



RIRDC Completed Projects in 2002 - 2003
and Research in Progress as at June 2003

Sub-Program 2.3

DEER

August 2003
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Foreword

This year RIRDC has produced *Research in Progress, June 2003*, which contains short summaries of continuing projects as well as those that were completed during 2002 - 2003 for all of the Corporation's 19 program areas.

The complete report on all the programs is only available in electronic format on our website at <http://www.rirdc.gov.au>

The following report is a hardcopy extract covering sub-program 2.3. It contains all entries from continuing and completed Deer research projects funded by RIRDC – Deer. This program aims to foster an Australian deer industry as a highly profitable and efficient mainstream agricultural enterprise.

This report is an addition to our extensive catalogue of almost 900 research reports, videos and CD-Roms of projects supported by RIRDC. Please contact us for the latest publications catalogue or view it on our website.

- downloads at www.rirdc.gov.au/reports/Index.htm
- purchases at www.rirdc.gov.au/eshop

Simon Hearn
Managing Director
Rural Industries Research and Development Corporation

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2.3 DEER COMPLETED PROJECTS

Improve the Profitability of the Australian industry for all stakeholders

Project Title:	Improving Deer Industry Profitability
RIRDC Project No.:	DIP-5A
Researcher:	Chris Tuckwell
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Objectives	<p>To continue the improvement of deer farmer profitability and increase new interest in the industry by:</p> <ul style="list-style-type: none"> • Ongoing collection, interpretation and reporting of deer industry statistics and databases • Regular reporting of project outcomes and industry activities to media and industry stakeholders • Reproducing new industry QA manuals produced by DIP-3A part B for dissemination to industry • Producing computer CD's that holds an electronic format of new manual • Encouraging and training new industry QA facilitators as required • Updating the accreditation status of existing facilitators
Background	<p>New interest in the Australian deer industry is largely dependent on clearly demonstrated, sustainable farm profit and favourable long-term market supply and demand estimates. The expansion of the industry in Australia will continue to be dependent on promulgation of positive market information and development of marketing and production strategies based on accurate records. Industry commitment to its QA programs is evidenced by its commitment to rewriting existing manuals including the recognition of HACCP requirements and the production of a computer record-keeping program for farmers who adopt the program (RIRDC project DIP-3A part B). This project seeks to reproduce manuals, both in electronic and hard copy formats for distribution to existing manual holders and for new QA accreditation.</p>
Research	<p>Project methodology included:</p> <ol style="list-style-type: none"> 1. Maintenance of deer industry databases, including those related to industry QA, service provider lists, technical resources, venison statistics and velvet statistics. 2. Regular and open reporting of market and other information to industry. 3. Reproduction and dissemination of new manuals developed by RIRDC project DIP-3A part B 4. Production of the new manual in electronic format to assist distribution and to allow manuals to be displayed on RIRDC and DIAA Internet Web sites. 5. Visits to all facilitators to upgrade their accreditation.

Outcomes

Database development has continued and statistical data has been collected and reported to industry. Slaughter statistics collected from 1999 coupled with velvet production statistics have allowed some amendment of industry population estimates provided in the report of RIRDC project DIP-1A (The Development of the Deer Industry as a major Australian livestock industry). Best estimates suggest the Industry's current population has fallen and venison production is unlikely to increase significantly during the next two or three seasons unless a temporary increase occurs for sale of breeding stock.

RIRDC project DIP-3A part B (Venison Quality Assurance) reviewed and updated all industry QA manuals, including the addition of HACCP sections in each manual and developed a computer database program that will allow those who participate in the industry farm and QA program to easily record, store and report on all information required by the program.

Amended manuals and a copy of the new computer database program (Deer QAMA) have been provided to all registered manual holders during the period of the project. Deer industry Quality Assurance Facilitators have been made aware of amendments to the manuals and have been trained in the use of Deer QAMA.

The Australian Competition and Consumer Commission (ACC) and the Trade Marks Office have finally accepted and registered the distinctive industry quality assurance accreditation marks for venison, velvet antler (one for processed antler and another for unprocessed antler), deer farms and deer transports. Documentation for the use of each mark exists (prepared as part of previous projects) and now the Deer Industry Company must determine how to make marks available for those who wish to use them and how the use of each mark will be audited.

