CURRICULUM OF MAGISTER PROGRAM OF ANIMAL SCIENCE

FACULTY OF ANIMAL SCIENCES
UNIVERSITAS BRAWIJAYA
2024

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CHAPTER I

STUDY PROGRAM SPECIFICATIONS

MAGISTER PROGRAM OF ANIMAL SCIENCES (MPAS)

Vision: Become a Master's Program in Animal Science that runs the Tridharma of Higher Education and a reforming curriculum with an International Reputation in Science, Technology and Entrepreneurship that Supports Livestock Industry Culture for Community Welfare

Mission:

1. Organize master's education in the field of animal science that meets national and international standards.
2. Develop research that produces scientific papers with international standard and science and technology needed for society and industry.
3. Develop and expand cooperation networks nationally and internationally in the fields of education, research and international scientific publications.
4. Aligning the quality of learning with national and international standards to produce graduates who are nationally and internationally competitive and have competencies in accordance with the needs of stakeholders.

Educational philosophy:

MPAS supports food security in Indonesia through innovative, science-based research aimed at enhancing community welfare.

Academic Ethics:

In exercising its rights and obligations, the academic community must adhere to universally applicable academic ethics, including honesty, openness, objectivity, lifelong learning, mutual respect, and non-discrimination. These ethical principles should be reflected in the teaching and learning process, research, community service, publication, use of titles, and supporting administrative processes. Violations of academic ethics are considered unethical actions or academic infractions and prohibited actions, including (1) cheating on exams, (2) plagiarism, (3) deceit, (4) forgery, (5) bribery, (6) discriminatory actions, and similar offenses.

Class

- Regular Class 1
- Regular Class 2
- Double Degree Class

Language of instruction

Indonesian

Learning Scheme:

Classroom instruction combined with up to 40% online learning, with a Student-Centered Learning approach, including (1) problem-based learning, (2) interactions between lecturers, students, the community, and the natural environment, (3) various sources and media, (3) cooperative learning and (4) multi-disciplines.

Scientific Concepts and Supporting Technology

A scientific concept that prioritizes attitudes to develop knowledge and increase innovative skills.

Workload of MPAS student

The workload of MPAS is as follows:

a. The master student must obtain at least 54 SCU including thesis (Permendikbudristek Number 53/2023: Quality Assurance for Higher Education)
b. The master students with non-linear study program background are required to do Matriculation Program (non-credit) which has been determined. It has to be done before formal learning program began.
c. Total credits for matriculation are 6 SCU (non-credit). The Matriculation subjects are Statistic and Experimental Design and Academic Writing.
d. Subject composition:
    1. Compulsory subjects are taken in the first semester (18 credits)
    2. Compulsory subjects 9 credits and Elective subjects (at least 7 credits) are taken in the second semester and
    3. Master Thesis in the third and fourth semester (22 credits). The learning outcome for thesis:
        - Scientific publication in international journals indexed by Scopus or Web of Science Core Collection (Thomson Reuter) or national journal accredited by Sinta 2, or UB journals determined by the Rector; or Scopus indexed proceedings according to the Rector's Regulation Number 52 of 2018.
        - The Master's Program is taken in a maximum of 4 years (8 semesters)

e. For enrolment as a master student, the candidate needs to obtain undergraduate degree except for students who take special programs such as the Fast-Track Program.

Curriculum Content

Curriculum of MPAS, FAS-UB was formulated to refer to Constitution of the Republic of Indonesia Number 20 of 2003 concerningthe National Education System. Meanwhile the learning outcomes refers to the Presidential Regulation No. 8 of 2012 concerning the Indonesian National Qualifications Framework (IQF), Permendikbudristek Number 53/2023: Quality Assurance for Higher Education, the Regulation of UB Rector Number 2770, 23 April 2024: The implementation of Permendikbudristek Number 53/2023. This curriculum is used as guideline for teaching and learning process at MPAS, FAS-UB. The curriculumis as follows:

a. University Compulsory Subject
   - Research Methods and Scientific Writing subject: 3 credits
   - Thesis: 22 credits
b. Study Program Compulsory Subjects: 15 credits
c. Department compulsory subjects: 9 credits
d. Elective Subjects: minimum 7 credits
e. Total workload for lectures: 24 - 40 credits
f. The maximum of total workload per semester is 18 credits

