Ministry of Education and Science of the Republic of Kazakhstan
Non-commercial Joint Stock Company "Holding "Kasipkor"

EDUCATIONAL PROGRAM

SPECIALTY: 1504000 – FARMING (on a profile)

Astana – 2016

DEVELOPED:

- **Jan Bach** - international expert of DREBERIS (Germany);
- **Natalya Popova** – Karaganda agrotechnical college, lecturer of specialist disciplines;
- **Davletnazar Akhanov** – Kaplanbek agricultual and technical college, Candidate for agricultural Degree, lecturer of specialist disciplines, Southern Kazakhstan Region;
- **Marat Yatayev –** Kulan agricultural college, lecturer of specialist disciplines, Jambyl Region;
- **Bauyrzhan Yesmukanov** – director, "Akniet" Ltd. Northern Kazakhstan Region;
- "Kasipkor" Holding" Non-commercial Joint Stock Company.

EXPERTS

- Bildungsinstitut PSCHERER gGmbH (Germany)
- ROO "the Union of Farmers of Kazakhstan"
- GCE "Akzhaiyk agrarian and technical College" of the Department of education of the West Kazakhstan regional akimat (educational-methodical Association on a profile "Agriculture")

SUBMITTED

"Kasipkor" Holding Non-commercial Joint Stock Company

CONSIDERED, APPROVED AND RECOMMENDED

At a meeting of the Republican educational-methodical Council for Technical and Vocational Education of the MES RK, Protocol No_4_ dated "_21_"_12_ 2016 year

Contents

1. Explanatory note to the educational program

This educational program is based on modular-competence approach, in accordance with modern international requirements for mid-level professionals and qualified working staff, with the participation of foreign partner Dreberis (Germany)

International experience, structure and content of vocational education and training educational programs for preparation of technical and service work staff, used in several European countries:

- focused on the acquisition of a number of competencies within the academic plan and educational programs on a specialty;
- by the structure and content differ from the traditional subject - cyclic approach to the description of the content of technical and special disciplines and types of training and production work;
- general and professional training disciplines combined into several modules, focused on the qualification competences;
- requires the development of training modules, focused on the performance of certain types of qualification competence of future professional activity.

The developers of this educational program took into account the above features of the educational programs of the European countries, the international concept of continuous learning, as the content of educational programs aimed at the formation of professional competence of future professionals, capable of adapting to changing situations at work, on the one hand, and continue professional growth and education - on the other.

The general requirements of the SCES for technical and vocational education, and applied to it the structure of the educational plans model and requirements for knowledge, skills and competencies by level of qualifications established by professional standards, were also taken into account.

During the elaboration of this educational program based on the modular-competency approach and the need for the introduction of modular training on preparation of skilled working staff and mid-level professionals, the following key definitions we were used:

modular training program is a part of the educational program, aimed at the development of knowledge, skills and competencies, required to perform certain professional activities within the specialty;

module is an independent, self-sufficient and complete section of educational program or training period;

working educational program is a document developed by the organization of technical and vocational education for a particular discipline, practices, and other learning activities (modules) of the working educational program on the basis of a typical educational program;

modular unit is a logically acceptable division of labor in a particular profession, having a clear beginning and end of work, which can be divided, further result of this is a product, a service or part of the work (work operation) - the definition of the I(International Labor Organization);

educational module (modular educational unit) is a set of sections (topics) of learning content within a single educational module (discipline), which provides the knowledge and performance of specific skills of future qualifications;

Qualification is a level of preparedness to the competent performance of certain

activities in acquired specialty;

Plan of educational process (educational plan) is a document, regulating the list, the sequence, the amount (labor input) of educational disciplines (modules), practices, and other types of educational activity of students of the appropriate level of education and forms of control;

Selection of structure and procedure for the formation of the content of educational programs, special modules or general professional disciplines and all types of training activities was carried out by the developers based on the modular-competence approach.

