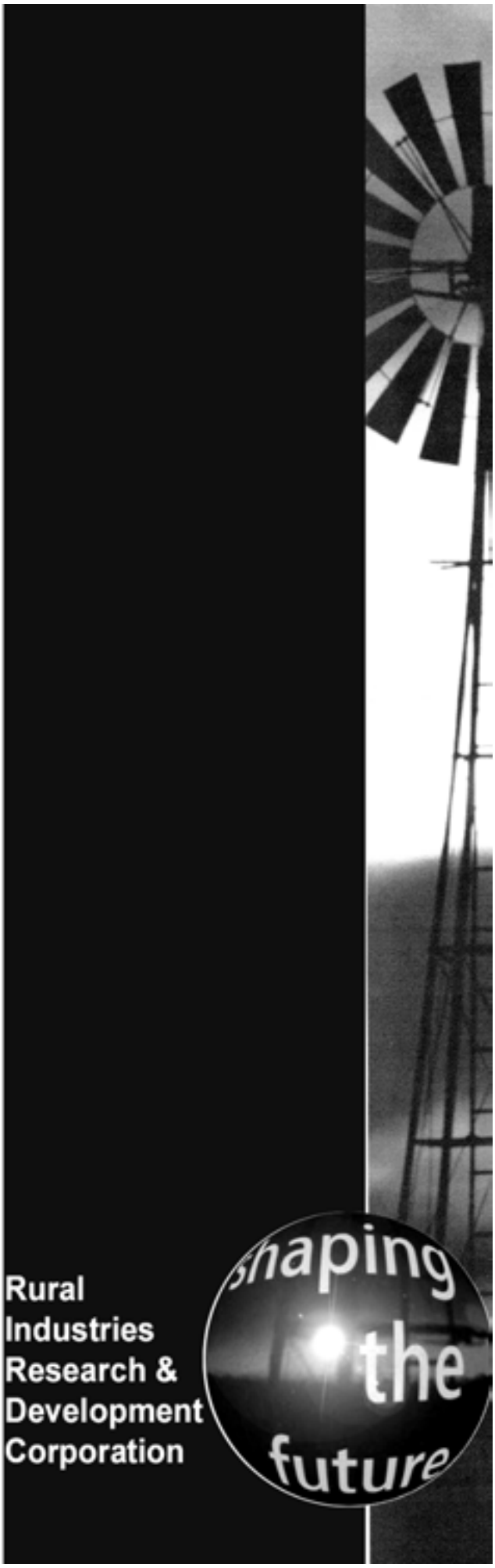

RURAL INDUSTRIES RESEARCH
& DEVELOPMENT CORPORATION

Completed Projects in 1998-1999 and Research in Progress as at June 1999

Sub-Program 2.3

DEER

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Foreword

This year RIRDC has produced *Research in Progress, June '99*, which contains short summaries of continuing projects as well as those that were completed during 1998-99 for all of the Corporation's 20 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 the newest addition to our extensive catalogue of almost 400 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.

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Peter Core
Managing Director
Rural Industries Research and Development Corporation

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2.3 Deer
Completed Projects

Project Title	Adding Value to Venison Forequaters and Trimmings using Cold-Set Binders

RIRDC Project No.:	CSS-1A
Researcher:	Dr Dean Gutzke and Ms Aarti Tobin
Organisation:	Food Science Australia PO Box 3312 Tingalpa D.C. QLD 4173
Phone:	07 3214 2000
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Objectives

- The overall objective of this project was to develop cold-set binding technologies that could be used by processors to add value to under-utilised venison forequarters and trimmings.

Background

Compared to venison primals, venison forequarters and trimmings are sold at a relatively lower price. This meat quite often contains high levels of connective tissue and some small pieces of gristle. The low value of venison forequarters and trimmings reflects the limited commercial uses of this meat in high quality products, which means they are generally in oversupply. Therefore this project was undertaken to develop cold-set binder technologies that would add value to venison forequarters and trimmings. Cold-set binders have the ability to bind small, raw pieces of meat together to form a larger piece of meat, which could be cut into steaks or roasted as a joint of meat.