CHAPTER II

LEARNING OUTCOMES OF STUDY PROGRAM

CURRICULUM

MPAS, FAS, UB curriculum is structured based on the Law of the Republic of Indonesia Number 12/ 2012 on Higher Education, Presidential Regulation of the Republic of Indonesia Number 8/2012 on the Indonesian National Qualifications Framework (IQF), Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 73/ 2013 on the Implementation of the Indonesian Qualifications Framework in Higher Education Sector, Permenristekdikti Number 44/2015 on National Standards for Higher Education (SN-DIKTI), Government Regulation Number 4/2012 on Implementation of Higher Education, and Permendikbud No. 32020 on National Standards of Higher Education. Permendikbudristek Number 53/2023: Quality Assurance for Higher Education, the Regulation of UB Rector Number 2770, 23 April 2024: The implementation of Permendikbudristek Number 53/2023. MPAS graduate profiles refer to IQF Level 8 with competences:

1. Capable to develop knowledge, technology, and/or art in the field of science or professional practice through research, so it produces innovative and tested works.
2. Capable to solve problems of science, technology, and/or art in their field of science through an inter or multidisciplinary approach.
3. Capable to manage research and development that is beneficial to society and science and can gain national and international recognition.

The structure of curriculum of MPAS, FAS, UB can be seen in Figure 2.1.

Figure 2. 1 Curriculum structure of Master Program of Animal Science, Faculty of Animal Science, UB

ILO's of MPAS:

MPAS developed 10 ILO's which are divided into two; core competency and supporting competencies (attitude, knowledge and skill). Full description of the ILO's presented in Table 1.

Table 1. ILO's of MPAS list

CORE COMPETENCY	ATTITUDE	Applying logical, critical, systematic, and creative thinking in the field of animal science through scientific research and the results of studies based on rules, procedures, and scientific ethics in the form of a thesis (ILO1)
		Arrange and communicate ideas, scientific ideas and opinions responsibly and are based on academic ethics and communicate the results of livestock industry research in a forum (ILO2)
	KNOWLEDGE COMPETENCY	Able to master the livestock industry theory (specifically breeding, feeding, and management, animal product technology and agribusiness) and have ability to develop competitive local resources (ILO3)
	SPECIAL SKILLS	Able to apply innovative, multidisciplinary technology in the development of the livestock industry (ILO4)
		Take decisions in the context of resolving the problem of developing science and technology based on analysis or experimental studies of information and data (ILO5)
		Identify the scientific fields that are the object of research and position them into a research map developed through an inter and multi-disciplinary approach (ILO6)

SUPPORTING COMPETENCY	GENERAL COMPETENCY	Increase learning capacity independently (ILO7)
		Have the ability to utilize application or software in animal science field (ILO8)
		Able to manage, to develop and to maintain networking with colleagues, colleagues inside institutions and research community wider (ILO9)
	SPECIAL COMPETENCY	Documenting, storing, securing, and rediscovering research data to ensure validity and avoid plagiarism (ILO10)

