Animal Reproduction

Code: 102661
ECTS Credits: 6

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Degree	Type	Year
Veterinary Medicine	OB	3

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no official prerequisites, but it would be advisable for the student to have acquired the knowledge of Animal Physiology, Morphology, Pharmacology, Biochemistry, Genetics and Statistics. It is recommended to have some computer skills and English knowledge before taking the subject.

Objectives and Contextualisation

Animal Reproduction is a third-year subject that provides the relative knowledge of the physiology of the reproduction of domestic animals as well as the methodology necessary for their control.

The specific objectives are that the student:

1.- Recognize and differentiate the anatomical and functional characteristics of the genital system, both male and female, in the different species of veterinary interest and master the techniques for exploring the male and female reproductive system in the different species.

2.- Understand the neuro-endocrine and gonadal mechanisms that control the appearance and development of sexual activity in different species and value the different existing methods for inducing and synchronizing estrus, with special theoretical and practical reference, to the different protocols to follow.

3.- Achieve a methodical and reasoned knowledge of the physiological reproductive processes that lead to the formation of gametes, as well as the factors that determine sexual behavior, and understand the physiological

and biochemical mechanisms of fertilization as well as the maternal-embryonic communication responsible for the implantation that takes place in domestic mammals and the use of assisted reproduction techniques and embryonic biotechnologies (cloning, sexing, transgenesis, etc.).

4.- Know the physiological changes that occur during pregnancy, both in the mother and in the fetus as well as their endocrinological characteristics in order to get used to the use of the most practical methods for the diagnosis of pregnancy as well as the advantages and disadvantages of each of them in the different domestic species, becoming aware of the zootechnical and economic importance of performing an early pregnancy diagnosis.

5.- Understand when, how, with which and why therapeutic abortion and induction of labor should be used in the different domestic species and understand the importance of fetal development (fetal statics), as well as the characteristics of the pelvic canal (pelvimetry) in the successful resolution of eutectic labor and understand the mechanisms that trigger labor in domestic mammal species as well as the zootechnical and economic importance derived from the correct establishment of the puerperium.

6. - Know the physiology and management of the newborn animal and understand lactation as the final phase of the reproductive cycle in mammals.

Competences

- Analyse, synthesise and resolve problems and make decisions.
- Apply the basic cures that guarantee the correct function of the reproduction cycle and the resolution of obstetric problems.
- Comunicar la informació obtinguda durant l'exercici professional de manera fluïda, oralment i per escrit, amb altres col·legues, autoritats i la societat en general.
- Demonstrate knowledge and understanding of the aspects of organisation, finance and management in all fields of the veterinary profession.
- Demonstrate knowledge of English to communicate both orally and in writing in academic and professional contexts.
- Draft and present satisfactory professional reports, always maintaining the required confidentiality.

Learning Outcomes

1. Analyse, synthesise and resolve problems and make decisions.
2. Attain a methodical and reasoned knowledge of the physiological reproduction processes that lead to the formation of gametes and to fecundation, as well as the factors that determine sexual behaviour and coupling.
3. Communicate information obtained during professional exercise in a fluid manner, orally and in writing, with other colleagues, authorities and society in general.
4. Demonstrate knowledge of English to communicate both orally and in writing in academic and professional contexts.
5. Develop in an applicative manner the different forms of artificial insemination, as well as the different dilution, conservation and semen manipulation techniques (refrigeration, freezing, sexing...).
6. Draft and present satisfactory professional reports, always maintaining the required confidentiality.
7. Evaluate the different methods for inducing and synchronising the oestrous cycle, with special theoretical and practical reference to the different guidelines that should be followed.
8. Evaluate the importance of foetal development (foetal physiology and statics), as well as the characteristics of the pelvic channel (pelvimetry) in the satisfactory resolution of normal delivery.
9. Explain the mechanisms that cause delivery in domestic mammals, as well as the zoological and economic importance of the correct establishment of puerperium and lactation and the importance of correctly handling the neonate (handling guidelines, use of colostrum, examination guidelines...).
10. Identify new embryo biotechnologies: transfer of embryos, their in vitro production and conservation, and recent embryonic biotechnologies (cloning, sexing, transgenesis, mother cells, etc.).

