

ANIMAL BREEDING

Study programme: MIMV **Curricular Year:** 4th **Semester:** 8th **Compulsory** **Credits:** 4.5 ECTS

Lecturer's: Luís Telo da Gama (CCP, R)

1. Contact hours: Theoretical: 26 Practical: 26 Total: 52

2. Objectives

To develop and strengthen knowledge about the applications of population, quantitative and molecular genetics in the improvement and conservation of Animal Genetic Resources; Evaluation of the impact of different mating systems (inbreeding and crossbreeding) in animal production; Development of methods of genetic evaluation and prediction of expected responses to selection; Planning of organized genetic improvement systems in different livestock species.

3. Programme:

- 1) Animal Genetic Resources: characterization, conservation and management of Animal Genetic Resources.
- 2) Population Genetics: genetic and genotypic frequencies; types of gene action; Hardy-Weinberg law; Factors affecting genetic and genotypic frequencies, Single genes of importance in Animal Breeding.
- 3) Mating systems:
 - Inbreeding: inbreeding at the level of an individual and a population; relationship and genetic contributions; inbreeding and selection; management of genetic variability.
 - Crossbreeding: Individual and maternal heterosis; direct and maternal effects; crossbreeding systems; expected results.
- 4) Selection: Revision of basic statistics concepts; true and estimated breeding value; heritability. Expected and observed response to selection. Estimation of genetic parameters. Correlated responses to selection. Genetic evaluation and expected response with repeated records, and records on the offspring, ancestors and collateral relatives. Selection indices; BLUP; selection for several traits. Expected responses in more complex systems.
- 5) Genotype-environment interactions
- 6) Applications of biotechnologies in Animal Breeding: Reproductive technologies; genetic polymorphisms; cloning; transgenesis.
- 7) Genomic selection.
- 8) Selection programs in different species: Organized selection schemes; organization of breeding programs; programs in different livestock species.

4. Bibliography

- Bourdon, R.M. 2000. Understanding Animal Breeding, 2nd Ed. Prentice Hall, New Jersey.
- Gama, L.T. 2002. Melhoramento Genético Animal. Escolar Editora, Lisboa.
- Khatib, H. 2015. Molecular and Quantitative Animal Genetics. Wiley-Blackwell.
- Nicholas, F.W. 2010. Introduction to Veterinary Genetics. 3rd Edition. Wiley-Blackwell.
- Oldenbroek, K. and L. van der Waaij. 2015. Textbook Animal Breeding and Genetics for BSc students. Centre for Genetic Resources The Netherlands, Animal Breeding and Genomics Centre.
- Van Vleck, L.D., E.J. Pollak and E.A.B. Oltenacu. 1987. Genetics for the Animal Sciences. W.H. Freeman and Co., New York.

5. Assessment

Students will be evaluated by a final written examination, covering both theoretical and practical topics.