The modular approach to learning organization allows educational institutions creating the conditions for students to select professional modules to obtain the necessary qualifications during the organization of educational process in which the learner can and should control of its own learning process, that teaches him to take responsibility for its own learning, and in the future - for its own professional growth and career. Thus, the student, as a consumer, will be satisfied with the education; he can improve it throughout the life, in response to changes in the labor market.

This educational program on a specialty contains information, concerning the respective skills levels, professional profiles, curriculum, requirements for students and implementation of vocational training. The requirements for the competences of 3, 4 and 5 skill levels of the National Qualifications framework of the Republic of Kazakhstan were taken into account.

In the process of educational program elaboration the following legal and regulatory documents have been used:

1. The Law of the Republic of Kazakhstan "Concerning the education" dated July 27, 2007
2. State obligatory standard for technical and vocational education. General provisions.
3. State obligatory standard for technical and vocational, post-secondary education (DGRK No 292 dated 05/13/2016)
4. State Program for Development of Education of the Republic of Kazakhstan for 2011 - 2020 years (Presidential Decree No 1118 dated December 7, 2010)
5. Holding Kasipkor NJSC Development Strategy for 2012-2021 (Governmental Decree No 1751 dated December 31, 2011)
6. The state program of industrial-innovative development of Kazakhstan for 2015-2019 years (Decree of the President of the Republic of Kazakhstan N 957 dated March 19, 2010)

Brief description of the educational program

In Kazakhstan agricultural works range is quite wide, both by regional diversity and by the level of agricultural enterprise. In particular, farms differ by their specialization, the level of vertical integration and organizational level, for example, the number of permanent workers. The aforementioned diversity will be reflected in the qualifications, where some of the results for each module (e.g. modules on the technology and machinery) are mandatory in all regions, and some - optional, depending on the regional requirements.

Agricultural enterprises specialize in the production of crops, fruits, vegetables, fodder, as well as breeding of cattle, pigs, poultry, sheep, horses, milk production and so forth.

The educational program offer specialists with such qualification, as "Farmer", "Farmer manager", to specialize in the future in certain areas of production with even more differentiated sub qualifications in a particular area.

According to the profile of livestock production at NQF 3 level, "Farmer" will receive the following qualifications: pig keep, poultry breeding, cattle breeding, ship breeding, horse breeding, milk production etc.

According to the profile of crop production - qualifications for growing crops, vegetables, fruits and so forth.

Moreover, acquisition of qualification, with practical experience for work and further training.

"Operator of machine milking", "Horse breeder", "Poultry breeder", "Pig keep", "Camel breeder", "Storage worker", "Horticulturist", "Agriculturist", "Gardener", "Beet grower", "Accountant", "Farm vehicles and tractors setter", "Electrician on maintenance of electric equipment", "Millwright", "Tractor operator-driver of agricultural production", -3 level of NQF/IQF;

- "Farmer" - 4 level of NQF/IQF;
- "Farmer manager" - 5 level of NQF/ IQF.

The educational program includes training of staff for the work profession with a certificate of qualified worker and middle ranking specialists training with the issuance of a college degree, as well as the preparation of applied Bachelor with degree-granting.

The term of training on the basis of basic secondary education to obtain the certificate of a qualified worker is 1year 10 months + 10 months for diploma of middle-ranking specialist + 10 months to obtain a diploma of junior engineer.

The term of training on the basis of general secondary education to obtain the certificate of a qualified worker is 10 months + 10 months for diploma of middle-ranking specialist + 10 months to obtain a diploma of applied Bachelor

The structure of the educational program on specialties contains a list of modules by cycles: compulsory modules; basic general professional modules; professional modules; modules, defined by the organization of education and professional practice module.

The educational program is designed to:

- regulate interactions between labor sphere and the sphere of vocational training;
- regulate both classroom and self-acquisition of the material and release the teacher from pure information functions;
- determine the full list of educational goals and objectives;
- elaborate requirements for preparedness (competence) of students before and after the acquisition of the module;
- elaborate characteristics of each module (the list of modular units with their summary, lectures terms, plans of seminars and laboratory and practical researches, subject of controlled independent works, creative tasks, schedule of tasks performance);
- prepare organizational and methodological characteristics (basic forms and methods of training and control of educational achievements, teaching policy);

- assess learning outcomes (including the accumulation of estimates);
- regulate requirements for the elaboration of training and professional retraining programs.