Research

Two different cold-set binding systems, Alginate and Pearl F, were evaluated. In the alginate system the meat, mainly trimmings, was minced into 2-4cm pieces, mixed with the binder, filled into a casing and held in a chiller overnight for the bind to form. Once the bind had formed, the meat could be cut into steaks for frying or into strips for stir-frying. In the Pearl F system, larger pieces of forequarter meat were dusted with Pearl F, the dusted surfaces stuck together, rolled into a log using a stretchable plastic film and held in the chiller overnight for the bind to form. Once the bind had formed, the product could be cut into steaks, or roasted as a joint of meat. Both products were evaluated for colour, flavour, microbiological status and bind strength.

Outcomes

Both alginate and Pearl F bound products were microbiologically safe, had an acceptable flavour, texture and bind strength. Pearl F bound products had similar colour shelf-life to non-bound venison meat, whereas alginate bound product had a significantly better colour shelf-life compared to minced venison meat. Connective tissue content was often highly variable and required sorting and desinewing prior to use in alginate binding system. The optimum level of desinewed meat in the alginate system was 30%

Implications

The cold-set binder technology can be used to produce higher value venison products from venison forequarters and trimmings. The technology is relatively low cost and versatile, thereby creating opportunities for venison products in the retail, catering, institutional and fast food markets

Publications

The final report for this project has been submitted to RIRDC.

Project Title	The Development of the Deer Industry as a Major Australian Livestock Industry

RIRDC Project No.:	DIP-1A
Researcher:	Mr Chris Tuckwell
Organisation:	Deer Industry Projects & Developments Pty Ltd PO Box 1105 GAWLER SA 5118
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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 has 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 by the slaughter of young breeding females resulting in a depletion in the industry's female breeding herds.

To maintain existing venison markets in the short term and increase 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.

Research

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 database 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 database 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 databases. 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.

Project Title	Exporting Venison to Israel - A market development test case

RIRDC Project No.:	FP-1A
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Objectives

- To research and analyse the market potential for deer and deer products to Israel and to provide recommendations and strategies for consumer support of Australian venison.

Background

The deer industry in Western Australia is under considerable pressure to find markets for its deer and venison products. The local food service and consumer market is small, and the costs associated with transport of live deer or venison to the larger East Coast marketplace makes the product too expensive to compete. Export is the preferred option which is constrained by lack of export abattoirs able or willing to slaughter deer. A company representing many deer farmers was already involved with the live cattle trade to the Middle East and interest in importing live deer to Israel was initiated by their clients. Given the requirement for kosher slaughter and the lack of any export slaughter facilities available in Western Australia, the option of live export was investigated.

Research

There were three major components to the project. Initial desk research established the special cultural and religious needs for this market, particularly related to food laws. Specific market sectors were also researched, as they have different needs and restrictions. Contacts were sought from the clients and their distribution chain, and both Austrade and Israel Trade Commission were able to supply contacts in the food and hotel sector. In-market research was undertaken in Israel and meetings held with all contacts, and finally, information sessions were conducted with prospective end users of Australian venison.

Outcomes

In the short to medium term, it is not possible to export venison from Australia to Israel even for the non-kosher market. There is, however, demand for the product from hotel chefs and restaurants generally to add variety to the red meats currently available and to provide a product with better eating quality. Supply of live animals is the only way to service this demand.
The export of live deer from Western Australia has proceeded as part of the well-established live cattle trade via Jordanian ships. Further evaluation of the success of the early shipments will need to be undertaken as an on-going task.

The work from this project sought to identify the requirements of the strict veterinary protocol of Israel, as they will apply to deer, and to facilitate the movement of deer through quarantine yards to resting feedlots prior to slaughter. Constraints and pre-requisite tasks were identified and addressed through discussions at both the Israeli and Australian ends.

Initial sessions with the food service sector to provide information on the characteristics and desirable attributes of Australian venison were well received and it is probable that a prominent chef from Israel will visit Australia to become more familiar with the meat and preparation and recipe development for venison. The existing printed material used for the domestic and export markets has proved adequate as an understanding of English is usual in this group of potential venison users.

