



**RURAL INDUSTRIES RESEARCH  
& DEVELOPMENT CORPORATION**

## **RIRDC Completed Projects in 1997-1998 and Research in Progress as at June 1998**

### **2.4 DEER**

**Rural  
Industries  
Research &  
Development  
Corporation**

*shaping  
the  
future*

**August 1998**

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**RIRDC Deer Research Manager**

Mr Peter Core  
RIRDC  
Level 1, AMA House  
42 Macquarie Street  
BARTON ACT 2600  
PO Box 4776  
KINGSTON ACT 2604

Phone: (02) 6272 5920  
Fax: (02) 6272 5877  
Email: peterc@rirdc.gov.au

**RIRDC Publications Manager**

Rural Industries Research and Development Corporation  
Level 1, AMA House  
42 Macquarie Street  
BARTON ACT 2600  
PO Box 4776  
KINGSTON ACT 2604

Phone: (02) 6272 3186  
Fax: (02) 6272 5877  
Email: evah@rirdc.gov.au  
Website: <http://www.rirdc.gov.au>

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# FOREWORD

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This year RIRDC has produced *Research in Progress, June '98*, which contains short summaries of continuing projects as well as those that were completed during 1997-98 for all of the Corporation's 21 program areas.

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

The following report is a hardcopy extract covering Sub-program 2.4. It contains all entries from continuing and completed Deer research projects funded by RIRDC. 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 over 200 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.

## **Peter Core**

Managing Director  
Rural Industries Research and Development Corporation



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## 2.4 DEER COMPLETED PROJECTS

### **Project Title**

**Maintaining year round production of quality venison: The use of immunocastration vaccines to control "rutting behaviour.**

**RIRDC Project No:** DAV-100A  
**Researcher:** Dr. Julie Simons  
**Organisation:** Victorian Institute of Animal Science,  
475 Mickleham Rd,  
ATTWOOD VIC 3049  
**Contacts:** Phone: 03 9217 4200.  
Fax: 03 9217 4299.

E-mail: [simonsj@woody.agvic.gov.au](mailto:simonsj@woody.agvic.gov.au)

### **Objectives**

- The objectives of this research project were to develop viable procedures, using immunocastration, to prevent rut induced weight loss and to control the sexual and aggressive behaviours associated with the seasonal rut in farmed male deer.

### **Background:**

Production of a "year-round" supply of quality venison has been recognised by the Australian deer industry as being vital for expansion in export and domestic markets. Rutting behaviour in stags however has limited the supply of venison during the breeding season due to weight loss, injury decreasing the value of the carcass and aggressive behaviour making the stags very difficult to control, handle or transport. The cause of this aggressive behaviour is the influence of testosterone as the testes become active during the rut. Immunocastration offers a possible alternative. Vaccination against LHRH has been shown to temporarily control testicular function and all related sexual behaviour. This process will allow stags to grow as entires but behave as castrates in the targeted breeding season. The result is easy yarding and transporting due to the lack of aggressive behaviour and that the weight loss associated with stags in the breeding season should be significantly reduced.

### **Research**

The project was defined within four major experiments:

- Experiment 1: To identify optimal vaccine formulation for use in deer
- Experiment 2: To identify optimal vaccine dosage for use in deer
- Experiment 3: To identify the duration of vaccine efficacy, control of weight loss, antler growth and behavioural changes in response to the immunocastration vaccine
- Experiment 4: To provide additional data regarding behaviour and weight loss during the rut.

### **Outcomes**

An immunocastration vaccine was developed using a formulation seen as being most optimal for use in deer.

This vaccine and another vaccine supplied by a commercial company have been shown to be effective in reducing testicular function in stags in up to 95% of the herd. Whilst antibody titre is high, rut induced weight loss and aggressive behaviour can be reduced.

### **Implications**

In practice however the vaccine is limited in four ways:

- firstly by its short duration of effect which therefore requires the use of multiple doses,
- secondly by the fact that 5-10% of the herd do not respond immunologically or biologically to the vaccine and therefore present problems in terms of behaviour and handling;
- thirdly the cost benefit to farmers in terms of weight and body condition have been shown to be highly variable;
- fourthly the vaccine acts to delay the rut not prevent it, thus limiting farmers to the necessity of sending animals to slaughter that season so to avoid significant weight loss and body condition.

In its current formulation the vaccines tested in this project are not viewed as being suitable for commercialisation for use in deer.

