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| **STUDY PROGRAMME:** | **Professional Undergraduate Study Programme *Agriculture***  Specific field of study: Management in Agriculture | |
| **Course:** | **DIGESTION PHYSIOLOGY AND LIVESTOCK NUTRITION** | |
| **Course code:** 240018  **Course status**: compulsory | **Semester: III** | **ECTS credits: 7** |
| **Course holder:** | **Tatjana Tušek,** Ph. D., professor of professional studies | |
| **Course associates:** | **Dejan Marenčić,** Ph. D., professor of professional studies  **Goran Mikec**, mag. ing. agr., assistant | |
| **Modes of delivery:** | **Number of hours** | |
| **Lectures** | 45 | |
| **Excersises,** | 30 | |
| **Seminars** | 15 | |
| **Practical training** | 15 | |

**Course objectives:** To prepare students to be able to compare the physiology of digestion and the specifics of metabolism (metabolism of carbohydrates, proteins, fats, water, vitamins and minerals) of domestic mammals and poultry. To be able to present specific neuro-hormonal management of biochemical processes at the level of food digestion and metabolic processes in the liver. To be able to valorize the fundamental laws and relationships that exist between food as a source of nutrients and the physiological state and productive metabolism of domestic mammals and poultry. To prepare students to independently assess the content of nutrients in feed and the nutritional needs of livestock and based on the assessments, independently compose meals - feed mixtures for all types and categories of livestock in accordance with legal provisions and environmental protection.

**Course content**

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|  | **PHYSIOLOGY OF DIGESTION; 3,5 ECTS** | **Modes of delivery:** | **Places of delivery** |
|  | **Course units** | **L, E, S, PT** |
|  | ***The concept of physiology,*** eco-physiology, introduction to the concept of the course. | 1 L | Classroom |
|  | ***Introduction to the digestive system.*** Evolutionary differences in the morphology of the digestive system and the physiological way of taking in food and water. | 1 L | Classroom |
|  | ***Digestion in the simple stomach.*** | 2 L | Classroom |
|  | ***Digestion in the complex stomach.*** | 3 L | Classroom |
|  | ***Digestion in the small intestines. Digestion in the large intestine.*** | 4 L | Classroom |
|  | ***The role of the liver and pancreas.*** | 2 L | Classroom |
|  | ***Neuro-hormonal role as a control system. Homeostasis.*** | 2 L | Classroom |
|  | ***Metabolism of carbohydrates, fats, proteins, minerals and water.*** | 6 L | Classroom |
|  | ***Physiology of cells and cell organelles.*** Comparative specificities of digestion in poultry. | 1 L | Classroom |
|  | ***Demonstration of digestive processes in the mouth.*** | 4 E | Classroom,  laboratory |
|  | ***Demonstration of digestive processes in a simple stomach.*** | 2 E | Classroom,  Laboratory |
|  | ***Demonstration of digestive processes in a complex stomach.*** | 4 E | Classroom,  Laboratory |
|  | ***Demonstration of the role of bile and pancreatic juice in intestinal digestion.*** | 5 E | Classroom,  laboratory |
|  | ***Seminar, topic I.*** | 2 S | Classroom |
|  | ***Seminar, topic II.*** | 2 S | Classroom |
| 16. | ***Seminar, topic III.*** | 2 S | Classroom |
| 17. | ***Seminar, topic IV.*** | 2 S | Classroom |
| 18. | ***Introduction to the professional practice of digestive physiology.*** | 2 PT | Poultry practicum |
| 18.1 | ***Monitoring the influence of pollen in cockerel feed on fattening results*** (output mass, meat color). | 6 PT | Poultry practicum |
| 18.2 | ***Monitoring the influence of pollen in the feed for laying hens on egg parameters (number, size, ratio of egg white to yolk, yolk color),*** | 7 PT | Poultry practicum |
| **In total** | | **22+15+8+15**  **(L+E+S+PT)** |  |

