COURSE LEARNING PLAN

UNIVERSITY OF BRAWIJAYA

FACULTY OF ANIMAL SCIENCE

DEPARTMENT OF ANIMAL SCIENCE

UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE

LEARNING PLAN: RUMINANT NUTRITION

Course	Code	Weight (credits)	Semester	Compilation Date
Ruminant Nutrition	PEN60003	3	3/Odd	July 27, 2020

Authorization	Course Coordinator	Ka PS S1	Vice Dean 1
	Dr. Ir. Marjuki, M.Sc	Dr. Herly Evanuarini, S.Pt., MP.	Dr. M. Halim Natsir, S.Pt., MP., IPM., ASEAN Eng

Learning Outcomes (LO)

PLO

1. LO 4: Able to develop comprehensive insight and mindset according to the science and field of the animal industry
2. LO 5: Able to examine the implications of the development or implementation of science and technology that consider and apply humanities values in accordance with their expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas
3. LO 6: Able to apply biological science, physiology, nutrition science, breeding science, animal raising management to comprehend the concept and implement it in the field of animal science
4. LO 13: Able to apply animal technology that is oriented towards improving production, efficiency, quality, and sustainability based on mastery of animal science including breeding, feed, processing of products, marketing management and organizing a sustainable animal production system, and applying entrepreneurial concepts

CLO

After taking this course, the students are able to:

1. Explain the system and function of the digestive organs, digestion process, and metabolism of ruminant animal feed
2. Mention the variety, population, and classification of rumen microbes and their living habitat and reproduction and the role of the rumen in the digestion process
3. Explain the process of digestion and metabolism of food substances in ruminant animals, its advantages and disadvantages and how to optimize it
4. Explain the process of regulating the consumption of ruminant animal feed
5. Make rations and strategies for providing them to ruminant animal in accordance with nutritional needs and using them efficiently and how to evaluate them

Brief Course Description	This course discusses the process of digestion and feeds metabolism in ruminant animals; the variety and function of microbes in the feed fermentation process; regulation of feed consumption, and strategies for feeding animals based on raising purposes.
Topics	1. Digestive system and function in ruminant animals 2. Rumen microbiology 3. The process of digestion and metabolism of food substances in ruminant animals 4. Regulation of feed consumption in ruminant animals (physical, metabolic, and physiological factors) 5. Principles and procedures for the making of ruminant animal rations 6. Strategies for feeding ruminant animals 7. Evaluation of feed in ruminant animals
References	Babcock Institute. 1999. Dairy Essentials 3rd edition. Wisconsin: Babcock Institute. McDonald, P., R. a. Edwards, J. F. D. Greenhalgh and Morgan. 2011. Animal Nutrition 7th Edition. New Jersey: Prentice Hall. Moran, John. 2005. Tropical dairy farming: Feeding management for smallholder dairy farmers in the humid tropics Chapter 5: How the rumen works?. Colling Wood: Lanlink Press. Soetanto, H. 2019. Pengantar Ilmu Nutrisi Ruminansia. Malang: UB Press.
Learning Media	Software: Video, PowerPoint, E-book Hardware: Laptop, Reference books
Teaching Team	1. Prof. Dr. Ir. Siti Chuzaemi, MS., IPU., ASEAN Eng 2. Prof. Dr. Ir. Hendrawan Soetanto, M. Rur. Sc 3. Prof. Dr. Ir. Hartutik, S.Pt., MP., IPU., ASEAN Eng 4. Prof. Dr. Ir. Kusmartono 5. Dr. Ir. Mashudi, M.Agr.Sc., IPM, ASEAN Eng 6. Dr. Ir. Marjuki, M.Sc 7. Asri Nurul Huda, S.Pt., MP., M.Sc 8. Poespitasari Hazanah Ndaru, S.Pt., MP.
Prerequisite Courses	1. Animal Anatomy and Physiology 2. Introduction to Animal Nutrition and Animal Feed Ingredients