Implications	The market will initially be small but the scope for growth is encouraging. Analysis of the statistics for consumption and purchase of meat, the dine out frequency and the increasing numbers of non-orthodox or reform Jews who are less concerned with the dietary laws, all indicate a shift towards new and better eating quality meats. How soon this evolves is largely dependent on the political and religious power bases. The export of deer to this market does offer a short to medium term solution to the Western Australian turn off need.

Project Title	**Reports for 2nd World Deer Farming Congress and the 4th World Deer Biology Conference**

RIRDC Project No.:	MS978-35
Researcher:	Chris Tuckwell
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Fax:	08 8522 6126

Objectives

- To attend both conferences on behalf of the Australian deer industry and to provide a written summary of both conferences to industry.

Background

In 1996 the Australian Deer Industry and RIRDC Industry Development Plans targeted a 50% increase in the Australian farmed deer population by the year 2000. Major markets for venison (the major product of commercial deer farming) already exist in Europe and newer markets are being developed in Asia and the USA. It is important that the Australian Industry is well informed of international industry developments and of advances in production, processing and marketing technology. The industry must have accurate knowledge of market developments and of those factors that influence market access for its products.

International economic downturns, heightened the need for accurate knowledge of international market and industry status, not only to encouraged industry growth but to prevent industry shrinkage.

The Second International Deer Industry Congress is only the second time all countries involved in commercial deer fencing have met.

The Fourth International Deer Biology Congress addresses issues related to Deer Behaviour, Genetics, Deer Antler, Asian research, Deer Welfare, Reproduction and Nutrition. The deer industry must remain informed of current trends and research results and technical developments.

Research

The Conference:
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 address aspects of management of feral populations and their influence on local environments.

Outcomes	*The Reports:* The reports provide a summary of all conference papers and an executive summary of each conference highlights 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.
Implications	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.

Project Title	**A study of reproductive performance and pre-weaning mortality in farmed red deer in Australia**
RIRDC Project No.:	OVH-1A
Researcher:	Andrew Hansen
Organisation:	Orange Veterinary Hospital 57 Molong Road, ORANGE NSW 2800
Phone:	02 6361 8388
Fax:	02 6362 3970
Email:	hansena@netwit.net.au
Objectives	• To assess reproductive performance in farmed red deer, determine its variability, create reasonable targets for farmers, and identify management practices that would optimise reproduction. Also, to document the major causes of pre-weaning mortality.
Background	Reproductive performance, expressed as calves weaned per hinds joined, is the primary determinant of pre-farm gate efficiency in breeding herds for meat production. Poor reproductive performance and incidents of calf mortality have been identified as major problems by producers. Without information on performance, management strategies to improve efficiency cannot be developed. Recognising that a herd is of below optimal reproductive performance, determining the causes and instituting corrective measures will greatly improve the productive efficiency of a farming enterprise.
Research	There were a number of components to the project. A questionnaire relating to farm reproduction performance and management was sent to approximately 200 red deer farmers annually for four years, 105 farmers participated in the survey. Data was collected from necropsy examination of calves conducted during the study period and from diagnostic laboratory archives. Abattoir specimens of female genitalia were examined for possible causes of infertility. Birth weight data was collected. Pregnancy hind mobs were monitored for foetal loss. A basic body condition score system was developed. Finally, as it has been implicated in infertility, two trials were conducted to assess the role of the trace element selenium in red deer production.