11. Identify when, how, with what and why therapeutic abortion and the induction of delivery should be used in different domestic species.
12. Master techniques for exploration of the male and female reproduction apparatus in different species.
13. Recognise the physiological changes produced during gestation both in the mother and in the foetus, as well as their endocrine characteristics.
14. Use the most practical methods for the diagnosis of gestation and know of the advantages and disadvantages of each in different domestic species.

Content

The content of the Animal Reproduction is structured in 5 blocks organized as follows:

1st block:

- Recap of the functional anatomy and inspection of the male and female reproductive system in the different domestic mammals.

2nd block:

- Description of the behavioral and physiological changes that occur during the different phases of the estrous cycle, as well as their endocrinological characteristics.

- Methods and techniques used for reproductive control and genetic improvement in different species. Analysis of methods for the induction and synchronization of estrus and ovulations and their importance in reproductive planning. Analysis of methods of inhibition of the estrous cycle

- Description of the collection, evaluation and conservation of semen as well as artificial insemination in the different species.

- Gamete transport and maturation, fertilization and pre-implantation embryonic development.

- In vitro fertilization and new embryo biotechnologies. Transfer of in vivo-derived and in vitro produced embryos.

3rd block:

- Study of pregnancy and changes in the fetus during pregnancy as well as everything related to the study of pelvimetry.

- Pregnancy diagnosis techniques. Methods to inhibit or interrupt pregnancy.

4th block:

- Physiology of parturition, as well as the techniques to induce and synchronize parturition in the different domestic species.

5th block:

- Study of the puerperium and the beginning of lactation, its control and particularities as well as the main physiological changes of the newborn and its management.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes

Type: Directed			
Clinical cases	14	0.56	1, 2, 4, 5, 10, 7
Magistral classes	21	0.84	2, 4, 5, 12, 9, 10, 11, 13, 14, 7, 8
Practical classes	16	0.64	1, 2, 4, 5, 12, 10, 14, 7
Type: Autonomous			
Resolution of cases	22	0.88	1, 2, 4, 5, 10, 7
Study	74	2.96	2, 4, 5, 12, 9, 10, 11, 13, 14, 7, 8

The learning will be done in a combined way, with theoretical teaching given as lectures and seminars and with practical teaching. In this way. However, students will have to expand their knowledge on the subject by reading and consulting the appropriate bibliography. The teaching material used in this subject will be available on the Campus Virtual platform except for the complementary bibliographic material to be consulted optionally by the student.

Thus, in accordance with the objectives of the subject, the development of the course will be based on the following activities:

THEORETICAL TEACHING: Lectures

Lectures will be given with the help of diagrams so that the student can follow the explanations. The necessary and basic information will be given although the acquired knowledge can be completed by consulting suitable texts.

PRACTICAL TEACHING: Practical classes, independent work/cases and seminars/practices in the classroom.

The practical classes bring theoretical models closer to reality while also reinforcing, completing, and enabling the application of knowledge gained in lectures. Students will develop the ability to observe and integrate knowledge. In the practical classes, through work in small groups, the student will learn the different techniques of exploring the male and female reproductive systems (rectal palpation, ultrasound, vaginal cytology,...), artificial insemination techniques, seminal analysis, methods of semen collection or obtention and cryopreservation of gametes and embryos. In some cases, practices will be conducted in small groups to allow the student to interact with reality (manipulation of the instrument and the animal) and bring it closer to real-life situations.

The goal of autonomous workor clinical case resolution is to resolve and discuss cases that can be used to infer physiological concepts and practical applications. The course will address specific reproductive physiology and technology issues. Independent work is a methodology that is primarily aimed at students, though teachers play an important role in this process. The goal is to help students develop the skills needed to set learning goals, choose between different learning methods, set their own pace, plan and organize their work, discover and solve problems, make decisions, and evaluate their own progress. Independent learning promotes a variety of transversal skills and has become an essential teaching method.

During classroom practices or seminars, small groups of 2-4 students will work through various cases. The students will be responsible for leading the session alongside the teacher. The rest of the group will be tasked with evaluating their work and asking questions. These practices include, on the one hand, teacher-supervised small group work and, on the other, large-group discussion. The practices must allow students to apply what they've learned in theoretical classes while also familiarizing them with various sources of information. Students will be able to identify problems, make diagnoses, and seek specific solutions. At the same time, these practices must promote students' critical thinking, discussion, and communication skills.

