



Australian Government

**Rural Industries Research and
Development Corporation**

RIRDC Completed Projects in 2004 - 2005 and
Research in Progress as at June 2005

Sub-Program 2.7

DEER

Rural
Industries
Research &
Development
Corporation



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Foreword

This year RIRDC has produced *Research in Progress, June 2005*, which contains short summaries of continuing projects as well as those that were completed during 2004 - 2005 for all of the Corporation's 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 2.7. 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 over 1500 research reports 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/fullreports/Index.htm
- purchases at www.rirdc.gov.au/eshop

Peter O'Brien

Managing Director

Rural Industries Research and Development Corporation

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2.3 DEER COMPLETED PROJECTS

Improve on farm production efficiency

Project Title	Optimum weaning time of fallow deer in southern Australia
RIRDC Project No.:	SAR-41A
Researcher:	Dr Phil Glatz and Dr Yingjun Ru
Organisation:	South Australian Research and Development Institute
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Email:	Glatz.phil@saugov.sa.gov.au
Objectives	<ul style="list-style-type: none"> • Improve growth rate of weaners during weaning; • Improve profitability of deer farming.
Background	<p>The Mediterranean environment is characterised by wet cold winters and hot dry summers. The herbage availability for grazing deer under such an environment fluctuates with the season, resulting in a low availability of green feed in autumn and winter, a surplus of green feed in spring, and a dry feed period in summer/autumn. Deer in these regions fawn in December and January. Most deer farmers allow fawns to stay with does until natural weaning occurs, but a few farmers wean fawns in May-June. Very few farmers wean their fawns in March.</p> <p>A common question has been posed by deer farmers attending the field days at Roseworthy and at meetings of the South Australian Deer Farmer Association. The farmers question whether they should wean their deer later during May or June to reduce the stress during weaning and to improve performance during the grazing season or should they wean in March to allow does to recover their body conditions for the next reproduction cycle.</p>
Research	<p>An on-farm trial comparing early weaning versus late weaning is being conducted on the Bilby Deer Farm in South Australia. Does were first weighed in November 2003. During 2004 does were weighed in March, May, July, September and November. Fawns were weaned early in March and compared with weight of fawns, which were weaned later in June 2004.</p> <p>In March body weight of does in the early weaned treatment were about 4 kg heavier than does in the late weaned treatment but by May this difference was only 0.7 kg. In September 2004 there was no differences observed in the weight of does on the early and late weaning treatments. Early weaned fawns were 4-5 kg heavier in March and 2 kg heavier in May compared to the late weaned fawns. However in September 2004 there was no difference in the weight of fawns whether they were weaned earlier or later in the year. The body weights of does were similar at the start of the experiment and after the experiment had been completed their body weight was also similar.</p>

Outcomes

The advantages of early weaning were apparent early in the season. However by the end of the season there appeared to be no benefits from early weaning.

Implications

It is suggested that deer farmers undertake a small trial on their own farms to determine if early weaning is beneficial or not, ensuring that handling is kept to a minimum.

Publications

Y. M. Bao*, Y. J. Ru, P. C. Glatz and Z. H. Miao. (2004) The influence of weaning time on deer performance. *Asian-Aust. J. Anim. Sci.* 17:569-581.

Facilitate adoption of improved production technologies

Project Title	
Venison Quality Assurance	
RIRDC Project No.:	DIP-11A
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Objectives	<p>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:</p> <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.
Background	<p>The project sought to improve the original Deer QAMA program. Suggested improvements will assist enterprise management and are also likely to make the program more attractive to international markets.</p>
Research	<p>Project methodology will included:</p> <ol style="list-style-type: none">1. Discussion and negotiation of the requirements for the upgrading of the software of industry representatives with the project's principal researcher and a computer-programming specialist2. Employing a computer-programming specialist to design and produce an upgraded version of the Deer QAMA software program, under the direction of the Principal researcher3. Assessment and testing of the software during its development by selected industry representatives4. Designing the program to allow for future upgrading or amendment should that become necessary.
Outcomes	<p>The 'Deer Quality Assurance Management and Analysis' (Deer QAMA) has been rewritten to allow easier recording, storing and reporting of all information that must be maintained by all businesses accredited by the Deer Industry QA program.</p>
Implications	<p>The upgraded Deer QAMA program helps provide credibility and audibility of the Australian Deer industry QA programs that is required by the marketplace while simplifying the requirements of data entry by users.</p>

Project Title**Dissemination of results of research projects - 2**

RIRDC Project No.: DIP-15A
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Objectives

To continue the improvement of deer farmer profitability by:

- Expanding the series of seminars undertaken during 2003/2004 to disseminate information and encourage uptake of results of research
- The ongoing collection, interpretation and reporting of deer industry statistics and servicing the Venstat program.