Outcomes	The weaning rate (calves weaned per 100 hinds joined) of the 21,300 hinds for which reproductive data was provided over the four years of the project was 77.98% with a range from 76.42% to 80.31%. The minimum calving rate (calves weaned plus observed calf deaths, n=877) was 82.14%. Minimum calf mortality 5.28%. 1.44% of hinds died annually. The dystocia rate 1.27% of joined hinds. Mean weight of male calves was 10.5kg (n=92), female calves 9.5kg (n=78). 50.03% of calves with recorded gender (n=12682), were male. 5.6 sets of twins were born for every 10,000 hinds joined. The cause of death of most calves was unknown to the farmer (36.5%). Most deaths were attributed to management practices and the weather. Of dead calves submitted for laboratory examination, the most common diagnosis was enteritis involving *Cryptosporidia sp* organisms. A positive growth rate response resulted when weaner hinds were grazed on spring pasture top-dressed with selenium. A suppression of growth rate was exhibited in a group of yearling hinds when orally dosed with selenium during winter.
Implications	The comparative weaning rate in a recent New Zealand study was 83.6%, with an annual hind mortality 1.77% and minimum calf mortality of 2.32%. Australian deer farms must improve their reproductive efficiency to compete internationally. In this study, the retention of non-breeding hinds is the most important suppressor of reproductive performance. Other management practices that affect weaning rate are discussed in final report.

Project Title	**Identification of Factors Associated with Ecchymosis (blood splash) in Deer**
RIRDC Project No.:	UWS-12A
Researcher:	Dr Robert Mulley
Organisation:	Faculty of Environmental Management & Agriculture UWS Hawkesbury, RICHMOND NSW 2753
Phone:	02 4570 1438
Fax:	02 4570 1383
Objectives	• To determine the prevalence of ecchymosis in deer carcasses, and to develop ways to minimise the occurrence of this economically important meat quality defect.
Background	Following establishment of deer farming in Australia as an alternative meat production system, the slaughter of large numbers of deer at commercial abattoirs commenced in the early 1990's. The carcasses from these animals were often affected by ecchymosis (otherwise known as blood splash) and the venison was frequently downgraded or condemned. Anecdotal reports of the frequency of ecchymosis in deer carcasses, particularly from fallow deer, prompted a meeting in 1994 between the Rural Industries Research and Development Corporation, Venison wholesalers and interested research groups to determine ways in which this problem could be investigated, and if possible resolved.
Research	The experimental approach involved analysis and review of factors associated with the occurrence of ecchymosis in other livestock species, collection and analysis of case study information from a range of abattoirs where deer are slaughtered, and from these analyses the planning of experiments on techniques used for stunning and exsanguination of deer, sex of deer, time of year that slaughter of deer took place, and various combinations of these factors. Some of the experimental work was conducted in a small research abattoir where slaughter conditions could be controlled, and the outcomes of these trials were then tested under commercial conditions.

Outcomes

The results from this study confirmed that ecchymosis is a significant problem in deer carcasses, particularly in slaughter systems involving rusa deer and fallow deer. Analysis of data from slaughter trials indicate that a number of changes should be implemented in commercial abattoirs where deer are slaughtered, that will minimise the extent to which ecchymosis occurs in the carcasses of deer.

Specific recommendations to industry include:

1. incorporation of the thoracic stick method of exsanguination into all slaughter systems used for deer;
2. reduction of the interval between stunning and exsanguination to less than five seconds. Where the interval is between 5 and 10 seconds, captive bolt stunning should be preferred to head only electrical stunning, but if the interval is between 10 and 20 seconds, head only electrical stunning should be preferred;
3. the minimum voltage required for humane head only electrical stunning of fallow deer is 150 volts for a current duration of 1 second;
4. sex of deer slaughtered will affect the prevalence of ecchymosis, with castrates and does more likely to exhibit ecchymosis than bucks;
5. sale of whole carcass will often mask ecchymosis, but the left round is a useful indicator tissue for ecchymosis in the rest of the carcass. Ideally, fallow deer carcasses should not be exported as whole carcasses;
6. denvering of venison primals will remove superficial ecchymosis.

Implications

Simple changes to deer slaughter systems can minimise the extent to which ecchymosis occurs. However, it is considered likely that adoption of these changes will be slow given the relative size of the deer industry, and the conservative response to change that characterises the Australian meat processing sector. Some of the required changes are also contingent on acceptance by Muslim slaughtermen that currently practiced methods of stunning and exsanguination associated with Halal slaughter can be modified without compromising religious or animal welfare guidelines. Increased quality assurance for Australian venison will result from adoption of recommendations from this study, and the advertising of “ecchymosis free” venison may become an important marketing tool for this product in the future.

