
Fallow	24.3	21.6	22.7	21.4	25.4	22.8	25.0	25.6	27.9	27.5	24.0	27.0	26.3	23.2	22.4
Rusa	47.5	43.5	54.6	0.0	47.5	0.0	0.0	0.0	0.0	55.4	47.5	0.0	51.6	35.3	37.6

Table 12. A predictive estimate of the rate of growth of the Australian industry (see 5.1 for reproductive and culling rate assumptions)

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
Red	73898	80393	83798	86283	90104	93650	96563	99253	101066	101899	100957
Fallow	91886	93360	99826	107209	115005	123328	132175	141225	150596	159751	166080
Rusa	12309	13209	14364	15276	16315	17580	18884	20267	21317	22539	23782
Chital	4119	4743	5306	5755	6241	6762	7306	7899	8516	9188	9869
Elk	5753	6463	7405	8456	9628	10939	12421	14047	15847	17870	20177
TOTAL	187965	198168	210699	222979	237293	252259	267349	282691	297342	311247	320865

Table 13a. FALLOW DEER NUMBERS

FEMALES - Total	64948	MALES - Total	26938
Initial Number of Weaners	13976	Initial Number of Weaners	15447
Initial Number of Yearlings	9702	Initial Number of Yearlings	6888
Initial Number of 2 Year Olds	7451	Initial Number of 2 Year Olds	1745
Initial Number of 3 Year Olds	15570	Initial Number of 3 Year Olds	1488
Initial Number of Adults	18249	Initial Number of Adults	1370
 			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
 			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	0.0%
Annual Culling Rate (yearlings)	30.0%	Annual Culling Rate (yearlings)	70.0%
Annual Culling Rate (2 year olds)	50.0%	Annual Culling Rate (2 year olds)	86.6%
Annual Culling Rate (3 year olds)	13.5%	Annual Culling Rate (3 year olds)	0.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 13b. RED and HYBRID DEER NUMBERS

FEMALES - Total	45928	MALES - Total	27970
Initial Number of Weaners	10112	Initial Number of Weaners	11180
Initial Number of Yearlings	5581	Initial Number of Yearlings	5707
Initial Number of 2 Year Olds	5009	Initial Number of 2 Year Olds	3623
Initial Number of 3 Year Olds	5735	Initial Number of 3 Year Olds	1610
Initial Number of Adults	19491	Initial Number of Adults	5850
 			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
 			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	0.0%
Annual Culling Rate (yearlings)	35.0%	Annual Culling Rate (yearlings)	60.0%
Annual Culling Rate (2 year olds)	50.0%	Annual Culling Rate (2 year olds)	71.0%
Annual Culling Rate (3 year olds)	62.5%	Annual Culling Rate (3 year olds)	0.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 13c. RUSA DEER NUMBERS

FEMALES - Total	8257	MALES - Total	4052
Initial Number of Weaners	1309	Initial Number of Weaners	1481
Initial Number of Yearlings	1470	Initial Number of Yearlings	1525
Initial Number of 2 Year Olds	1636	Initial Number of 2 Year Olds	271
Initial Number of 3 Year Olds	1660	Initial Number of 3 Year Olds	547
Initial Number of Adults	2182	Initial Number of Adults	228
 			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
 			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	0.0%
Annual Culling Rate (yearlings)	30.0%	Annual Culling Rate (yearlings)	65.0%
Annual Culling Rate (2 year olds)	55.0%	Annual Culling Rate (2 year olds)	81.0%
Annual Culling Rate (3 year olds)	13.5%	Annual Culling Rate (3 year olds)	0.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 13d. CHITAL DEER NUMBERS

FEMALES	2622	MALES - Total	1497
Initial Number of Weaners	572	Initial Number of Weaners	455
Initial Number of Yearlings	301	Initial Number of Yearlings	243
Initial Number of 2 Year Olds	156	Initial Number of 2 Year Olds	68
Initial Number of 3 Year Olds	891	Initial Number of 3 Year Olds	509
Initial Number of Adults	702	Initial Number of Adults	222
 			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
 			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	0.0%
Annual Culling Rate (yearlings)	30.0%	Annual Culling Rate (yearlings)	50.0%
Annual Culling Rate (2 year olds)	50.0%	Annual Culling Rate (2 year olds)	65.0%
Annual Culling Rate (3 year olds)	15.5%	Annual Culling Rate (3 year olds)	20.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 13e. ELK/WAPITI NUMBERS