Background

The Australian Deer industry continues to pursue broad community acceptance as a profitable, sustainable Australian Livestock industry. However Australian deer farmers have been slow to adopt improved livestock management, handling technologies and pasture management identified by various research projects. This is in part due to information not being effectively communicated to existing and intending producers. The seminar series during 2003/2004 based on The Deer Farming Handbook (DFH) produced by RIRDC project DIP-9A provided people with comprehensive information on industry origins, transport, nutrition, reproduction, pasture management, health, quality assurance programs, handling, body condition scoring, venison production, velvet production, animal selection and the future for the industry. The success of the first seminar series led to a second series of seminars based on the book. The seminars provided deer producers with a practical interpretation of results of research to encourage efficient and profitable deer management. The expansion of the industry in Australia continues to be dependent on objective collection, interpretation and dissemination of positive market information as well as the development of marketing and production strategies based on accurate records like those reported here.

Research

Project methodology included:

- Promotion of the new DFH and the practical interpretation and application of research findings contained within it.
- Updating and amendment of visual aids and training information from information contained in the DFH to run seminars that provide practical interpretations of production related deer research from Australia and throughout the world.
- Development was undertaken in consultation with other industry specialists
- Maintenance of deer industry venison statistics and velvet statistics with regular and open reporting of market and other information to industry and related agricultural interests.

Outcomes

A previously developed set of seven PowerPoint © presentations and associated sets of seminar participant notes were developed for use with the seminars. Notes provide links to relative sections in the DFH. As well, an improved spreadsheet was developed to assist people understand some of the nutrition research and more easily and efficiently estimate feed requirements of their stock.

Implications

The database of industry venison and velvet statistics has continued its development and statistical data has been collected and reported to industry during the year and in this report

Seminars conducted as part of this project have demonstrated that Australian deer farmers clearly thought that they benefited from the seminars and felt that they were better able to understand the information presented and were more likely to implement new technologies and management practices on the basis of their new understanding. Seminar results also suggest only a small percentage of deer farmers are aware of results or RIRDC funded research. It appears the seminars are a valuable tool for promoting, explaining and encouraging the adoption of RIRDC funded research projects.

Statistics not only continue to show the depressed nature of the industry but suggest areas where correct application of research results may help improve the long term prospects for the industry.

Project Title Restoration of Cartilage by Novel Gene Therapy

RIRDC Project No.: MAT-1A
Researchers: Dennis White Prof. Peter Ghosh
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Objectives The ultimate objective of the present study was to evaluate the potential of a recently discovered gene DACC-7 as an appropriate means for transfecting chondrocytes or mesenchymal stem cells which when transplanted into the cartilage defects would result in a successful repair.

Background Articular cartilage has little capacity to spontaneously repair the defects caused by traumatic injuries or necrosis which, if untreated, will eventually lead to osteoarthritis (OA).

The medical management of OA has achieved limited progress in the past decades; the drugs currently available suppressing the symptoms rather than improving the underlying pathology responsible for the symptoms.

More recently researchers have focused on transplantation procedures that offer the potential to repair and restore a new matrix in cartilage defects. By this means it is anticipated that the on-set and/or progression of OA will be ameliorated.

Research We have investigated the functions of this gene at both the cellular and molecular level.

The protocol used for these studies consisted essentially of dissecting articular cartilage and bone marrow from 4 month old NZ white rabbits and establishing colonies of chondrocytes and mesenchymal stem cells in primary monolayer cultures.

These cells were then either transiently non-virally transfected with hDACC-7 or its vector (mock-transfected) using methods already established in our laboratories.

The transfected cells were then grown in the calcium alginate biomatrix beads in readiness for the subsequent transplantation operations.

Three circular osteochondral defects were created in the patella-femoral groove of both joints of a group of female 3-4 month old NZ white rabbit siblings, into which was transplanted either the biomatrix control, the biomatrix containing the seeded transfected chondrocytes or MSC. One of the defects was left unfilled to serve as a non-treated control.