### **Project Title**

**Marketing options of deer horn and co-products in China & Korea.**

**RIRDC Project No:** ADH-1A  
**Researcher:** David H Walker  
**Organisation:** Australian Deer Horn & Co Products Pty Ltd.  
Tarwin Road,  
INVERLOCH VIC 3996  
**Contacts:** Phone: (03) 5674 5520  
Fax: (03) 5674 5577

### **Objectives**

- To identify opportunities in China and Korea where Australia may be able to market more of its velvet and co-products either frozen or processed.
- To increase and improve the Australian deer farmers' quality of production to meet consumer expectations therefore increasing consumer demand. This can be done initially by revising and refining the information by which the buyer/processor defines the product. eg. His criteria for purchase of our product. With this end in mind the production of a Reference Handbook needs to be undertaken to rewrite all previously printed charts, etc. This Handbook must be written in at least four languages, Cantonese, Mandarin, Korean and English. This would enable the abattoir operator, buyer/processor and the deer farmer to have access to the same specifications for the harvesting/production and purchase of the green frozen product.

## Background

The Australian Deer Industry is relatively young in terms of established farming enterprises, therefore more hard work must go into production and marketing to access and maintain a profitable market share of the sales for the producer. While New Zealand has built a multi million dollar industry from deer farming and its related sectors they had a large feral population to draw from in the early days and importation of quality breeding stock began many years before deer were farmed in Australia. The Asian ethnic community both here and overseas have a long history of deer product usage.

## Research

While in China and Korea in January, 1998, I met with many buyer/processors and discussed the problems with identifying the many different grades depicted on our present product information charts. The discovery that many of these people cannot read English has highlighted our biggest drawback to achieving sales into these countries. The product quality is highly praised.

## Outcome

Chinese velvet processors are showing interest in setting up drying plants in Australia, particularly in Melbourne. Samples of velvet and velvet extract have been sent to several of these companies in China for testing.

## Implications

The success of a concise Australian Reference Handbook in defining production and harvesting specifications must encourage the Asian buyer/processor to purchase our velvet in the first instance, but also our co-products, as that is where the profit lies.

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## Project Title

### Microbial Contamination of Velvet - A Pilot Study

**RIRDC Project No:** ADH-2A  
**Researcher:** Dr. Jeff Fyffe  
**Organisation:** Australian Deer Horn and Co-products Ltd  
**Contacts:** Phone: (03) 5442 5455  
Fax: (03) 5441 5360

## Objective

- To examine the cut surface and core of Australian Deer Velvet harvested under the guidelines of the National Velvet Accreditation Scheme (NVAS), to determine the presence or absence of bacteria with particular reference to potential human pathogens.

## Background

It has been stated that 99% of all velvet is contaminated with bacteria at the cut end. There was also a suggestion that this contamination extends up the shaft. Velvet is a deer product for human consumption that has been used in Eastern medicine for at least 2000 years. The pharmacologically active components are increasingly being recognised as having application in many areas of human medicine. There is no literature available in the

world that records the bacterial flora of the cut end and core of velvet. As a consequence, if the assertion that Australian velvet is contaminated, there is great potential for damage to the velvet industry. Thus it is necessary to obtain an understanding of the microbial flora of velvet.

## Research

The project required the development of a new technique to obtain, aseptically, samples from the core of the velvet. The project design called for 20 sticks of "B" Grade velvet, carrying NVAS identification tags, to be selected at random and then examined for microbial presence at the cut end, between the brow and bez tyne, the bez and trez tyne and between the trez tyne and the tip. In all 80 swabs were collected and examined.

One stick that was included came from a consignment that was known to have thawed and refrozen in transit; another stick was found to have an unhealed puncture wound at the sampling site between the bez and trez tyne.

In view of the microbial findings on the stick that had thawed and refrozen, a second experiment was conducted which looked at the extent of migration of bacteria up these sticks.

## Results

The results show that except in certain circumstances, the core of velvet antler is sterile, while the cut surface has a resident microbial population composed principally of miscellaneous Gram-negative bacilli and *Bacillus cereus* group species. This is possibly indicative of the conditions under which the velvet was harvested. The circumstances that led to microbial contamination of the core of the velvet were thawing and refreezing and unhealed puncture wounds.

No Salmonella, Yersinia, Listeria or *Escherichia coli* were isolated from any site, however in the first experiment a pure growth of a Streptococcus was found at the site of the unhealed puncture wound.

In view of the significance of the *B cereus* group as potential human pathogens, the second study was designed to examine the possibility of bacterial migration into the core of velvet that was known to have thawed and been re-frozen.

This second experiment found a similar result to the first however there was migration of gram-negative bacilli isolated to at least 7.5cm from the cut end. When contamination was light a surprising finding was almost pure growth of *Acinetobacter sp.* These bacteria have only twice been recorded in the world literature as being the cause of food spoilage. The full significance of this finding is unknown, however it is known that *Acinetobacter sp.* are a major health issue in intensive care units in hospitals.