FEMALES - Total	3707	MALES - Total	2046
Initial Number of Weaners	892	Initial Number of Weaners	519
Initial Number of Yearlings	584	Initial Number of Yearlings	336
Initial Number of 2 Year Olds	446	Initial Number of 2 Year Olds	244
Initial Number of 3 Year Olds	784	Initial Number of 3 Year Olds	442
Initial Number of Adults	1001	Initial Number of Adults	505
 			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
 			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	5.0%
Annual Culling Rate (yearlings)	0.0%	Annual Culling Rate (yearlings)	50.0%
Annual Culling Rate (2 year olds)	30.0%	Annual Culling Rate (2 year olds)	60.0%
Annual Culling Rate (3 year olds)	23.5%	Annual Culling Rate (3 year olds)	20.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 13f. BASE WEANING RATES USED

Weaning Rate (2 year olds)	65.0%
Weaning Rate (3 year olds)	75.0%
Weaning Rate (adult olds)	75.0%

Table 14. Predictive estimate of the number of deer available for processing - (see 5.1 for reproductive and culling rate assumptions)

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
Red and hybrids	14038	10172	17149	18243	17003	18158	19610	20697	21402	23305	25254
Fallow	15072	14624	11964	12212	13237	14266	15682	16852	18811	23062	23503
Rusa	2775	2481	2246	3056	3012	3101	3448	4143	3990	4357	5302
Chital	574	404	741	944	925	1035	1135	1239	1313	1470	1605
Elk/wapiti	760	569	792	1001	1075	1304	1565	1772	2014	2309	2704
TOTAL	33219	28250	32892	35456	35252	37864	41440	44703	47530	54503	58368

Table 15. A predictive estimate of the rate of growth of the Australian industry - AMENDED MODEL (see 5.1 for reproductive and culling rate assumptions)

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
Red	70715	68713	69122	69471	69628	69820	70033	70244	70459	70684	70913
Fallow	80811	81658	82124	82480	82873	83295	83732	84188	84667	85170	85699
Rusa	11680	11446	11568	11646	11693	11748	11804	11865	11927	11990	12057
Chital	4278	4181	4209	4232	4247	4262	4278	4293	4309	4328	4348
Elk	5587	5798	6211	6751	7353	8025	8785	9636	10584	11398	12196
TOTAL	173071	171796	173234	174580	175794	177150	178632	180226	181946	183570	185213

Table 16. Predictive estimate of the number of deer available for processing - AMENDED MODEL(see 5.1 for reproductive and culling rate assumptions)

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
Red and hybrids	11115	12387	10097	9816	10093	10089	10084	10102	10118	10132	10148
Fallow	10172	12276	12496	12681	12710	12735	12778	12819	12862	12911	12960
Rusa	1840	2141	1763	1769	1816	1817	1820	1827	1833	1837	1844
Chital	677	787	662	653	669	671	671	672	674	675	677
Elk/wapiti	624	794	772	759	831	917	1006	1101	1454	1570	1705
TOTAL	24428	28385	25790	25678	26119	26229	26359	26521	26941	27125	27334

Table 17. Effect of changes in average reproductive rate on total deer population estimates - AMENDED MODEL (see 5.1 for reproductive and culling rate assumptions)

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
20% below base rate	173071	155923	148973	146908	144369	141484	138541	135544	132468	129072	125507
At base rate nominated	173071	171796	173234	174580	175794	177150	178632	180226	181946	183570	185213
20% above base rate	173071	187669	197493	202257	208264	215272	222699	230722	239464	248714	258605

Table 18. Effect of changes in culling rate on total deer population estimates - AMENDED MODEL (see 5.1 for reproductive and culling rate assumptions)

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
15% below base rate	173071	178034	184914	193082	201916	211600	222285	234034	246960	260929	276175
At base rate nominated	173071	171796	173234	174580	175794	177150	178632	180226	181946	183570	185213
15% above base rate	173071	165563	162560	158644	154360	150009	145540	140940	136214	131120	125761

Table 19. Effect of reproductive rate on estimates of the number of deer available for processing AMENDED MODEL (see 5.1 for reproductive and culling rate assumptions)

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
20% below base rate	24417	28372	25776	19224	19185	19277	19024	18755	18742	18479	18208
At base rate nominated	24428	28385	25790	25678	26119	26229	26359	26521	26941	27125	27334
20% above base rate	24439	28397	25803	32129	33056	33186	34120	35098	36322	37398	38585