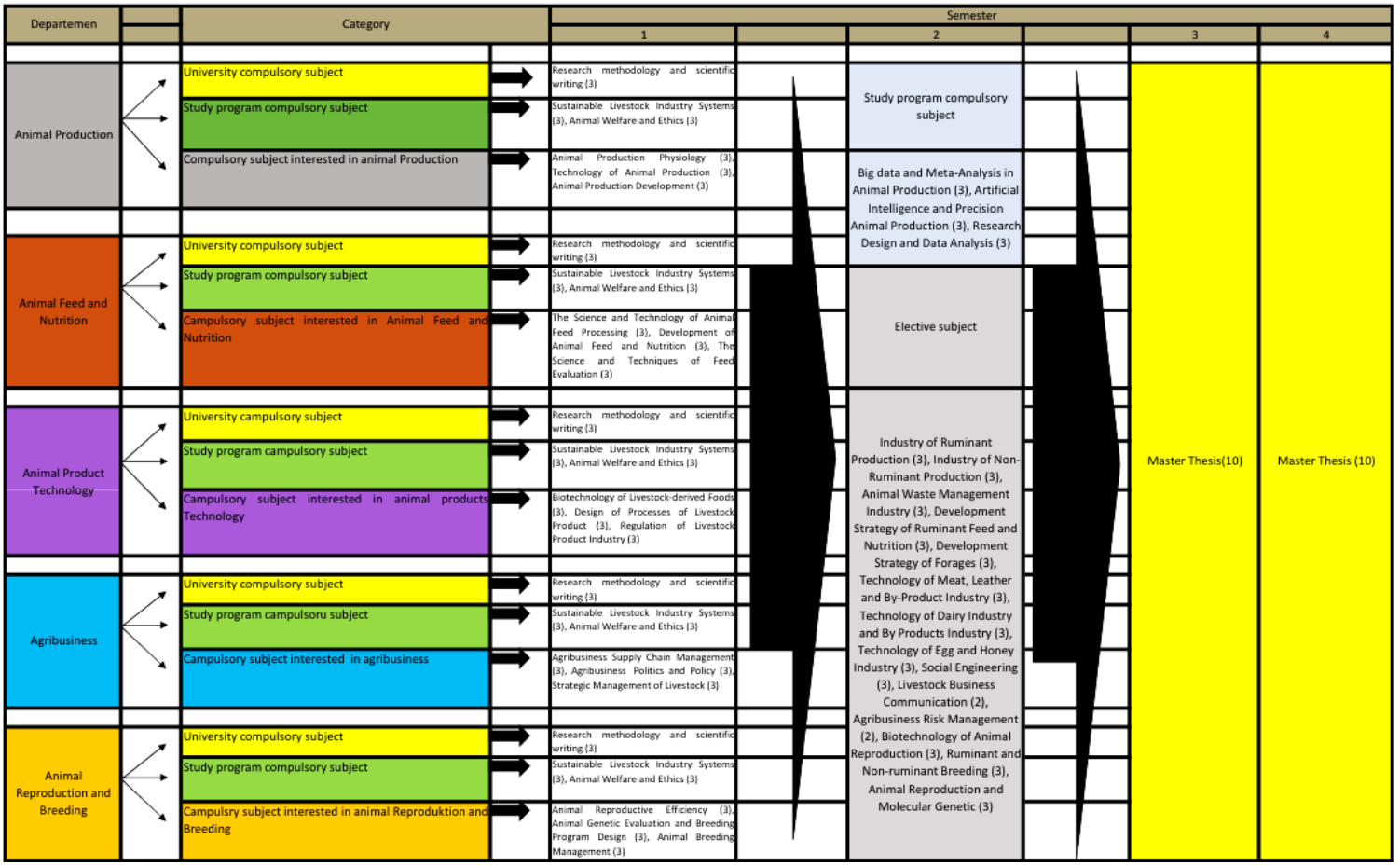
International Accreditation References

Acuan pada akreditasi internasional AQAS (*Agency for Quality Assurancethrough the Accreditation of Study Programmes*)

CHAPTER III

COURSES AND NUMBER OF CREDITS STUDY PROGRAM

The Ideal Plan for Completion of Study at MPAS, FAS, UB



The Distribution of Credits Earning by Students in Each Semester

Semester	Subject	N	Credit	Total
I (Subject)	- Compulsary subject of University - Compulsary subject of Study Program - Compulsary subject of Department	1 2 3	3 6 9	18
II (Subject)	- Compulsary subject of Study Program - Elective subject (at least)	3 3	9 7	16
III (Thesis)	- Examination of thesis proposal - Publication 1 - Publication 2 - Seminar - Final examination of thesis	1 1 1 1 1	2 3 3 2 12	22
IV (Thesis)				
TOTAL (at least)				**56**

No	Subject	Credit	Semester
A	**University Compulsory Units**		
1	Research Methodology and Scientific Writing	3 (2+1)	1
2	Thesis:		
	- Proposal Examination	2	3
	- Scientific Work 1	3	3/4
	- Scientific Work 2	3	3/4
	- Results Seminar	2	3/4
	- Thesis Examination	12	3/4
B	**Study Program Compulsory Units**		
1	Sustainable Livestock Industry Systems	3	1
2	Animal Welfare & Ethics	3 (2+1)	1
3	*Big Data and Meta-Analysis in Animal Production*	3	2
4	Artificial Intelligence and Precision Animal Production	3	2
5	Research Design and Data Analysis	3 (2+1)	2

C	**Compulsary Subjects of Department**		
1	Compulsory Subjects of Department 3 subjects x 3 (2+1) credits	9 (6+3)	1
D	**Elective Subjects**		
1	Elective Subjects of Department	Minimal 7	2

The list of all subjects in MPAS are as follows and the description of each subject is listed in below:

Compulsory Subjects of Universitas Brawijaya

No	Subjects	Credit	Semester
1	Research Methodology and Scientific Writing	3 (2+1)	1
2	Thesis	22	3/4

Compulsary Subjects of Study Program

No	Subjects	Credit	Semester
1	Sustainable Livestock Industry Systems	3	1
2	Animal Welfare and Ethics	3 (2+1)	1
3	Big Data and Meta-Analysis in Animal Production	3	2
4	Artificial Intelligence and Precision Animal Production	3	2
5	Research Design and Data Analysis	3 (2+1)	2