General characteristics of the competence of the qualifications

Milking machine operator - knows the configuration of different types of stationary and mobile milking platforms and installations, milk line, vacuum pumps, refrigeration units, tanks for the collection and storage of milk, the rules for their inclusion in the work; assembly and disassembly rules, use and storage of certain mechanisms of milking machines; the dosage of detergents; procedure for cleaning and disinfection of milking machines and installations, milk line; milking technology on milking installation; rules of operation of the machinery, milking machines; the basics of anatomy and physiology of animals; the structure of the udder; milk formation physiology end milk ejection; signs of approaching childbirth and the rules of delivery of the newborn animal; rules of veterinary treatment, rules of feeding, care for animals in the first period after calving; feeding value, norms and rules of feeding by different types of feed; methods to increase the productivity of animals and rules for the primary treatment of milk; milk production technology on an industrial basis.

Horse breeder should know the basics of anatomy, physiology, zoogigieny of horses; rules and norms of watering, feeding and grazing; Rules of veterinary-sanitary maintenance, and provide first vet aid; the main types of feeds and their nutritional value; auto drinker, transport equipment and harness configuration and operation; first aid for diseases and parturition rules; timing of puberty; signs of the emergence of heat, the rules of mating, artificial insemination of animals and preparing them for parturition; methods of young-stock breeding.

Poultry breeder should know the rules for the care and maintenance of poultry; signs of poultry diseases; basic veterinarian and sanitary requirements to the conditions of detention and cultivation of poultry; eggs sorting, marking and packing rules; composition of disinfectants.

Pig breeder should know the rules of feeding and care, technology and advanced methods of keepingbarren sow and bred sow, replacement pigs and fattening pigs; composition of feed, their nutritional value and structure of the feed rations; the order of forages feeding; need of animal for protein, vitamins and minerals; methods of increasing the productivity of pigs; zoohygienic requirements to the conditions of keeping sex and age groups of animals; the most common illnesses, first aid for sick animals; veterinary health measures for disease prevention; condition of meat-producing animals, dates and signs of puberty and technology of pigs breeding; evaluation of the productivity of sows; the main reasons of little parturition, not-in-pig, abortions and measures to combat them.

Camel breeder should know the technique of camels grazing; organization of veterinary measures, the basics of anatomy, physiology, zoogigieny, the main disease of camels and their prevention and treatment; types and characteristics of forages, pastures, and the rules for their management, methods of fattening, supplementary fattening and sagination of camels; camels need for nutrients; basics of breeding and stock breeding; Slaughter technology and primary processing of products of camels slaughter; safety measures, personal hygiene, industrial hygiene, fire prevention measures; best practices in the camel breeding.

*Farm vehicles and tractors setter*should know the configuration of serviced tractors, agricultural machinery and equipment, used in the maintenance of machines and tractors park; ways of machines and equipment setting up; regulating rules for agricultural machinery and tractors; control and measuring instruments purpose and rules of operation; plumbing in the amount of work of the millwright on repair of agricultural machines of third category.

Millwright must know the configuration of repaired equipment, machinery and vehicles; machines regulation rules; elimination of defects in the process of repair, assembly and testing of equipment, units and machines; purpose and rules of use of control and measuring instruments; universal design and special equipment; ways of marking and processing of various simple parts; system of limits and fits; quality classes and roughness parameters; properties of acid and other alloys; the main provisions of preventative maintenance of equipment; design features of repaired equipment, machinery and vehicles; technical specifications for repair, assembly, testing, adjustment and correct installation of the equipment, machines and vehicles; technological process of repair, assembly and installation of equipment; rules for testing equipment for static and dynamic machines balancing; geometric constructions with a complex layout; methods for determining the premature wear of parts; ways of restoration and strengthening of worn parts and applicationof the protective coating.