**L=Lectures, E=Excersises, S=Seminars, PT=Practical training**

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|  | **LIVESTOCK NUTRITION; 3,5 ECTS** | **Modes of delivery:** | **Places of delivery** |
|  | **Course units** | **L, E, S, PT** |
|  | ***Introduction:*** The influence of feeding on the productivity and economy of livestock production. Composition of plant and animal organism. Concept of feed and nutrients. | 1 L | Classroom |
|  | ***General chemical composition of feed:*** Water and dry matter. Raw proteins. Crude fat. NET and crude fiber. Ash-total minerals. | 7 L | Classroom |
|  | ***Basic principles of supply of certain nutrients:*** Energy supply and evaluation of the energy value of feed. Supply of proteins, vitamins and minerals. | 5 L | Classroom |
|  | ***Nutrient requirements:*** Sustaining, productive and product unit needs. | 2 L | Classroom |
|  | ***Feed knowledge:*** Assessing the nutritional value of feed. Voluminous forages (dry and green). ***Concentrated feed (carbohydrate, protein, mineral).*** Fodder fats. Nutrients and other feed additives. Storage of feed. | 5 L | Classroom |
|  | ***Basics of special feeding of domestic animals:*** Specifics of feeding certain types of domestic animals ***Feed mixtures:*** Classification and technological process of production. Mixtures for feeding certain types and categories of livestock according to the current Ordinance. | 3 L | Classroom |
|  | ***Getting to know feed and their organoleptic evaluation:*** University feed collection. Stored fodder in the Practicum of the University. Forage on the agricultural land of the University. | 2 E | Practicum |
|  | ***Methods of testing the nutritional value of feed and ration:*** Significance and basis of chemical analysis of feed. Taking feed samples and preparing them for analysis. Calculation of starch and oat value of feed. Calculation of the feeding ratio. Calculation of NEL and NEM. | 3 E | Practicum |
|  | ***Storage of fodder by ensiling, drying and trapping.*** | 1 E | Practicum |
|  | ***Basic principles of meal preparation techniques: -*** for cows and beef.  -use of computers in preparing meals | 3 E | Practicum |
|  | ***Preparation and use of fodder mixtures in wider practice:*** Preparation of complete and supplementary feed mixtures with a certain protein content for monogastric and polygastric domestic animals. Use of fodder mixtures in wider practice.  The use of computers in the preparation of mixture recipes. | 6 E | Practicum |
|  | ***Calculation of the net energy value of feed (NEL and NEM).*** Compilation of the basic structure of daily rations for polygastric animals and equids and evaluation of the effectiveness of daily rations. Basics of determining the nutritional status of livestock. Group work and presentation and evaluation in front of a group of students. | 3 S | Classroom |
|  | ***Calculation of the nutritional value of feed mixtures.*** Preparation of recipes of complete and supplementary feed mixtures for monogastric and polygastric animals. Group work and presentation and evaluation in front of a group of students. | 4.5 S | Classroom |
|  | ***Introduction to practical training:*** For all students, a short lecture on the importance and expediency of professional practice with all the specifics of certain types of livestock production, from the aspect of preparation and production technology of fodder and from the aspect of feeding certain types and categories of livestock, will be held. Also, students will be familiar with the specifics of nutrition when conducting experimental research.  ***Feed production technology:*** Understanding recipes. Preparation and weighing of microcomponents. Preparation of premixes, calculation of the share of premixes in the recipe of the complete mixture. Weighing of macrocomponents, forming a batch depending on the capacity of the mixer and the structure of the feed specified in the recipe. Production, leveling and storage of fodder mixtures - storage until use. | 4 PT | Practicum |
| 14.1. | ***Feed and litter storage (drying, ensiling):*** Direct participation in all activities related to the preparation of fodder for livestock by drying and ensiling. Timely storage of dried fodder during the months of June and July. Storing straw immediately after the harvesting of cereals (wheat, oats, barley). | 5 PT | Practicum |
| 14.2. | ***Livestock feeding in livestock practicums of the University:*** The practice is carried out according to the schedule of the practice manager-assistant and according to the needs of the University practicum. The practice applies to all types and categories of livestock, including the feeding of experimental groups of animals (capon experiment – ​​adding purified clay to capon feed). | 6 PT | Practicum |
| **In total:** | | **23+15+7+15**  **(L+E+S+PT)** |  |

**L=Lectures, E=Excersises, S=Seminars, PT=Practical training**

**Learning outcomes (LO)**

LO 1. Create a link between life processes and reactions of animals to their environment.

LO 2. Justify the laws of feeding, which in animal husbandry represent the basis for economic cost-effective production with simultaneous compliance of both production and physiological status of the organism.

LO 3. Connect the digestive and metabolic processes with the specific function of the digestive system in ruminants, non-ruminants and poultry.

LO 4. Determine the chemical composition and nutritional value of feed.

LO 5. Computationally assess the nutritional value of feed in newer practical measure units at the basis of the chemical composition and digestibility coefficient, as the nutritional needs of animals.

LO 6. Design rationss - feed mixtures that meet the needs of domestic animals, without harmful impact on the health of people and domestic animals with as little environmental pollution as possible.

Course holder:

Tatjana Tušek, Ph. D., professor of professional studies

Križevci, July 2024