Week	Sub-CLO	Indicator	Learning Materials / Topics	Learning Methods	Criteria & Form of Assessment	Weighted Score (%)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Able to explain the digestive system and function in ruminant animals	Able to explain the system and function of the digestive organs in ruminant animals completely and in sequence from anterior to posterior	Digestive system and function in ruminant animals	Lectures and Group Discussions	Pre-test	
2	Able to explain the variety and population of rumen microbes and their living habitats and breeding	Able to mention and explain the variety and population of rumen microbes and their living habitats and breeding correctly	Rumen microbiology	Lectures and Group Discussions		
3	Able to explain the role and activity of rumen microbes in the digestion of feed in the rumen	Able to explain the role and activity of rumen microbes in the digestion of feed in the rumen, its advantages and disadvantages correctly	The role and activity of rumen microbes on the fermentative digestion process	Lectures and Group Discussions		
4	Able to explain the process of digestion and carbohydrate metabolism in ruminant animals, its advantages and disadvantages and how to optimize it	Draw a diagram and explain the process of digestion and carbohydrate metabolism in ruminant animals correctly, its advantages and disadvantages and how to optimize it	Digestion and carbohydrate metabolism in ruminant animals	Lectures and Group Discussions	Structured assignment	
5	Able to explain the process of digestion and protein metabolism in ruminant animals, its advantages and disadvantages and how to optimize it	Draw a diagram and explain the process of digestion and protein metabolism in ruminant animals correctly, its advantages and disadvantages and how to optimize it	Digestion and protein metabolism in ruminant animals	Lectures and Group Discussions		
6	Able to explain the process of digestion and lipid metabolism in ruminant animals,	Draw a diagram and explain the process of digestion and lipid metabolism in ruminant animals	Digestion and lipid metabolism in ruminant animals	Lectures and Group Discussions		

	its advantages and disadvantages and how to optimize it	correctly, its advantages and disadvantages and how to optimize it				
7	Able to explain the process of digestion and vitamin metabolism in ruminant animals, its advantages and disadvantages and how to optimize it	Draw a diagram and explain the process of digestion and vitamin metabolism in ruminant animals correctly, its advantages and disadvantages and how to optimize it	Digestion and vitamin metabolism in ruminant animals	Lectures and Group Discussions	Quiz	
8	Midterm Exam					
9	Able to explain the process of digestion and mineral metabolism in ruminant animals, its advantages and disadvantages and how to optimize it	Draw a diagram and explain the process of digestion and mineral metabolism in ruminant animals correctly, its advantages and disadvantages and how to optimize it	Digestion and mineral metabolism in ruminant animals	Lectures and Group Discussions		
10	Able to explain the concept of regulation of feed consumption in ruminant animals (the physical factor)	Able to explain the concept of regulation of feed consumption in ruminant animals (the physical factor) correctly	Regulation of feed consumption (the physical factor)	Lectures and Group Discussions		
11	Able to explain the concept of regulation of feed consumption in ruminant animals (metabolic and physiological factors)	Able to explain the concept of regulation of feed consumption in ruminant animals (metabolic and physiological factors) correctly	Regulation of feed consumption (metabolic and physiological factors)	Lectures and Group Discussions		
12	Able to understand the principles and procedures for the making of rations for small ruminant animals in accordance with their physiological	Able to make rations for small ruminant animals in accordance with their physiological status and raising purposes	Principles and procedures for the making of rations for small ruminant animals	Lectures and Group Discussions	Structured assignment	

	status and raising purposes					
13	Able to understand the principles and procedures for the making of rations for large ruminant animals in accordance with their physiological status and raising purposes	Able to make rations for large ruminant animals in accordance with their physiological status and raising purposes	Principles and procedures for the making of rations for large ruminant animals	Lectures and Group Discussions		
14	Able to explain the principles, stages, and strategies for feeding ruminants	Able to explain the principles, stages, and strategies for feeding ruminants in accordance with the needs and safety of animals	Strategies for feeding ruminant animals	Lectures and Group Discussions		
15	Able to explain evaluation techniques of feed in ruminant animals (in vivo, in vitro, and in sacco)	Able to explain evaluation techniques of feed in ruminant animals (in vivo, in vitro, and in sacco) correctly	Evaluation techniques of feed in ruminant animals (in vivo, in vitro, and in sacco)	Lectures and Group Discussions	Quiz	
16	Final Exam					