Table 20. Effect of culling rate on estimates of the number of deer available for processing - AMENDED MODEL (see 5.1 for reproductive and culling rate assumptions)

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
15% below base rate	19866	25131	25416	25515	26494	27522	28558	29708	31218	32598	34117
At base rate nominated	24428	28385	25790	25678	26119	26229	26359	26521	26941	27125	27334
15% above base rate	28995	30791	24459	24265	24131	23559	23019	22481	22180	21617	21049

**Table 21. Effect of reproductive rate on estimates of the number of two year old red deer females accepted into the breeding herd - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)**

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
15% below base rate	5406	4204	2733	1784	1860	1861	1815	1772	1730	1687	1643
At base rate nominated	5406	4204	2733	2708	2815	2808	2807	2813	2819	2824	2830
15% above base rate	5406	4204	2733	3633	3771	3756	3855	3958	4056	4164	4279

**Table 22. Effect of reproductive rate on estimates of the number of two year old fallow deer females accepted into the breeding herd - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)**

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
20% below base rate	3842	3922	3957	2673	2678	2685	2624	2560	2497	2432	2364
At base rate nominated	3842	3922	3957	4035	4043	4054	4071	4088	4106	4125	4145
20% above base rate	3842	3922	3957	5396	5407	5422	5607	5782	5956	6148	6357

**Table 23. Effect of culling rate on estimates of the number of two year old red deer females accepted into the breeding herd - AMENDED MODEL
(see 5.1 for reproductive and culling rate assumptions)**

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
20% below base rate	5406	5466	4373	4333	4665	4850	5035	5258	5498	5756	6034
At base rate nominated	5406	4204	2733	2708	2815	2808	2807	2813	2819	2824	2830
20% above base rate	5406	2943	1472	1458	1462	1408	1359	1311	1261	1211	1159

Table 24. Effect of culling rate on estimates of the number of two year old fallow deer females accepted into the breeding herd - AMENDED MODEL (see 5.1 for reproductive and culling rate assumptions)

	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
20% below base rate	3842	5099	6246	6369	6540	6864	7196	7545	7931	8355	8816
At base rate nominated	3842	3922	3957	4035	4043	4054	4071	4088	4106	4125	4145
20% above base rate	3842	2746	2176	2219	2168	2091	2018	1944	1868	1789	1709

Table 25. Average per head price for red deer (including hybrids) at different carcass weights

	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
HCW of 45 kg	\$111	\$104	\$111	\$118	\$82	\$98	\$100	\$108	\$92	\$90	\$83	\$86	\$82	\$86	\$0
HCW of 55 kg	\$153	\$140	\$139	\$150	\$150	\$140	\$148	\$144	\$122	\$122	\$121	\$121	\$123	\$121	\$0
HCW of 65 kg	\$181	\$182	\$182	\$182	\$171	\$178	\$201	\$196	\$160	\$157	\$158	\$156	\$145	\$156	\$0

Table 26. Average per head price for fallow deer at different carcass weights

	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
HCW of 20 kg	\$38	\$40	\$41	\$40	\$36	\$43	\$35	\$39	\$28	\$34	\$40	\$33	\$34	\$32	\$0
HCW of 24 kg	\$59	\$57	\$55	\$60	\$50	\$56	\$53	\$53	\$49	\$51	\$51	\$51	\$36	\$38	\$0
HCW of 28 kg	\$74	\$75	\$63	\$61	\$57	\$65	\$62	\$71	\$59	\$64	\$57	\$59	\$54	\$51	\$65

Table 27. Volume of velvet antler processed by ADH (Tonnes)

	93/94	94/95	95/96	96/97	97/98	98/99
Red	5.5	10.8	12.4	13.1	16.1	11.6
Elk	2.3	0.3	0.4	0.4	0.3	0.2
Fallow	0.1	0.0	0.0	1.2	0.8	0.5
Rusa	0.6	1.0	1.1	0.1	0.0	0.0
Total	8.5	12.1	14.0	14.7	17.2	12.2

Table 28. Average value of velvet antler processed by ADH (Tonnes)

