

**REPORT ON "BIOLOGY OF DEER" CONFERENCE  
28 MAY - 1 JUNE, 1990, MISSISSIPPI STATE UNIVERSITY**

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The Conference started with a plenary lecture on "The status of deer in a changing world environment". This overview highlighted the dramatic changes in the wildlife habitats and the effect this is having on deer populations. The cutting down of rain forests, industrial pollution and acid rain damage of forests, the vulnerability of lichens to acid rain and their propensity to accumulate heavy metals and radio isotopes, and global warming all undoubtedly influence deer populations negatively. Fourteen deer species or subspecies are now endangered. "Although the production of meat from deer in captive herds continues to expand, pressures to increase agricultural crop production world-wide may have a far greater opposite effect on total deer numbers through loss of habitat". In New Zealand, where feral deer are a problem, it is very easy to lose sight of the opposite situation where unique wild deer populations are being lost through man's activities.

**Biology**

The following session had 11 papers which dealt with aspects of biology of wild deer. These covered the effects of climate and food availability on deer reproduction and survival, dispersion and colonisation of new areas, the effects of hunting pressures on populations, population dynamics of wild white-tailed deer in intensively farmed areas of USA, the effects of cattle ranching on wild white-tailed deer numbers in Mexico, the current status of wild fallow and red deer in Chile since their introduction in the last 60 years, plans for managing wild introduced rusa deer in Irian-Jaya, Indonesia, assessing wild red deer population dynamics in Hungary and observations on the behaviour and vocalisations of Muntjac or barking deer in Nepal.

**Health and Disease**

The second session held the greatest interest for veterinarians and dealt with "Animal Health and Disease". There were a total of seven papers, two presented by Frank Griffin entitled "Laboratory assays for the diagnosis of Tb in red deer" and "The impact of domestication on red deer immunity and disease", and I presented two on "Observations on the relative susceptibility to disease of different species of deer farmed in New Zealand" and "A review of yersiniosis in farmed red deer in New Zealand". The plenary paper for this session was given by Dr Hugh Reid of the Moredun Institute, Edinburgh on malignant catarrhal fever entitled "The biology of a fatal herpesvirus infection of deer" and it was the most recent review on the subject since the MCF workshop report published in the 1988 Deer Branch Proceedings No. 5. The other two papers comprised a 10 year retrospective study of elk mortality in western Canada and north-western USA based on necropsy reports from pathology laboratories, and a paper on brucellosis vaccination of free-ranging elk in Wyoming using an air gun which delivers a pellet of freeze-dried vaccine and a paint ball to mark vaccinated animals.

### Management

The plenary paper for the next session on Management and Behaviour of Farmed Deer was given by Dr Jerry Haigh of Saskatchewan. He listed the essential priorities for farming deer as: knowledge of the industry, a grasp of the biology of the species involved, management skills especially handling and feeding, and disease prevention and awareness. The other six papers in this session dealt with all the seasonal and production aspects of managing red, wapiti, wapiti-red hybrids, chital, rusa and fallow deer on farms in New Zealand and Australia and of fallow in parks in the UK.

### Deer products

Dr Ken Drew of Invermay presented the next plenary in the Deer Products session on "Venison and other deer products". He reviewed the development of the NZ deer industry from nothing in 20 years, and detailed the advances made in the production and processing of venison and velvet so as to ensure the highest quality product reaches the end user. The other four papers covered meat production aspects of reindeer, castrated fallow bucks, axis, fallow and sika deer and the legal aspects of farming exotic deer for meat production in the USA.

### Reproduction

By far the biggest session was on Reproduction, with 15 papers. The plenary paper, presented by Dr Andrew Loudon of London, gave an excellent review of the current knowledge and hypotheses of the evolution and controls of reproduction in deer, especially seasonal breeding species.

The first half of the session dealt with oestrus, LH surge and ovulation in fallow deer, the influence of food intake on reproduction in red deer, LH patterns and seasonal anoestrus in Pere David's deer, the effects of age and stocking density on reproduction and performance of fallow deer, reproductive behaviour of farmed chital deer in Australia, and mating tactics in roe deer. In the second half there were five papers on the effects of melatonin on the breeding season of red, fallow and white-tailed deer, two papers on synchronisation, superovulation and embryo recovery in white-tailed, fallow and red deer and a paper on the use of real-time ultrasonography for pregnancy diagnosis and fetal age estimation in red deer.

### Genetics

The plenary paper in the Genetics session entitled "Applications of biochemical genetics to deer management" was delivered by Dr Peter Dratch of Oregon (formerly of Invermay). This paper reviewed the development and management uses of the electrophoretic study of deer protein markers which allow the differentiation of species and also individuals within species. The following paper described the recent development of DNA probes for identification of cervidae and bovidae. The other three papers in this session dealt with the use of genetics to study productivity and behavioural characteristics of white-tailed deer in the USA.

### Nutrition and Physiology

Dr Robert White of Alaska, presented the plenary paper for this session entitled "Role of nutrition in relation to season, lactation and growth of deer". He pointed out the fundamental role of nutrition in modulating reproductive timing, fecundity, offspring survival and rate of growth to sexual maturity, and discussed the factors that interact with nutrition. The other papers in this session dealt with various aspects of nutrition, metabolic cycles in white-tailed deer, reindeer and roe deer, a comparison of food intake and digestion between red deer, goats and sheep, seasonal rhythms of electrolyte concentrations in adult red deer stags and the fatty acid composition in the bone marrow of cervidae.