ASSESSMENT RUBRIC

	UNIVERSITY OF BRAWIJAYA FACULTY OF ANIMAL SCIENCE DEPARTMENT OF ANIMAL SCIENCE UNDERGRADUATE STUDY PROGRAM OF ANIMAL SCIENCE		
Course	Ruminant Nutrition		
Score Level	CLO and PLO	Conversion	PLO Score
Program Learning Outcomes-S1: Able to apply biological science, physiology, nutrition science, breeding science, animal raising management to comprehend the concept and implement it in the field of animal science (LO 6). Course Learning Outcomes 1: Explain the system and function of the digestive organs, digestion process, and metabolism of ruminant animal feed			
Very Good (4)	Showing understanding and be able to explain the concept of the system and function of the digestive organs in the digestive process and metabolism of feed in ruminant animals comprehensively, correctly, completely, and in sequence from anterior to posterior	80-100	1
Good (3)	Showing understanding and be able to explain the concept of the system and function of the digestive organs in the digestive process and metabolism of feed in ruminant animals well, correctly, completely, and in sequence from anterior to posterior	70-79	0.75
Moderate (2)	Showing understanding and be able to explain the concept of the system and function of the digestive organs in the digestive process and metabolism of feed in ruminant animals correctly, quite complete, and in sequence from anterior to posterior	60-69	0.5
Poor (1)	Showing poor understanding and be able to explain the concept of the system and function of the digestive organs in the digestive process and metabolism of feed in ruminant animals correctly, but not complete, and not in sequence from anterior to posterior	<60	0.25
Score Level	CLO and PLO	Conversion	PLO Score
Program Learning Outcomes-S1: Able to apply biological science, physiology, nutrition science, breeding science, animal raising management to comprehend the concept and implement it in the field of animal science (LO 6).			

Course Learning Outcomes 2: Mention the variety, population, and classification of rumen microbes and their living habitat and reproduction and the role of the rumen in the digestion process			
Very Good (4)	Mention the variety, population, and classification of rumen microbes and their living habitat and reproduction and the role of the rumen in the digestion process of feed comprehensively	80-100	1
Good (3)	Mention the variety, population, and classification of rumen microbes and their living habitat and reproduction and the role of the rumen in the digestion process of feed well	70-79	0.75
Moderate (2)	Mention the variety, population, and classification of rumen microbes and their living habitat and reproduction and the role of the rumen in the digestion process of feed limitedly	60-69	0.5
Poor (1)	Mention the variety, population, and classification of rumen microbes and their living habitat and reproduction and the role of the rumen in the digestion process of feed very limitedly	<60	0.25
Score Level	CLO and PLO	Conversion	PLO Score
Program Learning Outcomes-S1: - Able to develop comprehensive insight and mindset according to the science and field of the animal industry (LO 4) - Able to examine the implications of the development or implementation of science and technology that consider and apply humanities values in accordance with their expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas (LO 5) Course Learning Outcomes 3: Explain the process of digestion and metabolism of food substances in ruminant animals, its advantages and disadvantages and how to optimize it			
Very Good (4)	Have **comprehensive** abilities in explaining the process of digestion and metabolism of food substances in ruminant animals, its advantages and disadvantages and how to optimize it	80-100	0.5
Good (3)	Have **good** abilities in explaining the process of digestion and metabolism of food substances in ruminant animals, its advantages and disadvantages and how to optimize it	70-79	0.375
Moderate (2)	Have **moderate** abilities in explaining the process of digestion and metabolism of food substances in ruminant animals, its advantages and disadvantages and how to optimize it	60-69	0.25
Poor (1)	Have **poor** abilities in explaining the process of digestion and metabolism of food substances in ruminant animals, its advantages and disadvantages and how to optimize it	<60	0.125