### **Implications**

All velvet will have a resident population of normal bacteria at the cut surface. This is unavoidable and not of any concern. The only time that a problem will arise is if the velvet is allowed to thaw and re-freeze at any time or if there are full thickness puncture wounds in the skin of the velvet.

Despite having potentially harmful bacteria resident at the cut surface, they do not cause a problem to the Australian velvet industry even under the most adverse conditions.

It is important, from a Quality Assurance point of view, that no velvet with any skin puncture should be allowed "in grade".

Producers must adhere closely to the NVAS protocol and chill velvet immediately after removal from the animal to adhere more closely to the Quality Control of velvet production.

Producers must keep dust levels to a minimum during harvesting and velvet must remain frozen from the time of harvest to the point of sale. This includes the grading table.

Any velvet with an off-odour must be condemned.

The major conclusion drawn from these studies is that provided velvet is harvested in strict accordance with the NVAS protocol, and grading is of the highest standard, then Australian commercial frozen velvet will have low numbers of normal bacterial flora at the cut surface and will be sterile in the core of the stick.

Contingent upon adherence to these conditions, then Australian velvet harvested under the NVAS protocol can be considered to be of the highest possible product for human consumption. This places Australia at the forefront of Quality Assurance as well as Quality Control of deer velvet production, since this project has never been done anywhere else in the world.

Leading from this pilot study, is the requirement to quantify the extent of cut end "contamination" and the origin of this contamination. Further it is necessary to determine the extent of migration of bacteria into the cut end of normal velvet.

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## 2.4: 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:** 01-May-97  
**Finish Date:** 30-Sep-98  
**Researcher:** Mr. Kevin Barnes  
**Organisation:** PO Box 140  
BALHANNAH SA 5242  
**Contacts:** 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.
- To provide abattoirs and producers with information to help reduce the occurrence of ecchymosis and high pH in venison.

### **Current Progress**

The first three months of the project have been completed – recording data using the ‘old’ killing system. We have accurately recorded the sex, condition, weight, fat score, temperament, feed given and ecchymosis score (in round) of all animals killed in May-June 1997.

The Strathalbyn Abattoirs have constructed the new ramp and have partly completed the changes to the lairage and killing shoot. We cannot commence the second stage of the project until this is complete. The reason for the delay has been that the new QA program now in progress has taken priority. Management has assured me that the construction will be completed soon.

### **Project Title**

**Adding value to venison trimmings using cold set binders**

**RIRDC Project No:** CSS-1A  
**Start Date:** 01-Aug-97  
**Finish Date:** 01-Aug-98  
**Researcher:** Ms. Aarti Tobin  
**Organisation:** Food Science Australia  
Brisbane Laboratory  
PO Box 3312  
TINGALPA DC QLD 4173  
**Contacts:** Phone: (07) 3214 2000  
Fax: (07) 3214 2062

### **Objectives**

- To add value to under-utilised venison trimmings by seeking to develop a cold-set bound restructured product that has uniform and acceptable meat colour, is microbiologically sound, has an effective bind and has meat texture similar to fresh meat.

### **Current Progress**

A number of cold-set binders and processing methods were investigated to determine the optimum conditions for manufacturing high quality cold-set bound venison products from lower-value venison cuts. The results of these trials indicated that two different binding processes were required. The best cold-set binding technology for manufacturing restructured steaks used alginate as the binder. For larger pieces of meat in boneless, rindless venison forequarter meat, the best cold-set binder was Pearl F. Venison products produced in this way were found to be safe to eat and have acceptable quality with no foreign meat flavours. Furthermore, these products look similar to whole tissue meat and could compete with higher value cuts such as fillet steaks or other products, especially crumbed or battered products.

### **Project Title**

**The development of the deer industry as a major Australian livestock industry**

**RIRDC Project No:** DIP-1A  
**Start Date:** 01-May-97  
**Finish Date:** 30-Jun-99  
**Researcher:** Mr. Chris Tuckwell  
**Organisation:** Deer Industry Projects & Developments Pty Ltd  
PO Box 1105  
GAWLER SA 5118  
**Contacts:** Phone: (08) 8523 3500  
Mobile: 0149 864 725  
Fax: (08) 8522 6126  
E-mail: [tuckwell@dove.net.au](mailto:tuckwell@dove.net.au)

### **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.

### **Current Progress**

Significant effort has been made to collect industry statistics. Information currently being loaded onto the new DMS. (Deer Management System) program includes a combination of estimates and actual data. A delay in reporting of the data relates to DMS program glitches which should be resolved soon.