Use of Artificial Intelligence

For this course, the use of Artificial Intelligence (AI) technologies is permitted exclusively for support tasks, such as bibliographic or information searches, or the consultation of theoretical concepts. Under no circumstances is the use of AI authorized to directly solve the proposed clinical cases, to write the case resolution summaries, or to prepare the presentations. The resolution, presentation, and final written report of these cases must be original and entirely completed by the student or student group.

The student must clearly identify which parts have been generated using AI technology, specify the tools used, and include a critical reflection on how these tools have influenced both the process and the final outcome of the activity. Lack of transparency in the use of AI will be considered academic dishonesty and may result in a partial or total penalty on the grade for the activity, or more serious sanctions in severe cases.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Cases	40%	0	0	1, 2, 3, 4, 5, 10, 6, 7
Exams	60%	3	0.12	2, 4, 5, 12, 9, 10, 11, 13, 14, 7, 8

The evaluation system consists of two partial exams, which will include the theoretical/practical part of the program (theoretical classes, seminars and practicals), and the evaluation of the cases carried out during the semester.

Attendance at the practical program (seminars and practices) is mandatory. The student who misses more than one practical session without justification will have the practical program suspended and will have to repeat it.

CASES

Each case will be scored on a scale of 0 to 10, with the arithmetic mean serving as the final score. The cases will be evaluated based on each group's participation in the presentation, defense, or examination of the case, the resolution capacity demonstrated during class, and, in some cases, the case summary provided to the teacher.

The assessment of the two cases taught in English will also include an individual assessment of this competency. Students who present and defend the two cases taught in English will receive a bonus of up to one point, which will be applied to the cases' final grade based on the following guiding criteria:

- Does not receive a bonus for having little or very little communicative ability in English. His/her vocabulary is limited, and what he/she wishes to express is either unintelligible or difficult to understand.

- Communication ability in English is worth 5% of the grade for the activity's contents. Even though the student makes mistakes and has a limited vocabulary, you understand what he/she is trying to say.

- Good communication skills in English will earn you a 10% bonus on the activity's grade.

Finally, the teacher will determine the final bonus that the students will receive (between the "no bonus" range and 10% on the final grade of the cases).

EXAMS:

Both the first and second exams have 40 questions. The questions have four possible answers, and only one is correct. Each incorrectly answered question costs 0.33 points. The exam content will correspond to what was brought up in theoretical classes, practical classes, and seminars. Each exam lasts 60 minutes.

Final grade for the subject: The grade from the first exam accounts for 30% of the final grade in the subject. The grade from the second exam accounts for another 30% of the subject's final grade, with the results of the cases accounting for the remaining 40%. All three parts must be passed with a score of $\geq$5.Grades of less than 4.99 will be considered failed.

The subject will be considered non-evaluable If student does not take one or both exams and does not complete the cases.

The subject does not offer a unique assessment.

RECOVERIES

Students who failed one of the two exams with a grade less than 5 will be able to make it up on the final recovery exam. Students who wish to improve their grade in one of the two exams may take this recovery exam under the following conditions:

- The conditions for passing the subject are identical to those described above (*Final grade).

- If the grade obtained in the second attempt is lower than the grade of the part intended to be passed, the higher grade will be considered.

If the grade for the cases is <5 points, the student can recover this part by completing and handing in an assignment related to a clinical case. The assignment requires the student to diagnose and provide possible solutions to the problem.

STUDENTS REPEATING THE SUBJECT

Students who repeat the subject do not need to take the practical classes again. To be evaluated, they must take the exams, and the grade of the cases obtained from previous courses will be kept.

It should be noted that the cases content and theoretical classes may differ from one year to the next. Therefore, it will be the student's responsibility to be aware of these changes.

Repeating students must communicate with the teaching team if they wish to repeat a practice or improve a grade on a case.

Bibliography

Veterinary reproduction and obstetrics. Arthur, GH, Noakes, DE, Pearson, H and Parkinson, TJ. Saunders Co. Ltd. 7th edition, 1996.

Text of physiology of reproduction and obstetrics structured by species with a very appropriate approach to the learning of the student. Particularly useful in subjects of the oestrous cycle and the management of the gestation and parturition

Pathways to pregnancy and parturition. Senger, PL. Current Conceptions Inc. 2nd Edition, 2003.

Text of physiology and reproduction technology specially designed for the study of reproductive endocrinology, oestrus cycles, gametes and embryo physiology, implantation and gestation. The use of graphs and explanatory diagrams makes it particularly useful for students.