	93/94	94/95	95/96	96/97	97/98	98/99
Red	\$59.39	\$82.02	\$81.33	\$59.08	\$22.42	\$36.87
Elk	\$55.80	\$128.80	\$119.09	\$90.47	\$31.25	\$52.65
Fallow	\$19.79	\$29.04	\$33.25	\$47.20	\$19.01	\$20.58
Rusa	\$55.55	\$39.36	\$51.20	\$38.15	\$0.00	\$0.00
All velvet	\$57.64	\$79.63	\$79.79	\$58.86	\$22.43	\$36.41

Table 29. Variation in average value of velvet antler processed by ADH (Tonnes)

	93/94	94/95	95/96	96/97	97/98	98/99
6 yr average	\$54.21	\$54.21	\$54.21	\$54.21	\$54.21	\$54.21
1st Pool	\$59.12	\$102.16	\$95.63	\$55.67	\$37.70	\$32.94
2nd Pool	\$56.60	\$66.50	\$68.28	\$61.39	\$21.71	\$39.52
Annual average	\$57.64	\$79.63	\$79.79	\$58.86	\$22.43	\$36.41

Table 30. Variation in volume of velvet antler processed by ADH (Tonnes)

	93/94	94/95	95/96	96/97	97/98	98/99
1st Pool	3.5	4.5	5.8	6.5	0.8	5.8
2nd Pool	5.0	7.7	8.1	8.2	16.4	6.5
Combined Pools	8.5	12.1	14.0	14.7	17.2	12.2

Table 31. Variation in the range of value of velvet antler processed by ADH (Tonnes)

	Elk				Red				Fallow			
	Min	Max	Average	6 yr average	Min	Max	Average	6 yr average	Min	Max	Average	6 yr average
93/94	\$32.80	\$121.00	\$55.80	\$68.97	\$1.59	\$121.01	\$59.39	\$54.47	\$2.00	\$96.00	\$19.79	\$32.18
94/95	\$80.00	\$170.05	\$128.80	\$68.97	\$9.09	\$159.30	\$82.02	\$54.47	\$5.00	\$110.00	\$29.04	\$32.18
95/96	\$76.45	\$170.00	\$119.09	\$68.97	\$2.50	\$150.10	\$81.33	\$54.47	\$5.00	\$122.00	\$33.25	\$32.18
96/97	\$36.00	\$118.00	\$90.47	\$68.97	\$4.00	\$102.00	\$59.08	\$54.47	\$1.50	\$95.00	\$47.20	\$32.18
97/98	\$0.00	\$40.00	\$31.25	\$68.97	\$3.50	\$87.00	\$22.42	\$54.47	\$5.00	\$40.00	\$19.01	\$32.18
98/99	\$11.20	\$70.00	\$52.65	\$68.97	\$4.20	\$71.00	\$36.87	\$54.47	\$3.00	\$40.00	\$20.58	\$32.18

Table 32a. AMENDED FALLOW DEER NUMBERS

FEMALES - Total	61114	MALES - Total	19696
Initial Number of Weaners	11772	Initial Number of Weaners	11772
Initial Number of Yearlings	8005	Initial Number of Yearlings	3296
Initial Number of 2 Year Olds	3842	Initial Number of 2 Year Olds	376
Initial Number of 3 Year Olds	3247	Initial Number of 3 Year Olds	368
Initial Number of Adults	34249	Initial Number of Adults	3884
 			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
 			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	0.0%
Annual Culling Rate (yearlings)	30.0%	Annual Culling Rate (yearlings)	70.0%
Annual Culling Rate (2 year olds)	50.0%	Annual Culling Rate (2 year olds)	86.6%
Annual Culling Rate (3 year olds)	13.5%	Annual Culling Rate (3 year olds)	0.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 32b. AMENDED RED and HYBRID DEER NUMBERS

FEMALES - Total	47568	MALES - Total	23148
Initial Number of Weaners	8755	Initial Number of Weaners	8755
Initial Number of Yearlings	8580	Initial Number of Yearlings	3327
Initial Number of 2 Year Olds	5406	Initial Number of 2 Year Olds	898
Initial Number of 3 Year Olds	2595	Initial Number of 3 Year Olds	880
Initial Number of Adults	22232	Initial Number of Adults	9287
 			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
 			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	0.0%
Annual Culling Rate (yearlings)	35.0%	Annual Culling Rate (yearlings)	60.0%
Annual Culling Rate (2 year olds)	50.0%	Annual Culling Rate (2 year olds)	71.0%
Annual Culling Rate (3 year olds)	18.4%	Annual Culling Rate (3 year olds)	0.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 32c. AMENDED RUSA DEER NUMBERS