2.3 Deer
Research in Progress

Project Title	The influence of pre slaughter conditions on the occurrence of ecchymosis (blood splash) and high pH in deer carcasses
RIRDC Project No.:	BRN-1A
Start Date:	1/05/97
Finish Date:	30/08/99
Researcher:	Mr Kevin Barnes
Organisation:	PO Box 140 BALHANNAH SA 5242
Phone:	08 8388 4205
Fax:	08 8388 4205
Objectives	• To compare and contrast the incidence of ecchymosis and pH levels in deer carcasses under two alternative slaughtering systems. • To determine the influence of carcass fat levels and a number of other pre-slaughter conditions on the occurrence of ecchymosis and high pH levels in deer carcasses. • 3 .To provide abattoirs and producers with information to help reduce the occurrence of ecchymosis and high pH in venison.
Current Progress	After long and frustrating delays the Strathalbyn abattoirs have finished building the covered ramp, lairage and restrainer. This was finished on 30 March 1999. We then used the new system for the next 5 weeks to familiarise ourselves with it. Then on 7 May 1999 we started doing the same recording on the new system as we had done on the old system 2 years earlier. At this stage, we have recorded 4 weeks kill and have a further 9 to go. A lot of the information that we are hoping to get will not be available until the project is finished and the two different killing systems compared. We are delighted with the new system so far and, at this early stage of recording, we are finding a marked decrease in ecchymosis in the carcasses.

Project Title	Decision support system for managing red and rusa deer in Queensland
RIRDC Project No.:	DAQ-246A
Start Date:	1/07/98
Finish Date:	30/10/99
Researcher:	Mr Stephen Sinclair
Organisation:	Department of Primary Industries (Qld) PO Box 96 IPSWICH QLD 4305
Phone:	07 3280 1905
Fax:	07 3812 1715
Email:	sinclas@dpi.qld.gov.au
Objectives	• The development and commercialisation of existing knowledge into a computer Decision Support Software (DSS) management package, which will evaluate both nutritional and economic 'whole farm' management scenarios for red (Cervus elaphus) and rusa (Cervus timorensis) deer in Queensland. • The project is designed to provide existing farmers a tool to improve information and management skills on a 'whole property' basis, in addition to acting as a precursor for further industry expansion.

Current Progress	A detailed literature review of the nutritional management of red and rusa deer in Queensland has been completed, including both venison and velvet production. Preliminary model parameters and algorithms have been defined with respect to inclusion of animal production and forage utilisation functions into the FEEDMAN© Decision Support Software (DSS) package (an existing management software package for beef cattle in Queensland which is being modified for inclusion of deer management modules). Completion of the review has allowed for compilation of nutritional extension material to be available to the Queensland deer industry via the 'QDPI Note' series. Newly compiled feed requirement tables also allow ration formulation and feed management planning to be initiated on a larger industry scale. Project staff are currently concentrating on refinement and validation of mathematical models and algorithms concerning deer production, and the compilation of deer management modules. The project team is currently on schedule to have a commercial DSS for deer management available to industry by the end of 1999.

Project Title	**Domestic venison marketing: A Test Case**
RIRDC Project No.:	HES-1A
Start Date:	1/04/99
Finish Date:	30/12/99
Researcher:	Mr Daryl Heslop
Organisation:	Mr Daryl Heslop Willtun Wollombi Road CEDAR CREEK NSW 2325
Phone:	02 4998 1576
Fax:	02 4998 1576
Objectives	• To process and distribute 500 deer carcasses via an integrated supply chain in NSW during the six months from April 1, 1999. • To create a public awareness of quality-assured Australian venison through quality restauranteurs and retailers with appropriate point-of-sale support. Initial retailers would be suitable butchers.
Current Progress	Contact has been made with five butchers in the Hunter region which have agreed to sell product and are promoting venison, using newly designed point-of-sale material and print advertising. A dozen restaurants and a cooking school have been contacted and provided with wholesale details and availability of locally-grown product. Demand has seen 20 carcasses slaughtered at Woy Woy abattoir. Mr Heslop has also designed and built a new slaughter box and transporter for deer which are used at the abattoir. These are designed for ease-of-use by a single operator. Personal contact with retailers and restaurateurs will continue to develop demand in the region and test venison in the market.