Animals were euthenased at eleven weeks post-surgery, joints dissected out and examined macroscopically, photographed, and

	<p>osteocondral slices, encompassing the defects, cut with a fine band saw.</p> <p>Histological sections were prepared from these blocks and stained with H&E and Toluidine Blue prior to examination and scoring to ascertain the extent of repair using a published scoring system. The protocol for this study was approved by the Animal Ethics Review Committee of the CSIRO Molecular Sciences Division, North Ryde, Sydney, and establishing colonies of chondrocytes and mesenchymal stem cells in primary monolayer cultures.</p> <p>These cells were then either transiently non-virally transfected with hDACC-7 or its vector (mock-transfected) using methods already established in our laboratories.</p> <p>The transfected cells were then grown in the calcium alginate biomatrix beads in readiness for the subsequent transplantation operations.</p> <p>Three circular osteochondral defects were created in the patella-femoral groove of both joints of a group of female 3-4 month old NZ white rabbit siblings, into which was transplanted either the biomatrix control, the biomatrix containing the seeded transfected chondrocytes or MSC. One of the defects was left unfilled to serve as a non-treated control.</p> <p>Animals were euthenased at eleven weeks post-surgery, joints dissected out and examined macroscopically, photographed, and osteochondral slices, encompassing the defects, cut with a fine band saw.</p> <p>Histological sections were prepared from these blocks and stained with H&E and Toluidine Blue prior to examination and scoring to ascertain the extent of repair using a published scoring system. The protocol for this study was approved by the Animal Ethics Review Committee of the CSIRO Molecular Sciences Division, North Ryde, Sydney.</p>
Outcomes	<p>The macroscopic appearance of the joints showed a high level of healing in all defects irrespective of the treatment used. However, the most consistent repair response was obtained for defects filled with DACC-7 transfected mesenchymal stem cells (MSC).</p>
Implications	<p>Although the outcome of this study failed to demonstrate that DACC-7 transfected chondrocytes exhibited <i>superior</i> cartilage healing capacity to other treatments this research has provided critical information which demonstrated that the DACC-7 gene could stimulate pro-chondrocyte division at a higher level than mock transfected cells. Although the underlying mechanism is not clear, the cell division could be precisely controlled as shown in the cell proliferation assay. Therefore, DACC-7 has therapeutic potential for cartilage repair.</p>

Develop international and domestic markets for Australian venison and develop supply chain management

Project Title	National Velvet Accreditation Scheme Database Development
RIRDC Project No.: Researcher: Organisation: Phone: Fax: Email:	DIP-14A Chris Tuckwell Rural Industry Developments Pty Ltd PO Box 1105 Gawler, SA, 1105 (08) 8523 3500 (08) 8523 3301 cdt@bigpond.net.au
Objectives	To develop an interactive database to record store and report on activities of the National Velvet Accreditation Scheme (NVAS).
Background	Prior to the development of the database produced by this project, limited data records for the scheme were recorded in spreadsheet format. However increasing concern by the AVA about the use of S4 drugs has required that more detailed data about the scheme is recorded and the records are maintained in a format that allows a range of detailed reports to be provided on request of the Chairperson of the Scheme.
Research	Project methodology included: <ol style="list-style-type: none"> 1. Development of an easy-to-use Microsoft Access database that records all information required by the NVAS and allows the existing scheme administrator to produce reports as required. 2. Training of the NVAS administrator in the use of the database.
Outcomes	This project has produced a database that allows recording of required data in a format that provides for a range of required reports. The database allows for future addition of new fields including a future requirement to include National Livestock Identification System (NLIS) numbers.
Implications	This database will assist the NVAS in its ongoing program to ensure consumers of deer velvet and the wider community that adequate animal welfare, product traceability, OH&S standards and other QA standards related to velvet production and harvesting are maintained.