Score Level	CLO and PLO	Conversion	PLO Score
Program Learning Outcomes-S1: - Able to develop comprehensive insight and mindset according to the science and field of the animal industry (LO 4) - Able to examine the implications of the development or implementation of science and technology that consider and apply humanities values in accordance with their expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas (LO 5) Course Learning Outcomes 4: Explain the process of regulating the consumption of ruminant animal feed			
Very Good (4)	Have **comprehensive** abilities in explaining the process of regulating the consumption of ruminant animal feed	80-100	0.5
Good (3)	Have **good** abilities in explaining the process of regulating the consumption of ruminant animal feed	70-79	0.375
Moderate (2)	Have **moderate** abilities in explaining the process of regulating the consumption of ruminant animal feed	60-69	0.25
Poor (1)	Have **poor** abilities in explaining the process of regulating the consumption of ruminant animal feed	<60	0.125
Score Level	CLO and PLO	Conversion	PLO Score
Program Learning Outcomes-S1: - Able to apply animal technology that is oriented towards improving production, efficiency, quality, and sustainability based on mastery of animal science including breeding, feed, processing of products, marketing management and organizing a sustainable animal production system, and applying entrepreneurial concepts (LO 13) Course Learning Outcomes 5: Make rations and strategies for providing them to ruminant animals in accordance with nutritional needs and using them efficiently and how to evaluate them			
Very Good (4)	Able to make ration arrangements and giving strategies to ruminants very well in accordance with nutritional needs and their efficient use and method of evaluation	80-100	1
Good (3)	Able to make ration arrangements and giving strategies to ruminants well in accordance with nutritional needs and their efficient use and method of evaluation	70-79	0.75
Moderate (2)	Able to make ration arrangements and giving strategies to ruminants limitedly in	60-69	0.5

	accordance with nutritional needs and their efficient use and method of evaluation		
Poor (1)	Able to make ration arrangements and giving strategies to ruminants very limitedly in accordance with nutritional needs and their efficient use and method of evaluation	<60	0.25

Formula to Calculate PLO Score: $\frac{Level\ Skor}{\sum level\ skor} \times \frac{\sum CLO}{\sum PLO}$

CLO Score Calculation

Assessed components	Component Weights	CLO Weight on the Score			
		CLO 1	CLO 2	CLO 3	CLO 4
Practicum	0.3		0.3	0.3	0.4
Midterm Exam	0.3	0.5	0.5		
Final Exam	0.3			0.4	0.6
Assignment	0.05		0.5		0.5
Quiz	0.05	0.25	0.25	0.25	0.25
CLO WEIGHT					

PLO Score Calculation

CLO	CLO Score	CLO Weight	PLO			
			PLO 4	PLO 5	PLO 6	PLO 13
CLO 1					1	
CLO 2					1	
CLO 3			0.4	0.6		
CLO 4						1

Basic Format for the Lecture Portfolio

	UNIVERSITY OF BRAWIJAYA **FACULTY OF ANIMAL SCIENCE** **STUDY PROGRAM OF ANIMAL SCIENCE**		
Course: Ruminant Nutrition	Code: PEN60003	RMK:	Semester: 3
Lecturers	1. Prof. Dr. Ir. Siti Chuzaemi, MS., IPU., ASEAN Eng 2. Prof. Dr. Ir. Hendrawan Soetanto, M. Rur. Sc 3. Prof. Dr. Ir. Hartutik, S.Pt., MP., IPU., ASEAN Eng 4. Prof. Dr. Ir. Kusmartono 5. Dr. Ir. Mashudi, M.Agr.Sc., IPM, ASEAN Eng 6. Dr. Ir. Marjuki, M.Sc 7. Asri Nurul Huda, S.Pt., MP., M.Sc 8. Poespitasari Hazanah Ndaru, S.Pt., MP.		

Introduction

This course discusses the process of digestion and feeds metabolism in ruminant animals; the variety and function of microbes in the feed fermentation process; regulation of feed consumption, and strategies for feeding animals based on raising purposes.