Project Title	Drought feeding - Early weaning strategies
RIRDC Project No.:	UQ-78A
Start Date:	1/07/98
Finish Date:	31/12/00
Researcher:	Dr Gordon Dryden
Organisation:	University of Queensland School of Veterinary Science & Animal Production GATTON QLD 4345
Phone:	07 5460 1255
Fax:	07 5460 1444
Email:	gmd@warigal.uqg.uq.edu.au
Objectives	• To improve the ability of deer farmers to control growth and survival of young deer by investigating the feasibility and effects of weaning at various ages and advising practicable early-weaning strategies by 2000.
Current Progress	Red deer calves were separated from their dams on 18 January, at ages of 7 and 9 weeks, then introduced to pens (2 per pen), and given a self-selected diet of concentrate pellets and chaffed lucerne hay. Growth, feed intake, and feed digestibility were measured. Growth was steady and animals of both ages grew at approximately the same rate. The preliminary results indicate that early weaning is feasible. Chemical and statistical analysis of data is proceeding.

Project Title	Overcoming summer/autumn nutritional constraints to deer production in Southern Australia
RIRDC Project No.:	UA-46A
Start Date:	1/07/98
Finish Date:	30/06/01
Researcher:	Dr Philip Tow
Organisation:	University of Adelaide Department of Agronomy and Farming Systems Roseworthy Campus ROSEWORTHY SA 5371
Phone:	08 8303 7857
Fax:	08 8303 7979
Email:	philip.tow@adelaide.edu.au
Objectives	• Provision of cost-effective strategies for nutrition of weaner deer in dryland farming regions in southern Australia that will reduce nutritional stress in the dry autumn post-weaning period and maintain high growth rates. • Through dissemination of research results, improve deer production and foster expansion of the deer industry into dryland farming systems.
Current Progress	The aim of this experiment is to compare a range of feedstuffs (cereal and pulse grains, silage, hay and fresh lucerne) for fallow deer in the two months following weaning, prior to transfer to regenerated annual legume pasture. An Honours student (Michael Fisher) and Dr Dean Revell (Department of Animal Science) joined the project this year. Consequently, additional measurements will be accommodated to improve the investigation, viz. Inclusion of an additional maintenance feeding treatment, blood sampling for determination of hormone and metabolite concentrations, and more frequent measurement of deer performance during the pasture-grazing phase.

Project silage and hay were made and lucerne established in 1998. Grain batches, electric fencing and watering facilities were prepared in Feb-April 1999. Following weaning in early May, fawns were grouped into two replications of the five treatments (6 weaners per plot) and treatments and weighings begun. The problem of escape of some animals through the electric fence is currently being addressed.

In spite of abnormally low rainfall in the November-April period, the young lucerne stand and the annual medic pasture, which regenerated in late March, have survived. They are now responding to good rains from mid-May. In all, therefore, a successful project is indicated.

Project Title

Nutritional requirements and growth characteristics of pregnant and lactating red and fallow deer

RIRDC Project No.: UWS-16A
Start Date: 1/07/97
Finish Date: 30/06/00
Researcher: Dr Robert Mulley
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Objectives

- Prepare information on the feed intake and energy requirements of pregnant and lactating fallow deer.

Current Progress

Daily feed intake and energy requirements of pregnant and lactating fallow deer have been determined over two breeding seasons.

Results of data analysis show particular energy needs associated with the last nine weeks of pregnancy and first ten weeks of lactation.

Observations of feeding behaviour have been collected for deer at pasture and in pen feeding trials, and will be analysed to assist with validation of feed requirement data obtained from feeding individual animals in pens.

Body condition score for over 200 deer have been collected using a scoring system developed during this project, and these have been validated at slaughter. Analysis of bone marrow fat, kidney fat index and various blood metabolites is continuing. Current experimental work is focussed on the effects of various levels of maternal nutrition on placental development and foetal growth in the first trimester.

This work will complement experimental work previously completed on placental and foetal development throughout the latter half of pregnancy, to parturition.