Project Title	A domestic market positioning strategy for Australian Venison - A sub-program of RIRDC US-130A
RIRDC Project No.:	LBP-1A
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Objectives	<p>The objective of this project was to capture an initial, current snapshot of Australian domestic consumer and food service industry perceptions of venison. This information will assist and facilitate development of an industry strategic plan that is based on satisfying potential consumer requirements and addressing factors currently limiting demand. The information will also identify core attributes of the product that can differentiate it from competitors and thereby identify a compelling positioning for venison around which a new image for the Australian product can be created.</p> <p>The research aims to provide feedback from potential consumers on:</p> <ul style="list-style-type: none"> • Market awareness of the product, range of uses and image • Key attributes of venison • Opportunities identified in the Limiting Factors Report • A possible new image and positioning for venison.
Background	<p>This research project was designed to explore and collaborate the validity of a number of factors identified in Phase 1, Part 1, of the RIRDC program <i>'Development and Implementation of an Industry Endorsed Venison Strategic Plan for Delivering Future Growth'</i> (US-130A) as reported in <i>'Identification of Growth Limiting Factors'</i> (Limiting Factors Report).</p> <p>The research undertaken in this project on potential domestic consumers represents new information and feedback for the industry.</p> <p>The research also included incorporation of questions from the 1996 and 1997 RIRDC funded market research with chefs, undertaken by L. Tume, to enable a point of comparison on usage and factors for increasing demand.</p>
Research	<p>The research comprised a qualitative study encompassing 29 consumers and 6 chefs plus 4 other catering staff of a commercial catering centre through a series of focus groups. An additional 6 chefs were reached through one on one interviews. The chefs selected were from medium level to high-end restaurants and were regular venison users.</p> <p>This was followed by a quantitative study involving 151 consumers in a guided questionnaire response.</p>
Outcomes	<p>Chefs and food service representatives included in the research were all currently using venison and were positively disposed to the</p>

Implications

product. The overriding factor identified as necessary to increase their existing usage was the need to increase consumer demand. One of the main barriers to increasing customer demand is the very low profile of venison as a red meat among Australian domestic consumers. This concern was also raised by producers and highlighted in the Limiting Factors Report. However, the very positive results from the taste tests, where venison consistently outscored beef indicate that the product has significant potential.

The report identifies a number of potential target markets for venison. The most promising is the 'top end' restaurant market.

The development of a marketing plan to increase the profile of venison and capitalise on the potential of the product should be a priority. The most cost effective marketing approach would focus strategies on identified target markets.

It is also suggested that further research be undertaken into the development of recipes for secondary cuts. Education and information regarding this research should be targeted at chefs in mid level restaurants to facilitate the use of these venison cuts into this level. This would assist in the creation of a new market for venison in mid level restaurants.

The overriding recommendation is for this latest research be used to assist the development of a comprehensive and staged strategic plan as well as a complementary marketing plan. These plans should recognise the variety of potential target markets and be guided by the need to create a compelling market position for venison based around its identified key attributes. Growing demand for venison will need to be supported by the industry working with all stakeholders – producers and suppliers, chefs and potential Australian domestic consumers.

Project Title**Marketing venison products: Trademark and country-of-origin influences and effects**

RIRDC Project No.:
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Objectives

- To review past studies and analyse the relevance and effectiveness of marketing initiatives focusing on country-of-origin (COO) beliefs and behaviour
- To collate and analyse information from past studies that could be used by the Australian venison industry to develop COO based export marketing strategies and tactics

Background

The Australian deer industry has a strong export focus. Nearly 80% of the industry's products are sold into Asian and European markets. Notwithstanding strong competition in export markets, RIRDC believes that there is significant potential to develop export markets for deer products such as venison. The report critically reviews and analyses more than 100 COO studies with the aim of obtaining information that would be useful to the industry in developing venison export marketing plans, strategies and tactics.

Research

Critical review of the literature and analysis of the methodology, context, findings and conclusions in 114 studies on COO based customer beliefs, customer behaviour, marketing strategies and marketing tactics.

Outcomes

The report shows that COO labelling, trademarks and logos combined with appropriate marketing mix (particularly communication) strategies could be useful in market development and market penetration initiatives into some countries and into some market segments in these countries. The venison industry needs to clearly identify the information cues that would generate positive product specific COO beliefs in target markets and develop appropriate marketing mix strategies.

Implications

The report demonstrates the importance of rigorous COO research design (selecting appropriate methods and study contexts) so that marketing strategies and tactics are the outcome of good quality information on target markets and market segments. The report illustrates how the application of inappropriate methodology or study contexts can lead to findings and conclusions that can be misleading. The report provides the Australian venison industry valuable insights regarding COO based customer beliefs and behaviour several countries and for different products.