*Horticulturist*should know the basics of farming and technology of vegetable and fruit crops grown in the area (sowing, planting, caring for crops, plantations, harvesting), the timing and execution of the methods of cultivation of fruit crops and vegetables in the open soil and greenhouses, equipment, methods of fruit crop trees trimming, the formation of head, the main regionized variety, their economic characteristics (productivity, ripening periods, resistance to disease, etc.), types of fertilizers, the methods and the timing of their introduction into the soil, types of diseases and pests of agricultural crops grown in this area, the ways to deal with them, the types of pesticides, and the rules for their storage and use of existing standards for vegetable and fruit production, rules of fruit, berry and vegetable production sorting, packaging, transport, the methods of its processing , the bases of the economic efficiency of crop cultivation, the rules and regulations of labor protection, industrial hygiene and fire protection.

Accountant should know the laws, regulations, directives, orders, guidelines, methodological and normative materials on organization of accounting of assets, liabilities and business operations and reporting and accounting methods in the enterprise, plan and correspondence of accounts, document management by accounting segments, procedure for making up the documentation and reflection of accounting transactions, related to the movement of fixed assets, inventory items and cash, on the accounts, the methods of economic analysis of economic and financial activity of the enterprise, rules of computer equipment operation, the economy, the organization of labor and management, market methods of management, labor legislation, rules and regulations of labor protection.

Farmer manufactures products ofhorticulture and animal breeding of market quality, prepares, stores, maintains and sales them. This work requires application of agricultural equipment, vehicles, tools and equipment, agricultural structures, which are operated, maintained and repaired. Performs tasks, related to record keeping, planning and marketing, and assists the conduction of business proce-

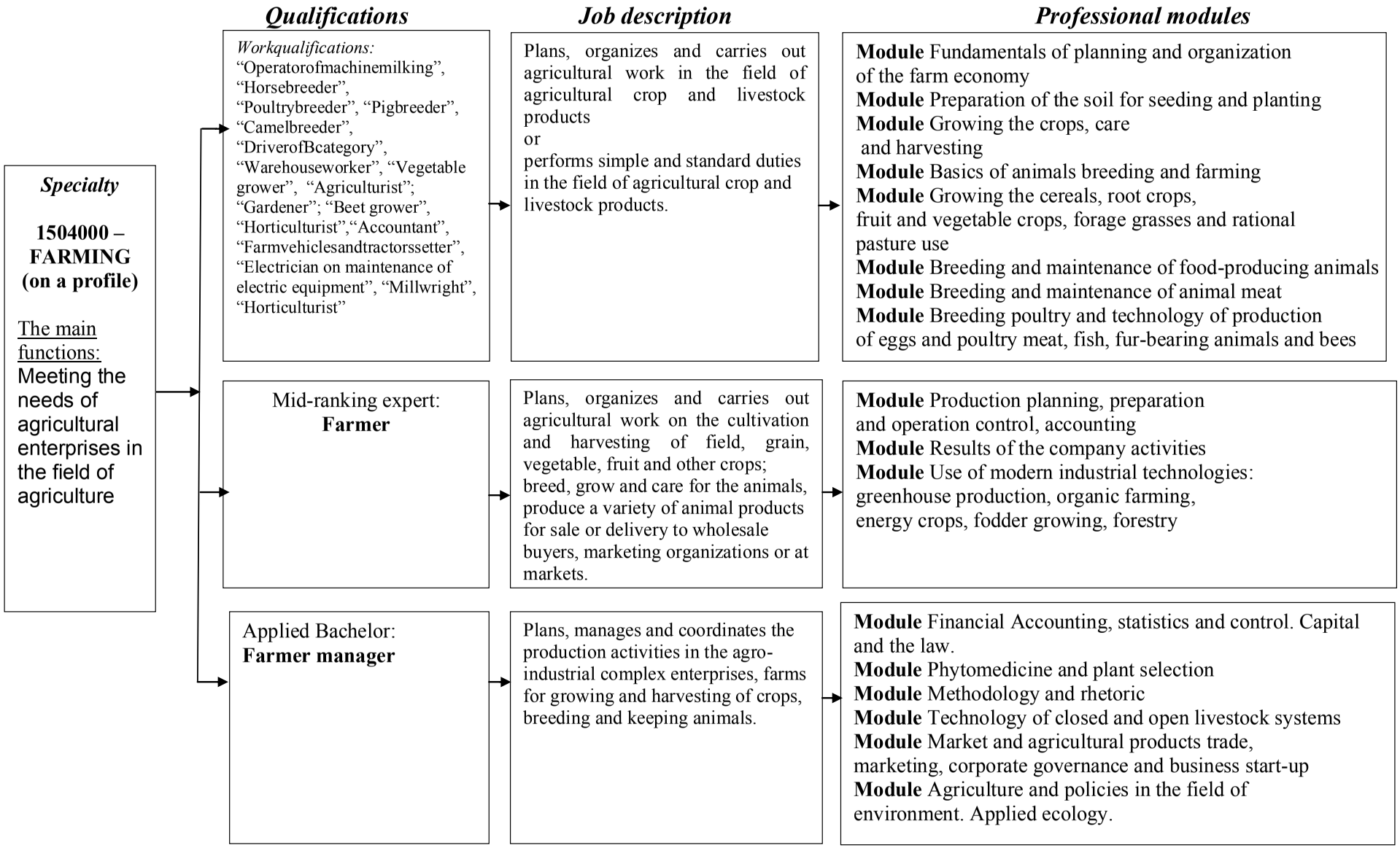
dures. They follow common standard operating procedures, in particular relating to the traffic regulation, safety, hygiene, health and the environment.