Compulsary Subjects of Department

Compulsary Subjects of Animal Production Department

No	Subjects	Credit	Semester
1	Animal Production Physiology	3	1
2	Technology of Animal Production	3	1
3	Animal Production Development	3	1

Compulsary Subjects of Animal Feed and Nutrition Department

No	Subjects	Credit	Semester
1	The Science and Technology of Feed Processing	3	1
2	Development of Animal Feed and Nutrition	3	1
3	The Science and Techniques of Feed Evaluation	3	1

Compulsary Subjects of Livestock Products Technology Department

No	Subjects	Credit	Semester
1	Biotechnology of livestock-derived foods	3	1
2	Design and Processes of Livestock Products	3	1
3	Regulation of Livestock Product Industry	3	1

Compulsary Subjects of Livestock Agribussiness Department

No	Subjects	Credit	Semester
1	Agribusiness Supply Chain Management	3	1
2	Agribusiness Politics and Policy	3	1
3	Strategic Management of Livestock Agribusiness	3	1

Compulsary Subjects of Animal Reproduction and Breeding Department

No	Subjects	Credit	Semester
1	Animal Reproduction Efficiency	3 (2+1)	1
2	Animal Genetic Evaluation and Breeding Program Design	3	1
3	Animal Breeding Management	3	1

Elective Subjects

Elective Subjects of Animal Production Department

No	Subjects	Credit	Semester
1	Industry of Ruminant Production	3	2
2	Industry of Non-Ruminant Production	3	2
3	Animal Waste Management Industry	3	2

Elective Subjects of Animal Feed and Nutrition Department

No	Subjects	Credit	Semester
1	Development Strategy of Ruminant Feed and Nutrition	3	2
2	Development Strategy of Non-Ruminant Feed and Nutrition	3	2
3	Development Strategy of Forages	3	2

Elective Subjects of Livestock Products Technology Department

No	Subjects	Credit	Semester
1	Technology of Meat, Leather and By-product Industry	3	2
2	Technology of Dairy Industry and By-products Industry	3	2
3	Technology of Egg and Honey Industry	3	2

Elective Subjects of Livestock Agribussiness Department

No	Subjects	Credit	Semester
1	Social Engineering	3	2
2	Livestock Business Communication	2	2
3	Agribusiness Risk Management	2	2

Elective Subjects of Animal Reproduction and Breeding Department

No	Subjects	Credit	Semester
1	Biotechnology of Animal Reproduction	3 (2+1)	2
2	Ruminant and Non-Ruminant Breeding	3	2
3	Animal Reproduction and Molecular Genetics	3 (2+1)	2

CHAPTER IV

COURSE DISTRIBUTION MATRIX

Summary Of Learning Achievements at MPAS, FAS, UB

No	Subject	Credits	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9	ILO10
1	Research Methodology and Scientific Writing	3	x	x				x				
2	Sustainable Livestock Industry Systems	3			x	x		x				
3	Animal Welfare & Ethics	3										
4	Big Data and Meta-Analysis in Animal Production	3				x			x	x	x	x
5	Artificial Intelligence and Precision Animal Production	3										
6	Research Design and Data Analysis	3										
7	Animal Production Physiology	3		x	x	x						
8	Technology of Animal Production	3	x	x		x	x					x
9	Animal Production Development	3				x		x	x			
10	The Science and Technology of Feed Processing	3		x	x	x						
11	Development of Animal Feed and Nutrition	3		x	x	x						
12	The Science and Techniques of Feed Evaluation	3	x	x								
13	Biotechnology of livestock-derived foods	3	x		x	x						
14	Design and Processes of Livestock Products	3	x		x	x						
15	Regulation of Livestock Product Industry	3	x				x					x
16	Agribusiness Supply ChainManagement	3					x					x
17	Agribusiness Politics and Policy	3	x	x			x					
18	Strategic Management ofLivestock Agribusiness	3					x					x
19	Animal Reproduction Efficiency	3	x		x	x						
20	Animal Genetic Evaluation andBreeding Program Design	3			x			x	x	x		
21	Animal Breeding Management	3	x		x	x						
22	Industry of Ruminant Production	3			x	x		x	x			