SPECIFIC BIBLIOGRAPHY

- Current therapy in large animal theriogenology. Robert S. Youngquist and Walter R. Threlfall Edició 2nd Saunders Elsevier, 2007

- Small animal theriogenology. Margaret V. Root Kustritz. Butterworth Heinemann, cop. 2003

- Canine and feline theriogenology. Shirley D. Johnston, Margaret V. Root Kustritz, Patricia N. S. Olson. Saunders Company. 2001

- Canine and feline endocrinology and reproduction. Feldman, EC y Nelson, RW. W.B. Saunders Company. 2ª edición, 1996.

- Manual of small animal reproduction and neonatology. Simpson G., England G., Harvey M. British Small Animal Veterinary Association, 1998.

- Fertility and infertility in dogs, cats and other carnivores. Concannon, PW, England, GCW, Verstegen JP y Russell, HA. Journal of Reproduction and Fertility Ltd., 1993.

- Equine reproduction. McKinnon,AO y Voss, JL. Lea & Febiger, 1993.

Software

THEORETICAL TEACHING

1. Reproduction: Definition. Importance and relationships of the subject wiht other subjects

2. Breeding Soundness Evaluation: External examination of the male. Internal exploration (1h)

3. Estrous cycle (by species): Phases of the cycle. Endocrinology. Changes in behavior and inspection of the reproductive system. Estrus diagnosis. Optimum time for mounting or artificial insemination (3h). *DA*

4. Estrus control (by species): Hormonal and management methods for synchronization or induction of estrus. Induction of ovulation: Methods for inhibition and interruption of estrus (2h). *DA*

5. Semen. Semen composition. Biological and functional characteristics of semen. Sperm cell. Seminal plasma. (2h)

Artificial Insemination. Semen collection techniques (by species). Semen composition. Biological characteristics. Evaluation of seminal quality. Dilution and preservation of semen in the short and long term. Artificial insemination technique (by species) (2h)

6. Fertilization: Folliculogenesis. Maturation of the oocyte. Sperm capacitation and acrosomal reaction. Fertilization Embryo development (1h)

7. Transfer of embryos. Applications Selection and preparation of donor and recipient females. Superovulation. Collection of embryos, evaluation and conservation. Transfer to recipient females. Ovum Pick Up (1h)

8. Pregnancy diagnosis (by species): Type of placentation. Maternal recognition of pregnancy. Endocrinology. Clinical diagnosis. Laboratory diagnosis (3h)

9. Interruption of pregnancy (by species): Indications. Products to be used in each period (1h)

10. Fetus: Nutrition and metabolism. Endocrinology. Development (1 hour)

11. Pelvimetry and fetal statics: Fetal diameters. Pelvimetry attitude. Situation. Presentation. Position (1h)

12. Part: Definition. Phases. Signs. Hygiene and management of birth and post-birth. Inductionand synchronization (2h)

13. Newborn: Physiology. Care and handling. Natural and artificial feeding (2 hours)

14. Puerperium: Definition. Phases Endocrinology (1h)

PRACTICAL TEACHING

PRACTICAL CLASSES

RA1: Vaginal cytology / Artificial Insemination in the canine species (2h)

RA2: Seminal analysis (2h)

RA3: Semen cryopreservation (2h)

RA4: Semen extraction in different species (2h)

RA5: Estrus synchronization / Artificial Insemination (2h)

RA6: Inspection of the female reproductive tract / Artificial Insemination (4h)

RA7: In vitro fertilization (2h)

SEMINARS

SRA1: Heat detection / Artificial insemination in dairy cows. (2h) *DA*

SRA2: Vaginal cytology / Artificial Insemination in female dogs (2h)

SRA3: Estrus synchronization in bovine and ovine species (2h) *DA*

SRA4: Fertility in sows (2h)

SRA5: Seminal analysis (2h)

SRA6: Reproductive parameters in farrowing sows (2h)

SRA7: New reproductive biotechnologies (2h)

DA: teaching in English

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	1	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	2	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	3	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	4	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	5	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	6	Catalan	first semester	morning-mixed

(SEM) Seminars	1	English	first semester	morning-mixed
(SEM) Seminars	2	English	first semester	morning-mixed
(SEM) Seminars	3	Catalan	first semester	morning-mixed
(SEM) Seminars	4	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	5	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	6	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	1	English	first semester	morning-mixed
(TE) Theory	2	Catalan	first semester	morning-mixed