FEMALES - Total	8557	MALES - Total	3122
Initial Number of Weaners	1545	Initial Number of Weaners	1545
Initial Number of Yearlings	1514	Initial Number of Yearlings	510
Initial Number of 2 Year Olds	1029	Initial Number of 2 Year Olds	87
Initial Number of 3 Year Olds	443	Initial Number of 3 Year Olds	85
Initial Number of Adults	4026	Initial Number of Adults	896
 			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
 			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	0.0%
Annual Culling Rate (yearlings)	30.0%	Annual Culling Rate (yearlings)	65.0%
Annual Culling Rate (2 year olds)	55.0%	Annual Culling Rate (2 year olds)	81.0%
Annual Culling Rate (3 year olds)	13.5%	Annual Culling Rate (3 year olds)	0.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 32d. AMENDED CHITAL DEER NUMBERS

FEMALES	2742	MALES - Total	1535
Initial Number of Weaners	501	Initial Number of Weaners	501
Initial Number of Yearlings	491	Initial Number of Yearlings	240
Initial Number of 2 Year Olds	334	Initial Number of 2 Year Olds	79
Initial Number of 3 Year Olds	143	Initial Number of 3 Year Olds	62
Initial Number of Adults	1274	Initial Number of Adults	653
 			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
 			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	0.0%
Annual Culling Rate (yearlings)	30.0%	Annual Culling Rate (yearlings)	50.0%
Annual Culling Rate (2 year olds)	55.0%	Annual Culling Rate (2 year olds)	65.0%
Annual Culling Rate (3 year olds)	15.5%	Annual Culling Rate (3 year olds)	20.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 32e. AMENDED ELK/WAPITI NUMBERS

FEMALES - Total	3485	MALES - Total	2102
Initial Number of Weaners	636	Initial Number of Weaners	636
Initial Number of Yearlings	623	Initial Number of Yearlings	305
Initial Number of 2 Year Olds	611	Initial Number of 2 Year Olds	116
Initial Number of 3 Year Olds	415	Initial Number of 3 Year Olds	90
Initial Number of Adults	1201	Initial Number of Adults	954
DEATH RATES			
Weaner Death Rate	2.0%	Weaner Death Rate	2.0%
Yearling Death Rate	2.0%	Yearling Death Rate	2.0%
2 Year Old Death Rate	2.0%	2 Year Old Death Rate	2.0%
3 Year Old Death Rate	2.0%	3 Year Old Death Rate	2.0%
Adult Death Rate	2.0%	Adult Death Rate	2.0%
CULLING RATES			
Annual Culling Rate (weaners)	0.0%	Annual Culling Rate (weaners)	5.0%
Annual Culling Rate (yearlings)	0.0%	Annual Culling Rate (yearlings)	50.0%
Annual Culling Rate (2 year olds)	30.0%	Annual Culling Rate (2 year olds)	60.0%
Annual Culling Rate (3 year olds)	23.5%	Annual Culling Rate (3 year olds)	20.0%
Annual Culling Rate (Adults)	0.0%	Annual Culling Rate (Adults)	0.0%
Age Females Finally Culled (yrs)	16	Age Males Finally Culled (yrs)	16

Table 32f. BASE WEANING RATES USED

Weaning Rate (2 year olds)	65.0%
Weaning Rate (3 year olds)	70.0%
Weaning Rate (adult olds)	75.0%

11. APPENDIX 2 - Population Estimates

GENERAL

All survey response data was recorded as 'Actual' data on the DMS program.
All other information supplied was recorded as an 'Estimate'.

SOURCES OF ESTIMATED DATA

1. DIAA membership records from 95/96 where some members supplied summary figures for breed and sex.
 - 1.1 Where only a lump sum figure was supplied with no break-up into species ie 300 deer, (there were very few in this category) the percentage break-up of each species per State (as there is considerable variation between States) derived from the 'Actual' survey information provided, was applied to the lump sum figure.
 - 1.2 The same strategy was employed when supplied with a lump sum for a breed, ie 250 Red. The percentage of male to female within each breed was calculated from the 'Actual' data and applied to the lump sum figure.
 - 1.3 All DIAA members who responded to the survey were removed from this list to avoid a double up.
2. DIAA-NSW Branch supplied a list of 'known deer farmers' (who had not responded to the survey) with an 'educated' estimate of the breed and number of deer farmed by each farmer.
 - 2.1 From the list provided by the NSW Branch, those who had supplied their own figures through the DIAA (refer No. 1) were crossed off the list to avoid a double up
3. DIAA-WA Branch similarly supplied a list of 'non-respondents' with an estimate of deer numbers, breed, property hectares and deer hectares. Once again those who supplied their own figures through the DIAA membership were removed from this list.
4. QLD DPI survey conducted shortly before the national survey provided a benchmark for estimates and their break-up. (*detailed later*)
5. SA DPI registration figures provided a benchmark for estimate figures
6. WA Dept of Agriculture registration figures provided a benchmark for estimate figures.
7. Tasmanian Deer Farmers Council TDFC provided benchmark figures for their State.
8. Some individuals supplied estimates at a local level. (eg Neighbouring properties)