2.7 DEER RESEARCH IN PROGRESS

Facilitate adoption of improved production technologies

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: 01-Oct-2001
 Finish Date: 14 Oct 2005
 Researcher: Dr Robert Mulley
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 Fax: (02) 4570 1383
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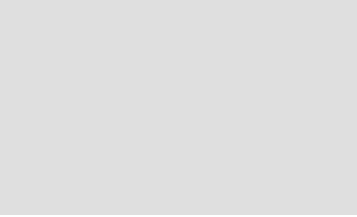
- Objectives**
- Characterise the biochemical and physical attributes of deer carcasses for condition score 2, 3 and 4 (commercial grades) to increase consumer confidence and quality of supply.
 - Develop industry best practice for post slaughter management of carcasses and/or cuts to enhance the three major quality components of venison being tenderness, juiciness and flavour.
 - Determine the impact of supplementary feeding on the eating quality characteristics of venison

- Timelines**
- Data analysis completed on 16th September, 2005
 - Final report to be submitted by 14th October, 2005

Current Progress

A large number of red deer and fallow deer with body condition scores (BCS) ranging from 2 to 4 have been slaughtered, and samples of venison from commercial primal cuts collected for biochemical and sensory evaluation. Some animals were fed concentrates prior to slaughter to determine if supplementary feeding altered the eating quality characteristics of venison. Post-slaughter carcass management involved hanging carcasses by the Achilles tendon, or tenderstretch hanging by suspending carcasses from the aitch bone. All venison was cooked using standard meat preparation methods for sensory testing, and evaluated by panelists who ranged in age between 25 and 55 years old, were meat eaters, and did not smoke within a set period of time prior to testing. The sensory panels were also balanced for male and female participants where possible.

The results indicate that consumers could not tell the difference between venison sourced from animals with BCS 2 and BCS 3 but did prefer venison from higher BCS (4) animals compared with lower BCS (2) animals. Tenderstretch hanging of carcasses produced venison that was more tender in every experiment, compared with carcasses hung by the Achilles tendon (traditional method), and this result was consistent for both red



and fallow deer. Taste panels were able to differentiate between levels of tenderness, and preferred venison from carcasses that had been tender stretched. Venison from tenderstretch carcasses also had lower drip loss from meat cuts tested, and had a higher 'juiciness' rating by consumers. Concentrate feeding of animals prior to slaughter increased the flavour rating according to sensory panelists.

Current Progress

Three published reports from this project have identified numerous factors limiting future growth and sustainability for the Australian venison industry. Some of these include:

- Lack of person, persons, group or organization actively marketing venison in the Australian market
- Overall lack of demand for venison
- Lack of volume available for the domestic market
- Overall high cost of producing venison
- Lack of product meeting "ideal" specifications
- The number of large scale producers within the industry has dropped significantly since the early and mid 1990's
- Enthusiasm within the Australian venison industry is extremely low
- Average farm gate values received for deer fell sharply in 2003/04, largely due to reduced export demand

The Australian farmed venison industry is currently experiencing a significant downturn in both domestic demand and supply despite a buoyant market in competing meats. Factors limiting growth are directly linked to a lack of effective and sustained consumer demand. It is of interest that very few participants surveyed, or reports reviewed have identified the end consumer's requirements at both levels of food service and retail. The researchers believe it is paramount that this information is identified and integrated into any future strategic plan. Work is currently progressing in this area.

Project Title**Scholarship - Tim McRae (Deer)**

RIRDC Project No.: US-132A
Start Date: 31-Jul-04
Finish Date: 30-Jun-06
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Objectives

The purpose of this study is to investigate and identify the Critical Success Factors (CSF) in the development of a strategic plan for the Australian Venison Industry. Research objectives are:

- Identify CSF for the Australian venison industry
- Classify and rank CSF for the Australian venison industry
- Develop recommended actions for addressing the identified CSF

Current Progress

As at the end of May, research into the critical success factors in the development of a strategic plan for the Australian venison industry has been progressing very well.

In early March, an extensive research proposal (see above objectives) was submitted to the University for approval. The proposal included an extensive literature review on the Australian Venison Industry, Critical Success Factor Theory and Strategic Planning for Agricultural industries. Progress on the research topic is ongoing, incorporating feedback from university reviewers.

Research will also draw upon the information contained in the following reports, which have been completed as part of the development of a deer industry endorsed strategic plan:

- Identification of Growth Limiting Factors
- Detailed SWOT analysis and identification of relevant benchmark initiatives from other meat industries
- A situation analysis of the Australian farmed deer industry.