Implications

Australian deer farmers should seek to ensure that their QA programs continue to evolve and remain relevant to the international and domestic communities that consume the Industry's products. Future risks to international market access for agricultural commodities that are unable to guarantee consumer safety, meet minimum quality standards and consumer expectations with respect to animal welfare issues are increasingly obvious.

Australian Deer Industry research and development programs should also seek to improve average returns to farmers by concentrating their efforts on factors they can easily influence. Information presented in this report further emphasises outcomes of the 2000 report. In particular, data shows the significant reduction in farmer returns that result for processing animals with less than ideal carcass weight. Carcass weight and carcass quality generally is the major factor over which farmers have direct control. Extension programs should concentrate on promulgation of information that can profitably improve carcass trait and subsequently grower returns

Improve on farm production efficiency

Project Title: Evaluation of Diagnostic Tests for Johne's Disease in Deer	
RIRDC Project No.:	DAV-194A
Researchers:	Chris Schroen, Jacek Gwozdz, Tracey Bradley, Robin Condon.
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Objectives	To evaluate and optimise the currently available diagnostic tests for the detection of <i>Mycobacterium paratuberculosis</i> in deer for whole herd testing.
Background	Johne's disease (JD) is a chronic bacterial disease of ruminants that infects the intestine and other regions. Subclinical infection usually exists for several years before an infected animal will produce a positive result by current diagnostic tests. In 2000, JD was detected in deer for the first time in Australia and subsequently 6 infected deer herds have been identified in Victoria.
Research	<p>Two existing diagnostic tests used for cattle and sheep were modified and evaluated for use with deer. Their performance was evaluated by comparison with individual faecal culture (IFC) which is the current standard test for the diagnosis of JD in live deer and by comparison with tissue culture (TC) and/or histopathology (HP) following necropsy examination.</p> <p>The commercially available absorbed ELISA kit (Parachek, CSL) was modified by replacing the bovine conjugate with either more concentrated anti-bovine conjugate, Protein G or rabbit anti-deer conjugate. Agar gel immuno-diffusion (AGID) was also evaluated against the ELISA and faecal culture. Faecal culture was evaluated as IFC and as pooled faecal culture (PFC) of 5, 10 and 20 animals containing faeces from one <i>M. paratuberculosis</i> infected deer. Quantification of the number of <i>M. paratuberculosis</i> organisms excreted in faeces of infected animals was undertaken using faeces from 39 infected animals.</p>
Outcomes	The most sensitive method for confirming deer to be infected with <i>M. paratuberculosis</i> was slaughter and culture of tissues and next sensitive was HP examination of affected lymph nodes and intestinal tissues. IFC was positive for 50% of infected deer tested by both TC and IFC. To achieve a specificity for the ELISA, a cut-point similar to the cut-point for sheep (OD = negative control plus 0.2) was selected and this had a sensitivity of 38.4% for concentrated bovine conjugate, 38.4% Protein G and 40.7% deer conjugate with specificity of 99.97.6% and 96.7% for these conjugates respectively. The concentrated bovine conjugate appeared to have marginally better sensitivity and specificity than Protein G or deer conjugates. The AGID test sensitivity and specificity was 20.5 % and 100%. The AGID detected only those animals with high concentration of antibodies. The average concentration of <i>M. paratuberculosis</i> in faeces from deer with clinical signs of JD was 5×10^6 CFU/g and for other deer with subclinical infection the concentration of <i>M. paratuberculosis</i> in faeces varied from 10^1 to 10^6 CFU/g. For specimens with concentrations of organisms close to the detection limits of faecal culture it was not always possible to reisolate <i>M. paratuberculosis</i> after the faeces had been frozen at -20°C .

PFC detected 54-60% of infected animals previously found to be IFC positive.

While both faecal culture and ELISA are suitable as whole herd tests to detect infected herds neither test is capable of detecting a large proportion of infected deer in a single test. Repeat testing is required to provide greater confidence in negative herd test results.