ESTIMATED DATA

Estimate Data was entered on the following basis derived from **averaging** 'Actual' figures.

[For **reporting** purposes the **total** 'Estimate' figure has been divided in accord with 'Actual' results for each age group to provide a more accurate figure. Applying this principle to each individual entry proved impossibly fiddly, time consuming and ultimately less accurate]

RED

36% MALE: 33.3% 0-1 YRS (WEANERS)
66.6% 2-3 YRS

64% FEMALE: 22% 0-1 YRS (WEANERS)
78% 4-5 YRS

FALLOW

25% MALE: 33.3% 0-1 YRS (WEANERS)

75% FEMALE 22% 0-1 YRS
78% 3-4 YRS

SLAUGHTER FIGURE ESTIMATES

Most respondents supplied a 'liveweight'... **or**... 'HCW' figure. A dressing percentage was therefore necessary to convert figures for comparison. Percentages were calculated from a combination of processor knowledge on the following basis:

Rusa	58%
Red, Fallow, Elk/Wapiti, Hybrid,	54%

Many people provided slaughter numbers with no indication of weight. The DMS program is not able to include slaughter figures in reports unless corresponding weights attached, or the outcome will be distorted.

Weights were estimated on the following basis: HCW:

RED

MALE	FEMALE
<1 55kg	<1 40kg
1-2 65	1-2 45
2> 80	2> 50

FALLOW

MALE	FEMALE
<1 24kg	<1 22kg
1-2 28	1-2 24
2> 34	2> 26

RUSA

MALE		FEMALE	
<1	40kg	<1	nil kg
1-2	45	1-2	38
2>	48	2>	43

CHITAL

MALE		FEMALE	
<1	35kg	<1	20kg
1-2	55	1-2	27
2>	90	2>	33

HYBRID

MALE		FEMALE	
<1	59kg	<1	52kg
1-2	68	1-2	59
2>	91	2>	65

STATE ESTIMATES**QUEENSLAND ESTIMATES (Postcode 4000)**

QLD DPI figures indicated 20,403 deer were farmed in the State.

DPI figure		20403
Less		
	Survey	Actuals
		7439
		Estimates
		3520
Balance		9444

The Balance was divided between breeds and sexes in accord with DPI survey results.

Those QLD deer farmers who were Direct members of the DIAA were included in survey actuals & estimates therefor none of the balance was allocated to the DIAA. The balance has since changed with QLD now holding DIAA Associated membership status.

TASMANIAN ESTIMATES (Postcode 7000)

Tasmanian Deer Farmers Council (TDFC) advised the following:

- i) Herd structure for the fallow deer population:

Male	3000	or	19%	
Female	9000		56%	
Yearlings	4000		25%	-12.5% Male 12.5% Female
Total	16000		100%	
- ii) Deer Farmers 164

iii)	TDFC membership	80%
	TDFC figures	16000
	Less	
	Survey 'Actuals'	5494
	Balance	10,506

TDFC is represented by the DIAA through Associated membership therefor the Balance was broken up the following fashion in accord with the nominated 80% representation:

DIAA		8405	NON DIAA2101	TOTAL 10506
Male	19%	1597	399	
Female	56%	4706	1177	
<1yr male	12.5%	1051	262	
<1yr female	12.5%	1051	263	

VICTORIA

No information supplied.

An educated guess derived from various reports including The Deer Industry Strategic plan indicated that approx. 25,000 deer were not accounted for in the 'Actuals'. Estimates amounted to 9524. The balance of 15,476 was distributed in accord with previous principles.

WESTERN AUSTRALIA

WA Dept of Agriculture registration figures indicated 16,000 deer.