No	Subject	Credits	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6	ILO7	ILO8	ILO9	ILO10
23	Industry of Non-Ruminant Production	3				x		x	x			
24	Animal Waste Management Industry	3			x	x						
25	Development Strategy of Ruminant Feed and Nutrition	3		x	x	x						
26	Development Strategy of Non-Ruminant Feed and Nutrition	3		x				x		x		
27	Development Strategy of Forages	3										
28	Technology of Meat, Leather and By-product Industry	3	x		x	x						
29	Technology of Dairy Industry and By-products Industry	3	x		x	x						
30	Technology of Egg and Honey Industry	3	x		x	x						
31	Social Engineering	3					x					x
32	Livestock Business Communication	2					x					x
33	Agribusiness Risk Management	2		x		x				x		
34	Biotechnology of Animal Reproduction	3				x		x	x			
35	Ruminant and Non-Ruminant Breeding	3			x			x	x			
36	Animal Reproduction and Molecular Genetics	3			x			x	x			

The Detailed Course Description of MPAS

University Compulsory Subjects

1. Research Methodology and Scientific Writing **2-1 PEF80001**

Subject Description:

This subject covers how to prepare a research proposal, research report and scientific work in animal science field. The topics consist of preparation of research background, problems identification, determined research objectives and the benefits, hypothesis formulation, literature review development, scientific framework formulation, research operational framework determination, literature study, experimental design determination, data analysis, result and discussion preparation, established a conclusion.

2. Thesis **22**

Subject Description:

The publication of scientific articles referred to here is the dissemination of science and technology from the results of thesis research or literature review, which is closely related to the thesis research topic. The task of scientific publication is part of the final thesis assignment that Master of Animal Science students must complete. Master of Animal Science Students are required to publish at least two scientific articles written based on the results of thesis research that has been carried out or one of them based on the results of a literature review that is closely related to their thesis research topic. The article is published in an international/national scientific journal or in an international proceeding in the appropriate scientific field. Articles must have been published or received an acceptance letter from a journal editorial board or proceedings stating that the article will be published without conditions. This assignment can be completed or completed by

students as early as the third semester. Master of Animal Science Students are rewarded by credits point for publishing in peer reviewed or Scopus index listed journals.

Study Program Compulsory Subjects

1.	**Sustainable Livestock Industry Systems**	**3-0**	**-**

Subject Description:
This course explains the sustainable livestock industry system (sustainable livestock industry) as one of the industry's goals, in addition to increasing the production and availability of livestock products, sources of income and profits, animal welfare, and others. It also analyzes problems (gaps) in fulfilling the objectives and formulates alternative solutions.

2.	**Animal Welfare and Ethics**	**2-1**	**-**

Subject Description:
This course discusses various aspects of livestock welfare, including the five freedoms of livestock, methods and indicators for assessing livestock welfare, intrinsic and extrinsic factors that influence livestock welfare (genetics, environment, management, and interactions with humans), ethical theories and principles in various contexts before experiments were carried out on animals and livestock, regulations and legislation related to national and international livestock welfare as well as the application of technology to improve livestock welfare to make livestock living comfortably (friendly animal housing) to make livestock healthy, happy and productive.

3.	**Big Data and Meta-Analysis in Animal Production**	**3-0**	**-**

Subject Description:

The Big Data and Meta-Analysis course will discuss the basic concepts of Big data, Machine Learning, Regression Models (RM), PRISMA, SYRCLE, and datasets. The course is a meta-analysis model method that has been created. Model interpretation also requires knowing the influence of each predictor on the predicted results.

4. Artificial Intelligence and Precision Animal Production **3** **-**

Subject Description:

This subject discusses the application of artificial intelligence inlivestock industry and the utilization of big data to solve a problem in livestock industry now and later.

5. Research Design and Data Analysis **2-1** **-**

Subject Description:

This course explains the sustainable livestock industry system (sustainable livestock industry) as one of the goals of the livestock industry, in addition to the aim of increasing production and availability of livestock products, sources of income and profits, animal welfare, and others as well as analysis of problems (gaps) in fulfill the objectives and formulate alternative solutions.

Department of Animal Production Compulsory Units

1. Animal Production Physiology **3-0** **PEP80001**

Subject Description:

This subject explains the physiological mechanism of the production process including internal and external factors that support livestock productivity, including; growth and development, physiology of parturition, lactation, egg formation,and environmental adaptation.

2. Technology of Animal Production 3-0 PEP80002

Subject Description:

This subject explains the development of livestock production potential by applying technique and innovation to dairy cattle, broilers, poultry and miscellaneous livestock on an industriallevel, including breeding and increasing productivity (breeding, feeding, management), molecular technology and evaluation of production based on livestock welfare.