Implications

Both the absorbed ELISA, IFC and PFC were found to be suitable for the diagnosis of JD in deer. The absorbed ELISA modified for deer had sensitivity from 37.5 to 40% and specificity 96.7 to 99%. PFC was useful as a diagnostic technique for identifying infected herds where herd prevalence is greater than 5.6%. Given that the performance of the absorbed ELISA, IFC and PFC of 5, 10 or 20 animals are equivalent to comparable tests where applied for other species, the tests were found to be suitable for the diagnosis of JD in deer. Consequently absorbed ELISA, IFC and PFC are recommended tests for JD market assurance testing in deer herds.

Publications

Papers will be published in the Australian Veterinary Journal.

Project Title:	Near Infrared Reflectance Spectroscopy: Applications in Deer Nutrition
RIRDC Project No.:	UQ-109A
Researcher:	Gordon Dryden
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Objectives	To review the application of NIR spectroscopy to agriculture and its potential application to the deer farming industry in Australia, particularly deer farming based on temperate pastures.
Background	Deer farmers can maximise the profitability of their enterprises by using nutritional management to optimise the liveweight and condition of their slaughter animals, and to ensure that calving rates are maximised. NIR spectroscopy is an accurate, rapid and relatively inexpensive way of predicting the nutritive value of animal feeds. Faecal analysis by NIR spectroscopy (faecal profiling) is a powerful tool for describing an animal's nutritional status, and has been successfully used with cattle and deer in the US and Australia.
Research	The current literature on NIR spectroscopy was reviewed. Discussions were held with the Texas A&M University group which is responsible for the beef cattle faecal profiling service presently available in the North America.
Outcomes	NIR spectroscopy and its use in feed analysis and faecal profiling is reviewed in this report. Emphasis is given as appropriate to its use in the deer industry.
Implications	NIR spectroscopic methods should be developed for the analysis of deer foods and for a faecal profiling service for the Australian deer farming industry. An NIR-based nutritional expert system should be developed to give information which is timely and relevant to individual deer farms.

Develop domestic and international markets for processed deer antler

Project Title:	Velvet Antler – a summary of the reported health benefits
RIRDC Project No.:	DIP-10A
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Email:	cdtuckwell@bigpond.com
Objectives	Objectives were (i) review and summarise information reported in available literature reviews related to deer velvet antler deer with particular consideration of its benefits for human and animal health and (ii) produce an educational pamphlet for public use that outlines the composition, product forms and medicinal benefits of processed deer antler and a list of references for those wishing to do further investigation
Background	Previous RIRDC funded research identified potential demand for the sale and consumption of deer velvet related products in Australia. Initial sales will be through traditional medicine shops and tourist outlets mainly to resident Australians of Asian descent and from Asian tourists. These people are aware of the relative benefits and traditional use of these products and sales will be related to exposure to the product and price rather than explanations extracted from Western medical research. The project aims to provide information to Australian clients that are not of Asian origin but who have interest in alternative medicine. Information that is currently available on the market often relies on unsupported and anecdotal information that may infringe TGA guidelines. There is an increasing body of supported scientific information available from Australian and overseas research that was summarized and reported at the recent Velvet Antler Symposium in Canada. The research work continues to validate, support and provide an increasing acceptance for some of the traditional claims made for deer antler products. The pamphlet summarizes information in a generic form relating to product safety, product type, product use and medicinal benefits. Its format allows its use as a first introduction for new clients. It also contains references for those who wish to do further reading.
Research	A review of scientific literature and other available information (Internet) relating to the chemical composition, safety, product types and consumer benefits of deer antler products was undertaken. Five thousand copies of a pamphlet containing details of consumer benefits, product types (powder, slice etc) common chemical analyses, safety etc as well as a list of references for further reading were produced and distributed to Industry organisations and commercial companies
Outcomes	Production of an appropriately researched pamphlet that is a useful tool to inform clients of the potential benefits of velvet antler and refer them to objective research data that supports information provided in the brochure. The pamphlet provides information about the strict industry quality assurance programs that guarantee the quality of velvet antler produced in Australia and the strict code of practice for the welfare of deer in Australia. The pamphlet has been distributed to industry. The deer industry bookshop holds extra copies of the pamphlet for ongoing use by industry. The project report summarises an increasing body of supported scientific information

Implications

available from Australian and overseas research that continues to validate, support and provide an increasing acceptance for some of the traditional claims made for deer antler products. The report provides a detailed list of references for those who wish to do further reading.