A combination of 'Actual' and 'Estimate' survey figures supplied came to a total of 16,434.

NEW SOUTH WALES

Rural Lands Protection Board (PP board) figures indicated a NSW deer population of 49,292.

Survey Actual & Estimate results came to:

$$\text{Actual } 39,248 + \text{Estimate } 16,925 = \text{Total } 56,173.$$

This seems a feasible variation as stock numbers are inclined to be assessed conservatively where a fee is associated with data collection related to number present.

SOUTH AUSTRALIA

Consultation with SA DPI indicated that survey 'Actuals' and 'Estimates recorded were in accord with their registration figures and previous estimates.

11. APPENDIX 3 - Estimation of the number of deer processed

Data collected by the project includes the total hot carcass weight (HCW) of venison processed by species and within weight ranges. The information is collected from most processors and is believed to represent at least 90% of all venison processed within Australia.

To estimate the number of animals processed, an average HCW weight was determined for each weight range of each species. The total HCW for each weight range was divided by the average HCW for the range to provide an estimate of the number of animals processed within that weight range for that species.

Table 33a - HCW (kgs) ranges and average used for Red and Hybrid deer.

Lower limit	25	40	45	50	55	60	65	70	75	80	85	90	95	100
Upper limit	39.9	44.9	49.9	54.9	59.9	64.9	69.9	74.9	79.9	84.9	89.9	94.9	99.9	104.9
Average used	32.45	42.45	47.45	52.45	57.45	62.45	67.45	72.45	77.45	82.45	87.45	92.45	97.45	102.45

Table 33b - HCW (kgs) ranges and average used for Fallow deer.

Lower limit	16	20	23	26	29	32
Upper limit	19.9	22.9	25.9	28.9	31.9	34.9
Average used	17.95	21.45	24.45	27.45	30.45	33.45

Table 33c - HCW (kgs) ranges and average used for Rusa deer

Lower limit	20	25	30	35	40	45	50	55	60
Upper limit	24.9	29.9	34.9	39.9	44.9	49.9	54.9	59.9	90
Average used	22.45	27.45	32.45	37.45	42.45	47.45	52.45	57.45	75

COMPENDIUM SUMMARY

Objectives

To develop and implement strategies that will consolidate and expand production of Australian deer products and position the Australian deer industry as a commercial livestock industry which complements Australia's traditional livestock industries.

Background

The Australian deer industry's background has been well documented. The appointment of the Venison Market Development Manager (VMDM) in 1992 not only led to a significant increase in the domestic consumption of venison but also to a dramatic increase in the international demand for Australian venison. Australian production of deer velvet also increased to almost 18 tonnes in 1995/96.

Despite the creation and development of new markets for Australian deer industry products, the supply of products, particularly venison was maintained in part, by the slaughter of young breeding females which as resulted in a continuing depletion of the industry's female breeding herds. To maintain existing venison markets in the short term and increase them in the long term, the industry's top priority was to increase the size and production capacity of the national herd according to industry Quality Assurance standards. This priority led to the appointment of the Industry Development Manager to undertake this project.

Methodology

The four major components to the project were: (i) implement strategies to increase the size of the National deer herd; (ii) establish a comprehensive industry data base of accurate industry statistics; (iii) the establishment of a centralised data transfer centre; and (iv) undertake training programs to educate industry members of the need for increased production, efficiency and quality of production.

Outcomes

Six months into the two year project the industry experienced a significant downfall in product prices which in turn reduced returns to growers. The industry remains in a state of depression at the end of project. However a range of strategies to increase the deer herd have been undertaken. They include the development of a series of seven technical and investment manuals and the reproduction of a range of product promotional material. A data base on industry statistics that comprises a mixture of actual and estimated data has been compiled. This information is used to predict industry growth and likely turn off. The Deer Industry Company has established its office as a data transfer centre and maintains technical, statistical, reference and quality assurance data bases. An industry Quality Assurance Program has been implemented and its promotion to industry is ongoing. Statistical data collected includes industry information on average venison prices by carcase weight range within breeds.

Implications

In summary, the major requirements for industry stability and renewed confidence include; (i) a reduction of the number of people and groups competitively marketing Australian product; (ii) grower commitment to ensure animals meet minimum processor specification; (iii) collective commitment of industry to quality assurance program; (iv) development of strategic alliances between groups of growers and selected processors; and (v) processor commitment to long term market development programs and prompt payment to growers for stock.

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