

Course: Lactation Biology of Tropical Dairy Animals

1. **Type** : Specialization's Elective
2. **Code** : PTD 6204
3. **Credit** : 3/0
4. **Semester** : Odd
5. **Description** :

The Lactation Biology of Dairy Tropical Animal is a course in the graduate program and consists of 3 credits. This course discusses about lactation process on the tropical dairy animals. Dairy cattle raised in Indonesia mostly come from tropical land, that the temperature, adaptation and acclimatization are highly necessary to be studied, especially those that related to the process during lactation. The discussion covering structures and functions of the mammary gland (anatomy and physiology), the growth of the mammary gland, hormonal roles in milk production during lactation (lactogenesis, galactopoiesis, involution of milk ejection), the health of the mammary gland, biosynthesis of milk components (lactose, fat, protein, proteomic, milk protein polymorphism), nutrient utilization in dairy cows: influence on production, milk composition and reproduction.

The lecture is conducted in the form of class meetings, discussions, independent assignments, and presentations. The selected learning methods are expected to give two-way learning directions. Subjects that need details explanation are given in the laboratory practice. The learning system utilizes materials provided by the Faculty of Animal Science UGM, such as: the Laboratory of Dairy and Milk Industry, Dairy Cattle Technical Implementation Unit, Recording livestock, and available facilities from the partners on site.

6. Course Outcomes (CO)

- CO 1 : Able to explain the function of the mammary gland, the process of milk biosynthesis, the function of nutrients during lactation in various type of tropical dairy cattle.
- CO 2 : Able to analyse and interpret the linkages of components that play a role in milk biosynthesis in the tropical dairy cattle.
- CO 3 : Able to simulate the development of tropical dairy cattle by considering factors related to lactation and the environment.
- CO 4 : Able to design alternatives for developing livestock milk production and communicating to the community.

7. The Alignment Between CO and ELO

CO*	ELO**																
	A				B			C				D					
	1	2	3	4	1	2	3	1	2	3	4	1	2	3	4	5	6
CO 1		✓		✓													
CO 2						✓	✓										
CO 3									✓	✓	✓						
CO 4												✓	✓	✓	✓	✓	✓

*CO refers to point 6.

**Expected Learning Outcomes (ELO) are written below,

A. Attitudes and Behaviors	
The graduates are able to behave well, correctly, and culturally as the result of internalization and actualization of values and norms, which is reflected in a spiritual and social life through learning process, experience, research, and/or community development in the animal husbandry.	
1	Piety to God and be able to show religious attitude and maintain the humanity values in carrying the task, which is based on religion, moral, and ethics.
2	Be proud and love the homeland show nationalism, and contribute to the improvement of the life quality in the community, nation and country, and the advancement of civilization according to Pancasila.
3	Showing the social sensitivity and attention to the community and environment by respecting the culture diversity, view, religious, beliefs, and other people's opinion, and also obey the rules.
4	Be accountable in carrying the professional practice that includes ability to accept accountability towards decision and professional action. It shall be according to the scope of the practice under their responsibility and laws.
B. Mastery in Sciences	
Master the theory of the current science in the animal husbandry and its application.	
1	Able to master the current animal science and its application theory.
2	Able to master the livestock production science, animal nutrition and fed science, animal products technology, and the livestock social economics in relation to food security and environment.
3	Able to master the design, management, and development of livestock research.
C. Special Skills	
The graduates are able to develop science, technology, and arts in the animal husbandry through interdisciplinary/multidisciplinary innovative and tested research.	
1	Able to make innovation in the animal husbandry based on the development of science and technology.
2	Able to design interdisciplinary and multidisciplinary research in the animal husbandry.
3	Able to formulate and solve problems in the national development especially in terms of animal husbandry.
4	Able to solve problems and anticipate issues in the development of animal science and industry.
D. General Skills	
The graduates are able to manage resources by utilizing science, technology, and arts to solve problems in the animal husbandry with current science and also conduct research with accountability and full responsibility.	
1	Able to develop logical, critical, systematic, and creative thought through scientific research, creation of design in the science and technology, which pays attention and applies humanity values according to their expertise. The graduates are able to arrange scientific concept and the study result based on the principles, procedures, and scientific ethics.
2	Able to identify the science that becomes their research object and position it to a research map by using information technology in the context of science development and expertise implementation developed through interdisciplinary or multidisciplinary approaches.
3	Able to make a decision in the context of solving problems in the development of science and technology, which pays attention and applies humanity values based on analysis study or experiment towards information and data.
4	Able to communicate the result of reasoning and scientific research in form of thesis and scientific writing responsibly based on academic ethics in the accredited national journal.
5	Able to maintain the academic integrity generally and avoid the plagiarism practice.
6	Able to communicate spoken and written English effectively by using the information technology for the development of animal science and its implementation.