Until now, information on velvet antler available to the market often relied on unsupported and anecdotal information that may infringe TGA guidelines. Information provided in this report may assist TGA consideration of applications linked to velvet antler.

2.3 DEER RESEARCH IN PROGRESS

Improve the Profitability of the Australian industry for all stakeholders

Project Title	Improving Deer Industry Profitability through Research Uptake - Pilot Project
RIRDC Project No.:	CAM-1A
Start Date:	9-Jan--01
Finish Date:	30-Aug-03
Researcher:	Gaye Cameron
Organisation:	PO Box 269 SOMERS VIC 3027
Phone:	(03) 5983 2030
Fax:	(03) 59832030
Objectives	<ul style="list-style-type: none"> The project will consider the farming enterprise from the viewpoints of 'Costs and Production, Production Techniques and Marketing' and implement the existing research data to improve the industries profitability. The project will (i) analyse the costs of production, and set benchmarks as industry standards. (ii) address the production issues of meeting carcass specifications and weaning percentages, and (iii) assist farmers to market their products at the optimal time.
Current Progress	<p>The Gippsland Discussion Group has had three meetings this year.</p> <ol style="list-style-type: none"> 1. At the Mc Millan Campus in Warragul. This venue gave us the opportunity to go over some of the theory on how grass grows. Ten members attended to hear Lionel Champion talked about the early history of the deer industry in New Zealand. Lionel a deer farmer near Yarragon, is a velvet buyer, he outlined the specifications and presentation required. 2. The March Meeting attended by 27 members was held at Ross and Dianne Lawrence Neerim in conjunction with the Annual General Meeting for the Warnham and Woburn meeting. Members are making an effort to improve their farm report to the group with the use of the Kilograms of Dry Matter for pasture, fat score for the animals, energy value of the silage or supplements being fed, and weaner weights. David Beckwith the President of the Warnham and Woburn Society talked about genetics and line breeding. The benefits of cross breeding were discussed particularly the benefits of hybrid vigor. 3. Sarah Morgan hosted the May meeting. Twenty members attended. The quest speaker was invited to speak about the criteria to be eligible to become a primary producer for tax purposes. This is the first time we have had an invited speaker. <p>Three meetings held by the South West Discussion Group</p>

1. Richard and Sue Coffin near Ballarat. Twelve members attended. Richard is a grader at the velvet pools. He gave a talk on velvet preparation for the pools. He has set a good example of how to produce velvet showing us stags in excellent condition.
2. Jeff and Josie Varcoe in South Australia, fourteen members attended. The South West group covers such a large area often people near the venue on the day come along so the participants change. It was an opportunity for the SA to attend and share knowledge and experiences. Jeff had deer in good condition feeding them green chop maize.
3. Trevor and Kylie Picken near Chetwynd. Thirteen members attended. Trevor had attended a livestock handling course. He outlines the theory behind mustering stock and the benefits of reducing stress on both animals and owners.

Ten Farmers entered their business figures for analysis. Interesting discussion was held on the group meeting day. Deer industry benchmarks were compared and found to be similar to other grazing enterprises.

Project Title	
Deer Production Handbook and Industry Statistics	
RIRDC Project No.:	DIP-9A
Start Date:	01-Aug-02
Finish Date:	08-Aug-03
Researcher:	Chris Tuckwell
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Email:	cdtuckwell@bigpond.com
Objectives	<p>To continue the improvement of deer farmer profitability by:</p> <ul style="list-style-type: none"> • Production of a Deer Production Guide that will present up-to-date technical information and findings of research in a practical and readable form that will assist the commercial application of research results. • Production of the Deer Production Guide as a PDF file that can, in the future, be linked by hypertext to an annotated bibliography maintained as separate file on a CC-ROM. • Ongoing collection, interpretation and reporting of deer industry statistics and databases.
Current Progress	<p>The collection and dissemination of industry statistics is ongoing and information is reported though the deer industry magazine and RIRDC newsletter as it is available.</p> <p>An editorial committee was established to review draft contents of the book to consider technical accuracy of information and its suitability for its intended farmer audience. Committee membership included industry researchers, veterinarians and extension specialists with particular interest in aspects of the Australian deer industry. The editorial committee as well as other selected industry leaders approved the contents of the book and the book is with the printer now.</p> <p>Printing is expected to be complete by 25th July 2003.</p> <p>A draft final report for the project has been written that included a detailed summary of industry venison and velvet statistics.</p>