3. Animal Production Development 3-0 PEP80003

Subject Description:

This subject explores livestock management and designs the development of dairy, meat, poultry, and miscellaneous livestock production according to Good Farming Practices (GFP), animal welfare, and regulations.

Department of Animal Production Elective Units

1. Industry of Ruminant Production 3-0 PEP80004

Subject Description:

This subject describes the development and application of optimal management of the ruminant livestock industry based on good farming practices/good dairy practices and regulations to

produce quality products with traceability and traceability of supply chains sustainable.

2. Industry of Non-RuminantProduction **3-0** **PEP80005**

Subject Description:
This subject describes the development and application of optimal management of the non-ruminant livestock industry based on good farming practices and regulations to produce quality products with traceability and sustainable supply chains.

3. Animal Waste ManagementIndustry **3-0** **PEP80006**

Subject Description:
This subject discusses livestock industry waste management technology with learning sub-achievements: open management technology (aerobic/air/blowing/added air) and closed management technology (anaerobic/without oxygen) as well as product quality evaluation technology to be marketed/commercialized.

Department of Nutrition and Animal Feed CompulsoryUnits

1. The Science and Technology of Feed Processing **3-0** **PEN80001**

Subject Description:

This subject discusses feed ingredient processing technology (protection, fermentation, preservation) and feed additive production technology for ruminant, non-ruminant and forage livestock. Furthermore, this subject examines the formulation of non-ruminant and ruminant animal feed.

2. Development of Animal Feed and Nutrition **3-0** **PEN80002**

Subject Description:
This subject explains the development and function of animal feed nutrition science and technology in a livestock business that can produce livestock products (high productivity and large scale livestock business), ASUH (safe, healthy, intact and halal), friendly and safe for the environment, as well as sustainable to meet/balance the number of requests/needs for livestockproducts which are continually increasing rapidly. The material discussed mainly focuses on the development of science that underlies the role and function of nutrition and animal feed science and technology in achieving the current and future demands of the livestock business and its products.

3. The Science and Techniques of Feed Evaluation **3-0** **PEN80003**

Subject Description:
This subject discusses:

1. Various feed evaluation methods have been developed or modified to predict feed quality.
2. Various techniques for evaluating feed and forage ingredients, antinutrients, contaminants and feed biotechnology products physically, chemically and biologically.
3. Quality standards of feed (ISO, KAN, HCCP and Sigma)
4. Evaluation of feed associated with various parameters in research. It is obtaining quality feed that can support the potential for livestock productivity.
5. Interpretation of data from the evaluation of nutrition and its benefits for livestock to support livestock business following the development of science.
6. No more discussing the evaluation procedure technique

Department of Nutrition and Animal Feed Elective Units

1. Development Strategy of Ruminant Feed and Nutrition **3-0** **PEN80004**

Subject Description:
This subject is a follow-up to the three compulsory subjects for Nutrition and Animal Feed Department that have been given in semester 1, especially those related to ruminants. This subject subject is focused on comprehensive studies in terms of technical aspects and the impact of the application of research results or the results of the application of a strategy/technique to increase the efficiency of feed utilization by livestock both to increase the production of high ruminant livestock, ASUH, friendly and environmentally safe and sustainable, as well as opportunities for their development. Some of these strategies/techniques start from selecting the feed ingredients, processing, formulating and giving them to livestock (precision feeding), including feed additives (rumen fermentation manipulation). This subject material is in the form of reviewing research articles or applying a strategy/technique to increase the efficiency of feed by livestock for the above production purposes.

2. Development Strategy of Non-Ruminant Feed and Nutrition **3-0** **PEN80005**

Subject Description:
This subject discusses the efforts to improve the quality and effectiveness of feeding non-ruminants, including aspects of supply and quality of local feed raw materials, application of microbial-based feed additive technology, substantive active substances and metabolic substances, feeding strategies related to environmental problems and agricultural locations, increasing nutritional efficiency, through the concept of Nutribiome, meta-analysis studies on aspects of nutrition and non-ruminant animal feed, as well as reviewing non-ruminant feed formulations.

3. Development Strategy of Forgaes **3-0** **PEN80006**

Subject Description:

This subject describes the role of science. This subject discusses strategies for increasing production and availability of animal forage, including intensive/monoculture, mixed cropping systems, vertical farming, phytoremediation, planting and the efficiency/accuracy for livestock. Furthermore, Analysis of the forage production systems and measurement of the capacity of extensive and intensive areas.