1	**Objectives** (describe general and specific course objectives)
	1. The students are able to explain the system and function of the digestive organs, digestion process, and metabolism of ruminant animal feed 2. The students are able to classify the variety and function of rumen microbes in the feed fermentation process 3. The students are able to explain the process of regulating the consumption of ruminant animal feed 4. The students are able to make rations and evaluate rations for ruminant animals
2	**Learning Strategies** (describe the strategy used to achieve the course objective - CLO)
	The learning strategies carried out in lectures include: 1. providing lectures, 2. discussions, 3. structured assignments, 4. quiz, and by using the concepts of SCL (Student Center Learning) and TCL (Teacher Center Learning).

3	**Lecture Management** (describe the lecture management: lectures, tutorials, practicum, assignments, major assignments, etc.)
	The lectures are carried out by conducting: 1) Lecture: 100 minutes/meeting (14 meetings) 2) Practicum of 150 minutes/meeting (14 meetings) 3) Structured assignments and quizzes (1 time before and 1 time after Midterm Exam) 4) Attendance: 80% of total attendance
4	**Lecture Contents** (explain its suitability with the applicable curriculum)
	This lecture material consists of: 1. Digestive system and function in ruminant animals 2. Rumen microbiology 3. The process of digestion and metabolism of food substances in ruminant animals 4. Regulation of feed consumption in ruminant animals (physical, metabolic, and physiological factors) 5. Principles and procedures for the making of ruminant animal rations 6. Strategies for feeding ruminant animals 7. Evaluation of feed in ruminant animals
5	**Lecture Participants** (provide an overview of the lecture participants)
	The lecture participants of the Ruminant Animal Nutrition Science are 3rd semester students who passed the Introduction to Animal Nutrition and Animal Feed Ingredients courses and the Animal Anatomy and Physiology courses.
6	**Attendance Percentage** (100% lecturer attendance; 80% student attendance)
	The lecturers are required to be present 100% in the lecture process, while the students have a maximum tolerance for the absence of 20% to be able to take the Final Exam.
7	**Evaluation System** (explain the homework, quizzes, group assignments, practicum, etc.)
	The evaluation is carried out by giving: 1. Quiz (5%) with the weighted score of CLO 1: 25%; CLO 2: 25%; CLO 3: 25%; CLO 4: 25% 2. Structured assignments (5%) with the weighted score of CLO 2: 50%; CLO 4: 50% 3. Practicum (30%) with the weighted score of CLO 1: 30%; CLO 2: 30%; CLO 3: 40% 4. Midterm Exam (30%) with the weighted score of CLO 1: 50%; CLO 2: 50% 5. Final Exam (30%) with the weighted score of CLO 3: 40%; CLO 4: 60%
8	**Class Observation** (explain important and interesting things that were encountered during the lecture)

9	**Learning Outcomes** (explain the achievement of the objectives that have been set, also include the learning achievements that can be explained)
	1. Able to develop comprehensive insight and mindset according to the science and field of the animal industry (LO 4) 2. Able to examine the implications of the development or implementation of science and technology that consider and apply humanities values in accordance with their expertise based on scientific principles, procedures, and ethics to produce excellent solutions and ideas (LO 5) 3. Able to apply biological science, physiology, nutrition science, breeding science, animal raising management to comprehend the concept and implement it in the field of animal science (LO 6) 4. Able to apply animal technology that is oriented towards improving production, efficiency, quality, and sustainability based on mastery of animal science including breeding, feed, processing of products, marketing management and organizing a sustainable animal production system, and applying entrepreneurial concepts (LO 13)
10	**Obstacles** (provide an overview of the main obstacles in the learning process)
11	**Score Distribution** (provide the score distribution following the learning achievements of this course)
	1. Quiz (5%) with the weighted score of CLO 1: 25%; CLO 2: 25%; CLO 3: 25%; CLO 4: 25% 2. Structured assignments (5%) with the weighted score of CLO 2: 50%; CLO 4: 50% 3. Practicum (30%) with the weighted score of CLO 1: 30%; CLO 2: 30%; CLO 3: 40% 4. Midterm Exam (30%) with the weighted score of CLO 1: 50%; CLO 2: 50% 5. Final Exam (30%) with the weighted score of CLO 3: 40%; CLO 4: 60%
12	**Conclusion**
13	**Improvement Recommendations**
	Appendices:
	1. 2. etc.