Project Title	
Generic investment proposal development	
RIRDC Project No.:	DIP-12A
Start Date:	01-Aug-02
Finish Date:	08-Aug-03
Researcher:	Chris Tuckwell
Organisation:	Deer Industry Projects & Developments Pty Ltd PO Box 1105 GAWLER SA 5118
Phone:	(08) 8523 3500
Fax:	(08) 8523 3301
Email:	cdtuckwell@bigpond.com
Objectives	To develop a business plan for the Australian Deer Industry that can be used to attract large corporate and financial institution investment into deer farming and to seek investment on the basis of the proposal.
Current Progress	<p>The project has completed a review of deer industry statistics from RIRDC funded deer industry development projects and other appropriate papers.</p> <p>Development of the investment proposal is based on the establishment of an enterprise with high quality stock that are managed according to best practice principals. Production, income and expenditure data generated by the investment enterprise is currently included in the 'RIRDC Profit Program' for comparison with industry benchmarks developed by that program.</p> <p>A spreadsheet model has been developed to allow assessment of alternate production options and to allow reasonable assessment of financial data for the investment.</p> <p>A draft business investment plan has been developed, considered by industry representatives. Based on editorial comments, variable inputs in spreadsheet model have been adjusted to ensure reasonable production and costs are used. The plan was edited and again reviewed by appropriate industry representatives.</p> <p>An investment review specialist nominated by representatives of the Superannuation industry is currently reviewing the draft.</p> <p>Development of a PowerPoint © presentation for use with the proposal has begun but will not be completed until the business investment plan is finalised.</p>

Improve on farm production efficiency

Project Title	
Determining the tolerance of red and fallow deer to salt	
RIRDC Project No.:	SAR - 26A
Start Date:	1-Jul-00
Finish Date:	30-Aug-03
Researcher:	Dr Yingjun Ru
Organisation:	South Australian Research and Development Institute
Phone:	(08) 8303 7787
Fax:	(08) 8303 7977
Email:	ru.yingjun@saugov.sa.gov.au
Objectives	<ul style="list-style-type: none">• To examine the effect of salt intake in drinking water and feed on feed intake and growth rate of fallow and red deer under grazing conditions,• To disseminate research outcomes to deer farmers by field days, fact sheets, seminars, workshops and scientific publication,• To improve profitability and sustainability of the deer industry
Current Progress	<p>An experiment with red deer is under way. A total of 20 weaners (red deer) were divided into four groups based on body weight and fed <i>ad libitum</i> on a commercial deer diet. Two groups were offered fresh water as the control, and the other two groups were offered water with added salt. Salt concentration in water is being adjusted every two weeks, increased gradually from 0.4%, 0.8%, 1.2% until there is a noticeable decline in feed intake. Deer were weighed before being offered the salty water and on the day when salt concentration was increased in the water.</p>

Project Title**Optimum weaning time for fallow deer in southern Australia**

RIRDC Project No.:	SAR - 41A
Start Date:	1-Jan-02
Finish Date:	30-Jun-04
Researcher:	Dr Yingjun Ru
Organisation:	South Australian Research and Development Institute
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Email:	ru.yingjun@saugov.sa.gov.au

Objectives

- To improve growth rate for weaners during weaning,
- To improve profitability of deer farming
- To disseminate research outcomes to deer farmers by field days, fact sheets, seminars, workshops and scientific publication,

Current Progress

A detailed literature review on the effect of weaning time on performance of deer has been completed. This review was submitted to Asian-Australasian Journal of Animal Science for publishing.

Four paddocks (about 5 ha/paddock) were set up on the Bilby Deer Farm (South Australia) in November 2002. A total of 350 does were selected based on their body condition and separated into four groups. The deer were supplemented with hay due to the extreme drought and shortage of feed. The deer started fawning from early December 2003. However, the experiment was terminated on January 14, 2003 for the following reasons; 1) extremely hot weather during the summer caused a very low fawning rate in the herd (only about 20-30 fawns out of 80 does survived), 2) due to the extreme drought conditions, pasture availability was extremely low and a significant amount of supplementary feed was required and 3) as a result of the drought no useful information was generated from this experiment. The experiment will be repeated in 2003.

