

Course: Ruminant Nutrition

1. **Type** : Specialization's Elective
2. **Code** : PTN 6108
3. **Credit** : 1/1
4. **Semester** : Odd
5. **Description** :

This course is an advanced course of the Basic Animal Nutrition (PTN 1301), as well as Animal Nutrition and Feed Science which are given at undergraduate level. The Ruminant Nutrition Course (PTN 6108) discusses the differences in physiological aspects and digestive anatomy, as well as provide understanding in nutrient metabolism for ruminants.

6. Course Outcomes (CO)

- CO 1 : Understand the basic concept of nutrients for ruminants.
- CO 2 : Understand the definition and function of digestive tract on ruminants, including its development.
- CO 3 : Understand the process of nutrient digestion in the digestive tract.
- CO 4 : Understand the absorption of nutrients in ruminants and its influential factors.
- CO 5 : Understand the metabolism of nutrients and metabolic disorder in ruminant.

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 5					✓							✓					

*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 feed 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	Introduction: <ul style="list-style-type: none"> Course introduction Learning contract Syllabus 	Classical lecture, discussion (SCL)	Midterm	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
2	CO 1	Feed and nutrient: feed; nutrient; interaction	Classical lecture, discussion (SCL)	Midterm	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.

3	CO 2	Digestive tract: anatomy, growth, and development	Classical lecture, discussion (SCL)	Midterm	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
4	CO 3	Digestive tract: motility and digestion rate	Classical lecture, discussion (SCL)	Midterm	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
5	CO 3	Rumination: prehension; mastication and saliva production	Classical lecture, discussion (SCL)	Midterm	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
6	CO 3	Microbiology: bacteria and protozoa	Classical lecture, discussion (SCL)	Midterm	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
7	CO 3	Fermentation: carbohydrate and protein	Classical lecture, discussion (SCL)	Midterm	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
Midterm Examination						
8	CO 3	Digestion: nutrient digestion	Classical lecture, discussion (SCL)	Final exam	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
9	CO 4	Digestion: absorption	Classical lecture, discussion (SCL)	Final exam	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
10	CO 4	Protein-energy balances	Classical lecture, discussion (SCL)	Final exam	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
11	CO 5	Metabolism: energy	Classical lecture, discussion (SCL)	Final exam	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
12	CO 5	Metabolism: energy	Classical lecture,	Final exam	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.

			discussion (SCL)			
13	CO 5	Metabolism: mineral and vitamin	Classical lecture, discussion (SCL)	Final exam	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
14	CO 5	Nutrient-metabolism abnormality	Classical lecture, discussion (SCL)	Final exam	1 x 55 minutes	Prof. Dr. Ir. Kustantinah, DEA.
Final Examination						

9. Practicum

Week	Activity	Methods	Total Hours
1	Assistance	Explanatory regarding in vitro practicum	2 x 2 hours
2	Laboratory practicum	In vitro analysis (worm availability on tannin-based feed)	2 x 8 hours
3	Report	Writing and submission	2 x 8 hours

10. Assessment

Component	CO	Percentage (%) for final grade	Minimum Satisfactory Level
Midterm	CO 1-3	30	70
Quiz	CO 1-3	10	70
Attendance			70
Paper			70
Final Exam	CO 3-4-5	30	70
Practicum	CO 5	30	70
Total		100	

11. Lecturer

1. Prof. Dr. Ir. Kustantinah, DEA.

12. Reference

1. Orskov, E.R and M Ryle. 1990. Energy Nutrition In Ruminants. Elsevier Science Publisher.

2. Ørskov, E.R. 1992. Protein Nutrition in Ruminants. Academic Press INC, UK.
3. Ørskov, E.R. 2002. Trails and Trials in Livestock Research. IFRU, Macaulay, Aberdeen, UK.
4. Lassiter, J.W and Hardy M. Edwards, Jr. 1982. Animal Nutrition. Reston Publishing LTD, USA.
5. Mc Donald, P., Edwards, R.A., Greenhalgh, J.F.D., and Morgan, C.A. 2002. Animal nutrition. Sixth Ed. Prentice Hall, Pearson Education, Edinburgh Gate, , Harlow, Essex CM20 2JE, UK.
6. Richard, O. K. and Church, D.C. 1998. Livestock feeds and feeding. 4th Ed. Prentice Hall, New Jersey, USA.