Farmer manager is responsible for the organizational and administrative aspects of agricultural production. Must know the guiding, normative and methodological materials on the development of agriculture and the peasant (farmer) economy, the technology of production, storage and processing of agricultural products, methods of assessing the quality of products, the basis of the rural economy, order of planning, accounting, reporting, distribution of income, profits, taxation, prospects and directions of technical equipment of agricultural production and farms, the rules of equipment operation, bases of land and labor legislation, legislation on environmental protection, the rules and regulations of labor protection and fire safety.

2. Abbreviationand symbols

1. CM - compulsory modules
2. GD - general disciplines;
3. GHM - general humanitarian modules;
4. EM - economic modules;
5. BGM - basic general professional modules;
6. PM - professional modules;
7. MDEO - modules, determined by education organization;
8. JT - job training;
9. PI - professional internship;
10. IA - interim assessment
11. ALPTQ - assessment of the level of professional training and qualification assignment;
12. FA - final assessment;
13. DP - diploma project;
14. C - consultations;
15. EC - extra curriculars

3. Functional analysis of specialty



4. Requirements to the levels of students' preparation

<table>
<tr><th>Competences</th><th colspan="4">Requirements of industry/ enterprise to the levels of students' preparation</th></tr>
<tr><td rowspan="2">Basic competences</td><td rowspan="2">Applied Bachelor:

Farmer manager
Level 5 NQF</td><td rowspan="2">Mid-ranking expert:

Farmer
Level 4 NQF</td><td>Advanced level qualification Level 3 NQF</td><td>BC1To organize its own activities, taking into account the goal of manager, observing the requirements of occupational health and environmental safety.
BC2To assess and define the necessary resources, the time for self-achievement of the set results in the framework of functional duties.
BC3To select the most rational ways and means of professional activities.
BC4To find, analyze, make a selection, convert, preserve, interpret independently the information, necessary for the effective performance of professional tasks.
BC5To use professional language.
BC6To use information and communication technologies in professional activity.
BC7 To analyze the work situation, to carry out the current and final control, evaluation and correction of own activities, to take responsibility for own work results.
BC8To work independently and in a team, to communicate effectively with colleagues, heads, customers.</td></tr>
<tr><td colspan="2">BC9To organize collective work on various forms of ownership enterprises.
BC10 To work with normative documents, reference books and other sources of information on the organization and management of the farm.
BC11To usecomputational equipment as an information management tool.</td></tr>
<tr><td></td><td></td><td colspan="3">BC12 Toorganize the work of performers, to find and make decisions in the field of labor organization and regulation.
BC13To systematize and synthesize information on the formation and use of enterprise resources.
BC14To analyze the process as an object of control and management.</td></tr>
</table>