8. Course Content

Week	CO	Topic/Subtopic	Learning Activity	Assessment Tools	Allocated Time	Lecturer
1	CO 1,2	Introduction: Mil production from various animals in tropic, structure of mammary gland (anatomy and physiology)	Classical lecture; discussion	Midterm	100 minutes	YS
2	CO 1,2	The development of mammary gland and hormone's roles	Classical lecture; discussion	Midterm	100 minutes	YS
3	CO 1,2	The health of mammary gland (immunology)	Classical lecture; discussion	Midterm	100 minutes	YS
4	CO 1,2	Hormones in lactation (endocrinology, lactogenesis, galactopoiesis, involution, milk ejection)	Classical lecture; discussion	Midterm	100 minutes	YS
5	CO 1,2	Biosynthesis of milk components: lactose, milk fat	Classical lecture; discussion	Midterm	100 minutes	TWM
6	CO 1,2	Biosynthesis of milk components: protein, proteomic, polymorphism of milk protein	Classical lecture; discussion	Midterm	100 minutes	TWM
7	CO 3,4	Biosynthesis of milk components: proteomic, polymorphism of milk protein	Classical lecture; discussion; individual assignment	Final exam, individual assignment score	100 minutes	TWM
Midterm Examination						

8	CO 3; CO 4	Nutrient utilization in dairy cows: the effects on production, milk constituents, and reproduction	Classical lecture; discussion; individual assignment	Final exam, individual assignment score	100 minutes	BP
9	CO 3; CO 4	Nutrient utilization in dairy cows: the effects on production, milk constituents, and reproduction	Classical lecture; discussion; individual assignment; presentation	Final exam, individual assignment score; presentation	100 minutes	BP
10	CO 3; CO 4; CO 5	Nutrient utilization in dairy cows: the effects on production, milk constituents, and reproduction	Classical lecture; discussion; individual assignment; presentation	Final exam, individual assignment score; presentation	100 minutes	BP
11	CO 3; CO 4; CO 5	Presentation and discussion	Classical lecture; discussion; individual assignment; presentation	Final exam, individual assignment score; presentation	100 minutes	BP
12	CO 3; CO 4; CO 5	Presentation and discussion	Classical lecture; discussion; individual assignment; presentation	Final exam, individual assignment score; presentation	100 minutes	TWM
Final Examination						

9. Practicum

Week	Activity	Methods	Total Hours
1	Structure and function of mammary gland (dairy cow and goat)	Observation, recording	3 hours

2	Production and composition of cow and goat's milk	Observation, recording	6 hours
3	Dairy cow and goat's feed formulation according to production and lactation period	Observation, feed formulating	12 hours
4	Report	Report writing and discussion	12 hours
5	Presentation of the result	Presentation and discussion	3 hours

10. Assessment

Component	CO	Percentage (%) for final grade	Minimum Satisfactory Level
Midterm	CO 1; 2	35	70
Quiz	CO 1; 2	10	70
Presentation	CO 3; 4	10	70
Paper	CO 3; 4; 5	10	70
Final exam	CO 1; 2; 3; 4; 5	35	70
Practicum			
Total		100	

11. Lecturer

1. Yuni Suranindyah
2. Budi Prasetyo Widyobroto
3. Tridjoko Wisnumurti
4. Adiarto

12. Reference