Department of Livestock Product Technology

Compulsory Units

1. Biotechnology of livestock-derived foods **3-0** **PET80001**

Subject Description:

This subject aims to provide students with an understanding of the principles of biotechnology, fermentation and enzyme technology, genetic engineering in livestock products and how toregulate and secure food products from biotechnology processes.

2. Design and Processes of Livestock Products **3-0** **PET80002**

Subject Description:

This subject discusses the components of animal product food process design, flow diagrams of livestock product processing processes, optimization of thermal processes such as pasteurization and sterilization, optimization of chilling, freezing and thawing processes, food processing and control, extraction process design, aseptic process design, and security during processing.

3. Regulation of Livestock Product Industry	**3-0**	**PET80003**

Subject Description:
This subject discusses the policies and regulations issued by the government regarding processed livestock products including milk, meat, eggs, honey and leather products. This includes distribution permits, import policies for livestock products from abroad, veterinary control number certification, PIRT/MD/ML licensing, free market policies, halal requirements, packaging requirements and labels.

Department of Livestock Product Technology Elective Units

1. Technology of Meat, Leather and By-product Industry	**3-0**	**PET80004**

Subject Description:
This subject aims to improve students' understanding of Meat, Leather and By-products: This subject discusses the industrial development and technology of meat, leather and by-products which are important and strategic commodities from thenutritional aspect, from the preparation of industrial rawmaterials to proper environmental management. caused by industry. Selection and assessment of raw materials, HACCP on processing, Handling and maintenance of core tools and equipment in the industry, as well as simple testing methods for its products.

2. Technology of Dairy Industryand By-products Industry	**3-0**	**PET80005**

Subject Description:

This subject discusses national dairy and international trade, the process of processing milk which is an important and strategic

commodity from the aspect and fulfillment of nutrition for the community in the industry, starting from the preparation of industrial raw materials to the proper handling of by-products and increasing added value.

3. Technology of Egg and HoneyIndustry	**3-0**	**PET80006**

Subject Description:
The Egg and Honey Industry Technology subject discusses the egg and honey industry which is an important and strategic commodity from the aspect and fulfillment nutrition for people in industry from the preparation of raw materials to the proper handling of the environment caused by the industry.

Department of Livestock Agribusiness Compulsory Units

1. Agribusiness Supply ChainManagement	**3-0**	**PES80001**

Subject Description:
This subject aims to improve student skills in aspects of Competitive advantage, understanding the concept of Integrated Supply Chain and Competitive Advantage, Supply Chain Management and Strategic Lead Time Management, Information Technology in Supply Chain Management and integrated corporate systems, the core concept of e-Supply Chain, B-to-B Landscape in e-Supply Chain and Chain, Extraprise Value Network, Strategy of Integrating Two Systems and Collaboration of Information Technology between Companies, Concept of Digital Economy in Supply Chain and Concept of Value Matrix in Virtual Value Chain, shifting from Linear Supply Chain to Networked Supply Chain and Case Study : Supply Chain Management in Industrial Era 4.0 vs New Normal Era.

2. Agribusiness Politics and Policy	**3-0**	**PES8000 2**

Subject Description:

This subject aims to improve student skills through aspects of understanding agribusiness, agribusiness structures, agribusiness development models, agribusiness problems and prospects, and agribusiness policies.

3. Strategic Management of Livestock Agribusiness	**3-0**	**PES8000 3**

Subject Description:

The focus of strategic management has shifted from business policy towards competitive advantage and finally to corporate governance. The direction of strategic management has also been changed from focusing on long-term planning, five force model analysis, strategic advantages, core competencies, and blue ocean strategy, to combining flexible corporate strategies that aresuitable for modern environments which are changing rapidly.

The subject material introduces students to the concept of strategic management. Through the strategy design process, students are introduced to the mission, vision and approach to setting strategic goals. Methods for evaluating external factors and competitiveness as well as internal strengths and weaknessesare included (EFE and IFE matrices, Competitiveness matrix and PEST analysis). Different business strategies (expansion, mergersand acquisitions, vertical integration, diversification). Strategy selection and analysis includes the application of SWOT, SPACE, BCG and QSPM matrix. The core objectives of this subject are to understand strategic planning processes, concepts, and tools and be able to apply them to certain business situations, develop knowledge related to the current livestock agribusiness sector, which includes the driving forces of change, industry trends, andindustry scope, develop and perfecting analytical,
communication and teamwork skills.