Professional competences

Competences	Requirements of industry/ enterprise to the levels of students' preparation			
Professional competences	Applied Bachelor: **Farmer manager** Level 5 NQF	Mid-ranking expert: **Farmer** Level 4 NQF	Advanced level qualification Level 3 NQF	**PC1** Performing activities under the direction and responsibility within the functional duties to determine the tasks and planning, taking into account the objectives of agricultural development. **PC2**To perform all the necessary techniques for the preparation of soil for seeding and planting, cultivation, processing plants against pests, harvesting and storage of crops. **PC3**To find and offer promising released varieties of agricultural crops, taking into account their biological characteristics. **PC4**To perform all the necessary techniques to improve the quality and reduce the cost of production of poultry farming, fish farming, bee-keeping. **PC5** To apply modern methods and techniques of feeding, breeding and efficient use of animal milk and meat production. **PC6** To perform work on the preparation of machinery and equipment for maintenance of livestock farms, poultry farms and complexes. **PC7**To manage tractors and agricultural machinery, observing traffic rules and SM. **PC8**To ensure effective use of agricultural machinery, equipment and computers. **PC9**To conduct maintenance work for machinery used in agricultural production. **PC10** To evaluate performance, according to established criteria, documenting and presenting the data to production management, production supply and sales. **PC11**To keep accounting and reporting documentation of prescribed form, in accordance with the accounting and financial reporting rules. **PC12** To be responsible for own health and safety, the health and safety of others and for the protection of the environment during the performance of professional tasks.
				PC13 To define a rational activity. **PC14**To organize collective work on various forms of ownership enterprises. **PC15** To evaluate performance, according to established criteria, documenting and presenting the data to production management, production supply and sales.

			PC16 To provide repair and maintenance of machines and mechanisms. **PC17** To select agricultural technologies for different crops. **PC18**To analyze causes of the violation of technological regimes, products defects, overhead costs fot raw materials, energy and other losses in agricultural production. **PC19** To monitor market conditions, flexibility and efficiency in the business process re-engineering. **PC20** To keep accounting and reporting documentation of prescribed form, in accordance with the accounting and financial reporting rules. **PC21**To use the services of financial, trade, supply, maintenance, legal and other support and mediating structures. **PC22** To provide operational funding, implementation of settlement and payment obligations, monitor the status of own funds.
		PC23 To managegroup of employees, takingresponsibility for the outcome of their actions at the site of the technological process. **PC24** To monitor the process of the activities within the strategy, policy and objectives of the organization **PC25**To monitor progress and assess the results of the works of performers. **PC26** To keep approved accounting and reporting documentation. **PC27** To be able to prepare and analyze financial statements. **PC28**To be able to show knowledge of the basics of scientific work conduction in practical fields. **PC29** To have presentation logic and demonstrate an understanding of system interconnections in the speeches and reports. **PC29**To interact with the services of information technology and use efficient the enterprise information systems.	

5. The structure of educational program

Professional competence	Eduational modile	Learning outcomes	Code the basic competence to be formed
PC1, PC11, PC12	**BGM01.** "Fundamentals of planning and organization of the farm"	LO1 To know the bases of agricultural products economy and market; LO2 To determine the role of enterprise in market economy conditions; LO3 To understandthe role of management and marketing in production process; LO4 To comply with occupational health and safety; LO5 To know the economy of the farm; LO6 To perform the main types of calculations	BC1- BC8
PC1- PC3, PC7, PC8, PC10- PC12	**BGM02.** "Preparing the soil for seeding and planting"	LO1 To know the main factors of crop production. LO2 To perform agricultural practices of seedbed preparation, in compliance with safety regulations. LO3 To select the methods of planting and planting material.	BC1- BC8
PC1, PC2, PC7- PC9, PC10-PC12	**BGM03.** "Growing crops, care and harvesting"	LO1 To know the technology of cultivation, protection and care of fruit and vegetables with appropriate agricultural units and equipment; LO2To solve practical problems, requiring independent analysis of the work situation during transportation and storage of the harvest; LO3 To understandthe role of agricultural marketing.	BC1- BC8

