ANIMAL BREEDING

Course Organiser: N Holdstock

Lecturers: D Chennells, J Gibson, N Holdstock, AJ Pearson, M Ptaszynska

Term: Michaelmas, Lent and Easter

Aims:

The course will focus on the clinical and practical aspects of efficient reproductive husbandry and breeding in: cattle; sheep and goats; horses; dogs and cats; pigs; common exotic species. It will provide a thorough knowledge of fertility, pregnancy, parturition and newborn care, enabling students to:

- build upon the scientific knowledge gained in the Tripos Reproduction Course for use in a clinical setting;
- give sound husbandry and technical advice to farmers and animal breeders when working as veterinary clinicians in practice;
- carry out all the basic manipulative procedures associated with normal breeding of domestic species, including: the collection, microscopic evaluation and insemination of semen; embryo transfer; performing palpation and ultrasound scanning of non-pregnant and pregnant genital tracts; other pregnancy diagnostic methods;
- manage the different stages of parturition correctly and perform newborn care;
- appreciate and benefit from the Infertility and Obstetrics Course and clinical cases presented in the 5th and 6th years.

Objectives:

At the end of the course the student should know:

1. the phases of the oestrous cycle and anatomical and behavioural changes associated with these phases;
2. the endogenous hormonal control of the oestrous cycle and the climatic and other factors controlling breeding;
3. the exogenous hormonal control of the oestrous cycle and manipulation and/or synchronisation of cycles for efficient breeding practices;
4. fertilisation, oviductal transport, luteal maintenance, placentation, anatomical changes associated with pregnancy, and the essential hormonal and nutritive maintenance of pregnancy, and the practical and laboratory methods used for its diagnosis;
5. the endogenous hormonal control of, and the anatomical and behavioural features associated with, parturition in the selected species, together with the indications for, and practical methods of, artificially inducing parturition;
6. the essential behavioural characteristics and adaptive processes of early post-natal life and survival;

7. the seasonal characteristics and hormonal control of spermatogenesis and libido in the males of the selected species and methods for artificially controlling their reproductive processes to management advantage;
8. the collection and microscopic evaluation of semen from males of most domestic species;
9. methods used for the dilution, cooling, and deep-freezing semen and insemination of semen;
10. the principles and practicalities of the recovery, in vitro culture and/or manipulation, and the transfer of, embryos. Practical control of oestrous cycles and ovulation for embryo transfer and hormonal induction of superovulation.

In the lectures below, the following aspects of reproduction and breeding will be considered.

For each species the age at puberty and the physical changes associated with sexual maturity will be discussed. The style, frequency and problems associated with copulation will be described, seasonality of reproductive function will be reviewed and the essential parameters of the ejaculate will be presented. Methods commonly employed to collect, analyse and store semen will be described. The commercial practicalities and limitations to these, and insemination techniques, will be discussed, along with the culture, handling, deep-freezing and transfer of embryos in both cattle and horses. Methods used to synchronise oestrus and ovulation in donor and recipient animals will also be covered, as will techniques to induce superovulation.

For each of the above species the length, anatomical manifestations and endogenous hormonal control of the oestrous cycle will be discussed and exogenous hormonal and other practical methods for shortening and synchronising oestrus and ovulation will be reviewed. Likewise, the length and other significant physical and hormonal features of pregnancy, will be described. Particular attention will be paid to mechanisms controlling cyclical luteolysis in the non-pregnant animal and the nature and method of transmission of the maternal recognition of pregnancy signal that prolongs luteal function in the pregnant animal. Methods for detecting pregnancy and the types and rates of development of the placenta in each species will also be covered.

For each species the length (and variability) and essential anatomical features of the birth process will be described. The different stages of labour will be categorised and common observations with each stage will be reviewed. The circumstances when veterinary intervention are required will be highlighted. The relative roles of the mother and the fetoplacental unit in secreting the major hormones that induce and drive parturition will also be described. The hormonal and physiological changes in the neonate to adapt to extrauterine life will be covered and routine management of the newborn animals will be described.

Lecture list:

Farm Animals

1. Oestrous cycle and pregnancy in the cow.	JG
2. Parturition and post-natal development in the cow.	JG
3. Reproduction in the bull. AI & ET in Cattle.	JG
4. Oestrous cycle and pregnancy in the sheep and goat.	JG
5. Parturition and post-natal development in the sheep and goat.	JG
6. Reproduction in the ram and Billy goat.	JG

Equine

7. Oestrous cycle and preparing the non pregnant mare for covering.	NH
8. Reproduction in the stallion and fertility examination.	NH
9. AI and ET in horses.	NH
10. Early pregnancy, pregnancy diagnosis, management of twins, diagnosis of fetal sex, and impending parturition in the mare.	NH
11. Preparation for birth, parturition and examination of the placenta.	NH
12–13. Routine management of the newborn foal.	NH

Small Animals

14–16. Reproduction in the female and male dog and cat and parturition and post-natal development in the dog and cat.	MP

Porcine

17. Oestrous cycle, pregnancy and parturition in the pig.	DC
18. Reproduction in the boar and AI in pigs.	DC

Exotics

19–20. Reproduction in exotic species	AJP

Practical classes:

Haptic cow session for each student (1 hour in a group of 8) and rectal palpation of the reproductive tracts of non-pregnant and pregnant cows at the New Dairy Unit, Park Road, Madingley – (class split into one of four half days).

In addition, assisting with supervision of the lambing of University Farm sheep flock.

Handouts: All lectures

CAL/DVDs

In Equine Hospital Reception:

- Foal-in-Mare. Insights inside the foaling mare. Ghent University.
- Equine Reproductive Ultrasound. University of Glasgow.

In Library Office:

- Equine stud medicine: AI and Stallion management
- Equine stud medicine: The non-pregnant mare
- Equine stud medicine: The pregnant mare
- Equine stud medicine: Foals and yearlings

Further reading (all these books are in the Library office):

1. Arthur's Veterinary Reproduction & Obstetrics. (2001)8th Edition D E Noakes, T Parkinson & G England. London. W B Saunders
2. England, G (1996) Allen's Fertility & Obstetrics in the Horse. 2nd Edition. Oxford. Blackwell Science
3. Jackson, P G G (2004) Handbook of Veterinary Obstetrics, London. 2nd Edition. W B Saunders.
4. Meredith, M J (1995) Animal Breeding & Infertility, Oxford. Blackwell Science.
5. Compendium of Animal Reproduction Published by Intervet Ltd. Cambridge.
6. Knottenbelt, D, Holdstock,N, and Madigan, J.M (2004) Equine Neonatology Medicine and Surgery. Saunders, Elsevier Science Publishing.
7. McKinnon, A O, and Voss, J.L (1993) Equine Reproduction. Philadelphia, Lea and Febiger.