Six modules of the deer manual are published, a seventh is in press. Collectively, modules of the manual provide a

technical resource on deer industry economics, management and production issues.

QA manuals have been printed and in excess of 30 manuals have been purchased. QU Accreditation facilitators have been trained in each State and the first two level 2 accreditation certificates will be issued in August.

Negotiations with processors for standardisation of payment/weight schedules has begun. Routine collection of venison price data is initiated.

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### **Project Title**

**A study of reproductive performance and pre weaning mortality in farmed red deer in Australia.**

**RIRDC Project No:** OVH-1A  
**Start Date:** 01-Jul-95  
**Finish Date:** 31-Dec-98  
**Researcher:** Dr. Andrew Hansen  
**Organisation:** Orange Veterinary Hospital  
57 Molong Road  
ORANGE NSW 2800  
**Contacts:** Phone: (02) 6361 8388  
Fax: (02) 6362 3970  
E-mail: [hansena@netwit.net.au](mailto:hansena@netwit.net.au)

### **Objectives**

- Assess the reproductive performance of farmed red deer in Australia and identify priorities for future R & D directed at reducing reproductive loss.

### **Current Progress**

The backbone of this study is a survey of approximately 200 Red Deer farmers throughout Australia to gather information on reproductive performance on their farms. The fourth and last questionnaire will be sent out in April.

Other aspects of the project include collection of information on causes of pre-weaning mortality of calves and birth weights, two trials on the effects of selenium supplementation on production, examination of abattoir specimens of female genitalia for possible cause of infertility and the initial development of a body condition scoring system for Red Deer. The project is due for completion in late 1998.

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### **Project Title**

**Identification of factors associated with ecchymosis (blood splash) in deer**

**RIRDC Project No:** UWS-12A  
**Start Date:** 01-Jul-95  
**Finish Date:** 31-Dec-98  
**Researcher:** Dr. Robert Mulley  
**Organisation:** University of Western Sydney  
Hawkesbury

School of Agriculture & Rural Development  
Bourke Street  
RICHMOND NSW 2753  
Phone: (02) 4570 1438  
Mobile: 014 619 591  
Fax: (02) 4570 1383  
E-mail: [r.mulley@uws.edu.au](mailto:r.mulley@uws.edu.au)

### **Contacts:**

E-mail:

### **Objectives**

- To define the extent to which ecchymosis occurs in deer, and the impact of this condition on the profitability of deer farming, and
- To develop ways of minimising the occurrence of ecchymosis in deer by determining causes.

### **Current Progress**

The analysis of data from 1997 trials on electrical stunning and bleeding techniques has been completed. Further experiments regarding blood loss have also been conducted. Experiments investigating the effect of restraint on the anatomical distribution of ecchymosis are currently being conducted. Unfortunately slaughter activity over the past 6 months, particularly at the new slaughter premises identified at the National DIAA conference, has been almost non-existent. Consequently other factors evident from our experimental work which need to be investigated using larger numbers of deer being slaughtered in commercial abattoirs have not yet been able to be attempted.

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### **Project Title**

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

**RIRDC Project No:** UWS-16A  
**Start Date:** 01-Jul-97  
**Finish Date:** 30-Jun-00  
**Researcher:** Dr. Robert Mulley  
**Organisation:** University of Western Sydney  
Hawkesbury  
School of Agriculture & Rural Development  
Bourke Street  
RICHMOND NSW 2753  
**Contacts:** Phone: (02) 4570 1438  
Mobile: 014 619 591  
Fax: (02) 4570 1383  
E-mail: [r.mulley@uws.edu.au](mailto:r.mulley@uws.edu.au)

### **Objectives**

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

### **Current Progress**

Twelve pregnant fallow does of two genotypes (6 Dama and 6 Dama dama x mesopotamica) were individually housed and randomly assigned a feeding treatment. Feeding treatment 1 (T1) consisted of a modified dairy ration, containing 14MJ/kg DM ME and 16% CP. T2

consisted of a 60/40 (w/w) pelleted oats/lucerne ration providing 11.5 MJ/kg DM ME and 10% CP. Feeding was ad libitum, and monitored daily. The does fawned in the pens in early December, and birthweights were recorded. The does and fawns were liberated onto pasture in early March, and the feeding data is currently being collated and analysed to determine the energy requirements for pregnant and lactating fallow deer. A slaughter trial coinciding with project UWS-12A will commence in May. This experiment aims to relate and compare maternal nutrition to the degree of placentation in the first trimester of pregnancy. Progress in UWS-12A was very pleasing in 1997, with 1998 set to be equally as productive.

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