PC4, PC5, PC6, PC13, PC14	**BGM 04.**"The basics of farm animals keeping "	LO1. To know the basics of farm animals keeping LO2. To explain the purpose of different types of fodder and to make up ration for animals LO3. To know the basics of farm animals selection LO4. To understand the importance of maintenance and care of farm animals	BC1- BC8
PC1, PC10, PC11	**PM 01.**"Production planning, work preparation and monitoring, accounting"	LO1. To apply the bases of accounting; LO2. To carry out an assessment of the property at the enterprise and to know the balance sheet structure; LO3. To know classification of accounts plan, as well as prepare financial statements LO4. To perform calculations of production costs and profitability records.	BC1- BC8
PC 1, PC 10, PC 11	**PM 02**."The results of the enterprise activities"	LO1. To know the purpose, structure and method of business plan elaboration. LO2. To know the bases of marketing LO3. To perform the basic requirements for the drawing up of the business plan sections.	
PC1-PC3, PC7-PC9, PC10-PC12	**PC 03.** "Cultivation of crops" **PM03.1** "Growing of cereals"	LO1 To know the basic factors of cereals production; LO2 To master technologies for preplant soil treatment for crops growing; LO3 To apply grain crops seeding technologies; LO4 To use technology of cultivation of crops in the region in order to obtain high and stable harvests; LO5 To master technologies for crops storing and protecting; LO6 To represent marketing as the company management, focused on the optimal marketing organization	BC1- BC8
PC1-PC3, PC7-PC9, PC10-PC12	**PC 03.** "Cultivation of crops" **PM 03.2** "Growing root	LO1 To know the basic factors of root crops production; LO2 To master technologies for preplant soil treatment for crops growing;	BC1- BC8

	crops"	LO3 To apply planting techniques of root crops; LO4 To use the technology of growing root crops in the region in order to obtain high and stable harvests; LO5 To master technologies for crops storing and protecting; LO6 To represent marketing as the company management, focused on the optimal marketing organization	
PC1-PC3, PC7-PC9, PC10-PC12	**PC 03.** "Cultivation of crops" **PM 03.3** "Growing fruit and vegetable crops"	LO1 To know the basic factors of horticultural crops production; LO2 To master technologies for preplant soil treatment for horticultural crops growing**;** LO3 To apply horticultural crops seeding technologies; LO4 To use technology of cultivation of horticultural crops in the region in order to obtain high and stable harvests; LO5 To master technologies for storing and protecting horticultural crops LO6 To represent marketing as the company management, focused on the optimal marketing organization	BC1- BC8
PC1-PC3, PC7-PC9, PC10-PC12	**PC 03. "**Cultivation of crops" **PM03.4** "Cultivation of forage grasses and rational use of pastures"	LO1 To know the basics of the arable fodder cropping; LO2 To know technologies of fodder plants seeding; LO3 To master methods of improving rangelands, taking into account the regional context; LO4 To use the technologies of rangelands management and production storage LO5 To understand the role of marketing in the organization of feed products sales.	BC1- BC8