Facilitate adoption of improved production technologies

Project Title	Upgrade of the Deer QAMA Software
RIRDC Project No.: Start Date: Finish Date: Researcher: Organisation: Phone: Fax: Email:	DIP-11A 01-Aug-02 29-Aug-03 Chris Tuckwell Deer Industry Projects & Developments Pty Ltd PO Box 1105 GAWLER SA 5118 (08) 8523 3500 (08) 8523 3301 cdtuckwell@bigpond.com
Objectives	<ul style="list-style-type: none"> • To continue the improvement of the Australian Deer Industry Quality Assurance program by upgrading the existing Deer QAMA software program that will improve the capability of the software and in particular provide deer farmers with a previously unavailable ability to: <ul style="list-style-type: none"> - Record, store report and analyse data related to animal body weights. - Record, store report and analyse data related to velvet antler production. - Undertake some statistical analyses of body weight and velvet weight data, particularly related to pedigree assessment. • A bridging program will be developed to allow current users to upgrade their existing program without losing any data. • The project will also seek to register the Deer QAMA name as a Trademark owned by the Deer Industry Company on behalf of the Deer Industry Association of Australia.
Current Progress	<p>A new application for Deer QAMA II is in development. The change from the use of the <i>Borland Database Engine</i> and <i>Paradox Tables</i>, as used in the first version of Deer QAMA, was necessitated by the need to make the Deer QAMA II database useable on future operating systems after <i>Windows</i> is no longer available and <i>.NET</i> is used instead.</p> <p>The <i>Firebird SQL Server</i> database engine will also allow the database to be used by multiple users and can be placed on a server computer. It has a transactional capability and triggers that provide for increased integrity, is faster and more reliable than the BDE and program maintenance is easier.</p> <p>Detailed program specifications were developed to ensure a high quality product including extra specifications not included in the original agreement. Completed aspects Deer QAMA II program development to date includes: Analysis; System Design; Database Design and the Project Plan.</p> <p>An extension to the projects completion date was sought and granted due to illness of the computer programmer. The computer programmer has been asked to provide a written report of progress at the beginning of each month until the project is complete. He has also been asked to provide a computer CD containing all of the up-to-date source codes for the project at the beginning of each month.</p> <p>The new completion date for the project is mid August 2003.</p>

Project Title	Study of the Relationship between body condition score, carcass composition and consumer perception of venison quality
RIRDC Project No.:	UWS-18A
Start Date:	10-Jan-01
Finish Date:	30-May-04
Researcher:	Dr Robert Mulley
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Fax:	(02) 4570 1383
Email:	r.mulley@uws.edu.au
Objectives	<p>A concise overview of the proposal work under the headings of:</p> <ul style="list-style-type: none"> • Outcomes and deliverables of the proposed research • Background, relevance and potential benefits • Research strategies and methodology • Communications/adoption/commercialisation strategy • Time-lines
Current Progress	<p>Data has been obtained from fifty-eight fallow deer that have been slaughtered in body condition score ranges of two (lean) to three (prime). It has become evident that commercial scores of four (fat) are unobtainable in average slaughter age animals, particularly in drought conditions. Experimental techniques have been established for sensory evaluation of venison.</p> <p>From June 2002 to June 2003, thirty-two, 16-20 month old fallow bucks have been processed; twenty-four of which comprise a tenderstretch trial. Twenty four were processed under commercial conditions, twelve in an export graded abattoir and twelve in a non export abattoir and eight slaughtered under experimentally controlled conditions. Data from these trials indicate a difference in ultimate pH of the carcasses between slaughter premises. Those processed in the export graded commercial works were higher, and data is currently being collected on a biochemical and sensory level from the carcasses from these trials. As part of these trials a number of carcasses were tender stretched to compare meat quality parameters with carcasses chilled under normal commercial hanging procedures.</p> <p>It has become evident that producers are no longer castrating fallow bucks and cull does are appearing regularly at some commercial works. The next phase of the project will involve the slaughter of 40 dry, 2-3 year old does of body condition scores ranging from 2 to 3 to establish a relationship of body condition score and venison eating quality in fallow does. Models developed from these experiments will then be applied to red deer venison cuts.</p>