Department of Livestock Agribusiness Elective Units

1. Social Engineering **3-0** **PES80004**

Subject Description:

This subject includes activities to provide students with an understanding in identifying and mapping existing social situations related to the nodes of activities in the livestock sector; then students can work on institutional intervention opportunities for livestock agribusiness development in accordance with agribusiness interests, the dynamics of social change and applicable regulations. Based on the intended objectives, the lectures are given materials: Understanding of social change and social-capital, Production-regime and organization of production, Social-analysis, Sustainable-Livelihoods approach and analysis, Regulations and policies for the development of livestock agribusiness , Land-tenure systems and livestock agribusiness, SDGs in agriculture-livestock, Climate change and smart-agriculture, Concepts of sovereignty and food security, Internet of things (IoT) in agriculture, Social inclusion and gender in agriculture, Agribusiness development withmillennial youth , as well as research and development agenda ofsocial institutions in agribusiness.

2. Livestock Business Communication **2-0** **PES80005**

Subject Description:

Students are able to apply the concept of business communication in animal husbandry which includes a basic understanding of agricultural development, communication systems, actors in business, communication messages, message delivery methods, media and communication and communication

technology in supporting supply chains

3. Agribusiness Risk Management 2-0 PES80006

Subject Description:

This subject aims to improve students' abilities in risk line analysis based on the concept of uncertainty, risk management, understanding individual behavior in dealing with risk, correlating between risk and income, individual behavior in dealing with risk (risk averse, risk taker, risk neutral), identifying and skilled in applying corporate risk management, understanding the types and sources of Agribusiness risks, skilled in decision making and calculating risky income with several methods and able to design risk management strategies.

Department of Animal Reproduction and Breeding
Compulsory Units

1. Animal Reproduction Efficiency 2-1 PER80001

Subject Description:

This subject discusses about the strategy produces reproductive efficiency so that it contains knowledge from reproductive physiology and regulation to achieve reproductive efficiency through accelerating puberty. Normal estrus cycle, mating system that produces high success with increased productivity, produces healthy offspring until weaning, and no reproductive disorder occurs

2. Animal Genetic Evaluation and Breeding Program Design 3-0 PER80002

Subject Description:

This subject discusses about the concept of genetic diversity, the concept of inheritance and repetition of traits and their applications, animal genetic quality improvement programs, quantitative genetic models and estimation of variance components, genetic evaluation methods and models, genetic

changes for several traits, increasing selection accuracy, utilization of heterosis and inbreeding pressure in breeding programs, application of software for genetic analysis, molecular genetics in animal breeding, analysis of genetic diversity and population genetics at the molecular level

3. Animal Breeding Management 3-0 PER80003

Subject Description:
This subject discusses about the concept of reproduction and breeding in management to produce animal breeds (factors that affect animal performance, understanding of genetic potential), the mating system includes the application of Artificial Insemination Techniques (AI), embryo transfer, Assisted Reproductive Technology (ATR), assessment of mating success and its calculations using reproductive parameters (NRR, S/C, CR, PR, Calving Interval, calving rate, calf crop and weaning rate), recording and correcting data, selection program on male/female through performance test and progeny test, calculation of population structure and animal development patterns, calculation of the need for breeds and animal supply as well as methods and evaluation of crossbreeding programs to produce breeds.

Department of Animal Reproduction and Breeding Elective Units

1. Biotechnology of Animal Reproduction 2-1 PER80004

Subject Description:
This subject focuses on the potential of animal production development uses technology engineering and its innovation on dairy, meat, poultry and others livestock including breeding, feeding and management, molecular technology and animal production evaluation based on animal welfare.

2. Ruminant and Non-Ruminant Breeding	**3-0**	**PER80005**

Subject Description:

This subject discusses about recording system, methods, procedures and preparation of breeding patterns for ruminants (beef cattle, dairy cattle, goats and sheep) and non-ruminants (poultry) to increase animal productivity as well as animal breeding policies and the formation of new breeds in Indonesia and several developed countries.

3. Animal Reproducton and Molecular Genetics	**2-1**	**PER80006**

Subject Description:

This subject discusses about three main aspects in reproductive molecular genetics, namely: (1) the mechanism of expression of reproductive traits (starting from the performance of DNA, RNA,RNA transcription for reproductive traits, non-genetic factors that affect reproductive traits), (2) the main aspects in regulating the expression of reproductive traits in male cattle (spermatogenesis processes, semen production; folliculogenesis, genetics in pregnancy and embryonic growth, reproductive disorders, nutrigenomics and reproduction); and (3) molecular analysis for reproductive traits using electrophoresis PCR, RFLP, SNP, genomic techniques and RNA sequencing