### Antler Physiology

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Dr Jim Suttie of Invermay presented the plenary lecture entitled "Recent advances in the physiological control of velvet antler growth" which concentrated largely on the hormones/growth factors thought to be involved. Principle among these are insulin-like growth factor-1 (IGF1) and growth hormone, and their modes of action are currently being studied. This final session had five other papers which dealt with various aspects of antler growth patterns and their associated endocrine patterns in red, reindeer, roe and chital deer.

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The closing address given by Dr Gerald Lincoln, Scotland, was on "Opportunities to manipulate the seasonal physiology of deer", and he contrasted the differences between temperate seasonal breeding and tropical aseasonal breeding species of deer. He pointed out that the bulk of the research effort up to now has been directed at studying the control mechanisms of seasonal breeding deer. However, there was much to be learnt about white-tailed deer which have the greatest latitude distribution of any deer (from 64° North in Canada to 24° South in Chile). This species may hold a key to the genetic mechanisms for control of seasonal breeding. There are 15 species of deer of temperate seasonal breeders and 25 species which are tropical aseasonal breeders and there is still side scope for future research.

### Workshops

During the Conference there were two multiple workshop sessions dealing with:

- Diseases and Immune Systems
- Bioenergetics and Estimation of Carrying Capacity
- Endangered Species
- Venison Marketing and International Trade
- Pheromones
- Chemical Immobilisation
- Genetics
- Artificial Insemination/Embryo Transfer
- Evolution of Cervidae
- Antler Development

These workshops promoted discussion on each topic amongst groups varying from 5-30 participants, and each had two chairmen who will produce a summary report for the Proceedings.

### Posters

There were three poster sessions each with about 20 posters on display. Each poster was manned by one of the authors, and this allowed the Conference delegates to circulate and spend time discussing the specific areas that interested them. The majority of the posters were on red, white-tailed or fallow deer, dealing with Health and Disease, Wild Biology or Reproduction and were largely contributed by delegates from USA, NZ or Australia (see Appendix 1). The posters in the Health and Disease category included "Social status and parasitic infection in red deer stags" Bartos *et al*, Czechoslovakia; "Haematological changes in red deer following xylazine administration" Cross *et al*, New Zealand; "The use of heterologous monoclonal antibodies to identify cell surface markers of red deer leucocytes" Buchan and Griffin, New Zealand; "Non-specific immunity in sika deer" Nivin USSR; "Paratuberculosis in deer" Nyange *et al*, Scotland; "Pasteurella-related mortality in park fallow deer" Putman *et al*, UK; "Immobilisation of Norwegian and Svalbard reindeer with medetomidine and medetomidine-ketamine and reversal with atipamezol" Tyler *et al*, Norway; "Pathology of naturally occurring diseases in deer at Nandankanan Biological Park" Rao and Acharjyo, India; "Causes of mortality in Indian deer at Nandankanan Biological Park" Acharjyo and Rao, India; "Identification of 36 strains of Mycobacteria from deer" Wang Shuzhi *et al*, China; "Measuring the responses of red and fallow deer to disturbance" Jones and Price, UK; "The responses of farmed red deer to being handled" Price and Jones, UK; "The importance of copper supplementation in farmed red deer" Sugar and Lassu, Hungary.

### Discussion

The Conference was very worthwhile and the papers and posters were of a consistently high standard, especially the plenary papers which provided an up-to-date review of all the major areas of deer research. Some of the workshops were very successful while others faltered, largely through lack of direction and poor chairing.

The published papers from this Conference will be fully refereed and edited and the Proceedings are due to be published within 12 months.

An excellent aspect of the Conference was the bound copy of abstracts of all papers and posters given to each delegate at registration. This enabled delegates to read the abstract prior to and after the presentation of the paper and it will act as a reminder until the Proceedings are available.

Copies of the abstract booklet may be purchased for US\$8.00 and copies of the proceedings should be available in due course from:

Dr R. Brown  
 Dept Wildlife and Fisheries  
 Mississippi State University  
 Mississippi, MS 39762  
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 [Fax: 601-325-8726]

**APPENDIX 1 Classification of papers and posters according to subject, deer species and country of author(s)**

<u>Subject</u>	<u>Papers</u>	<u>Posters</u>	<u>Deer Species</u>	<u>Papers</u>	<u>Posters</u>
Health & Disease	6	16	Red	21	20
Production	12	4	Fallow	12	7
Wildlife Biology	10	16	White-tailed	11	13
Antlers	6	7	Wapiti	6	1
Reproduction & Endocrinology	15	12	Chital (axis)	4	3
Nutrition & Physiology	10	7	Roe	4	1
Genetics	5	1	Rusa	3	0
			Reindeer/Caribou	3	3
			Sika	2	6
			Pere David's	2	2
<u>Countries</u>			Muntjac (Barking)	1	3
New Zealand	18	9	Moose	1	1
USA	18	19	Mule	0	5
UK	6	8	Black-tailed	0	3
Australia	4	1	Sambar	0	2
Alaska	4	0	Hog	0	2
Canada	3	3	Elds	0	1
Norway	3	1	Mesopotamian	0	1
Hungary	2	3	General category	9	1
France	1	2			
Sweden	1	1			
Germany	1	1			
Mexico	1	0			
Chile	1	0			
Papua-New Guinea	1	0			
Nepal	1	0			
Poland	1	0			
Others	0	12			