PC1, PC3, PC10- PC12	**PM 04.**"The use of modern industry technologies: the production of greenhouses, organic agriculture, energy crops, fodder production, forestry"	LO1 To know the technologies for agricultural crops growing in greenhouses; LO2 To know the basics of ecological agriculture, comply with environmental requirements in crop production; LO3 To understand the perspectives of cultivation and utilization of energy crops in Kazakhstan; LO4 To know the general classification of forage crops, their characteristics, chemical and biological composition of the fodder; LO5 To master technology of placement, growing forest ranges for different purposes and of care.	BC1- BC8
PC4, PC5, PC6, PC13, PC14	**PM05.** "Food-producing animals breeding and keeping"	LO1 To know the basics of animal farming, to use milk and meat production technology of LO2 To know the basics of goat breeding and apply the technology of production of goat milk and meat LO3 To know the basics of horse breeding, to apply milk and horsemeat production technology LO4 To know the basics of camel breeding, to apply shubat, meat and wool production technology	BC1- BC17
PC4, PC5, PC6, PC13, PC14	**PM 06.** "Meat animals breeding and keeping"	LO1 To know the basics of sheep breeding, to apply wool and lamb production technology. LO2 To know the basics of pig production, to apply innovative technologies in pig breeding LO3 To conduct organizational and livestock works in rabbit breeding	BC1- BC17
PC4, PC5, PC6, PC13, PC14	**PM07.**"Breeding of poultry and technology of production of eggs, poultry, fish, fur animals and bees"	LO1 To use biological and productive features of poultry, chickens, ducks, turkeys, geese, guinea fowl, quail, muscovy ducks. LO2 To apply technologies of fish farming, fur farming and beekeeping	BC1- BC17
PC27	**PM 08.** "Financial	LO1 To keep records of the agricultural enterprises	BC1- BC17

	accounting, statistics and control. The capital and the law"	LO2 To know the basic statistical parameters and procedures, as well as related software. LO3 To conduct general business analysis, operational analysis, planning of agricultural enterprises. LO4 To know the basics of investing and financing LO5 To know the laws and administrative sciences	
PC28 - PC30	**PM 09.** "Phytomedicine and plant selection"	LO1 To apply basic knowledge of plant breeding and phytomedicine	BC1- BC17
PC28 - PC30	**PM 10.** "Methodology for the presentation of information"	LO1 To know the information presentation methodology LO2 To know rhetoric	BC1- BC17
PC28 - PC30	**PM 11.** "Systems and technology of animal keeping"	LO1 To evaluate the production activities of the enterprise for and animals keeping and feeding	BC1- BC17
PC28 - PC30	**PM 12.** "The market and agricultural products trade, marketing, corporate governance and business start-up"	LO1 To be able to analyze the market LO2 To know the global markets of agricultural products and international trade of agricultural products LO3 To be able to manage projects LO4 To know methodology of agricultural market research LO5 To know the corporate governance and business startup.	BC1- BC17
PC28 - PC30	**PM 13**. "The agriculture and the policy in the field of environment. Applied ecology."	LO1 To know Agroecology LO2 To know organic farming LO3To know the social and political importance of the agricultural sector.	BC1- BC17

6. Educational program (module) content

BGM01 Fundamentals of planning and organization of the farm

The objective:

To obtain the basic knowledge about the functioning of the agricultural enterprises, methods of planning and organization of work, production and marketing.

Introduction to the module

The module contains the sections and topics of the basics of economy and organization of agricultural production.

This module will introduce students to the basic concepts of the organization and production organization functions, as well as related operations of planning, organization and documentation. The study of this module will contribute to the understanding of assessment issues and the characteristics of agricultural production technologies, introduce them with the appropriate documentation and assessment methods, adopted by the agricultural enterprises, thus contributing to the strengthening of interest in self-improvement and professional development to the level of the head.

Moreover,withinthis module students will study the factors, affecting production, production processes in the field of economic and environmental aspects, the composition and property of the company, the economic accounting and its forms,the wage calculations, the use of agrometereological information about the zonal farming systems, production facilities, crop rotations, modern environmental issues, and methods of marketing results use in the production activities.

This module will enable students to identify and describe the challenges and needs of the agricultural enterprises, to determine the agricultural machinery and equipment for various types of work.

The practical training provides the mastery of skills for the basic kinds of calculation and operational accounting of agricultural enterprises.

Learning outcomes:

LO1.To know the basics of agricultural products economy and market;
LO2.To determine the role of enterprise in market economy conditions;
LO3.To understand the role of management and marketing in production process;
LO4.To comply with occupational health and safety;
LO5.To know the economy of the farm;
LO6.To perform the main types of calculations
LO7.To be able to operate farm machinery and equipment

Module content

1. Knows the fundamentals of the economy and agricultural products market

The structure of the country economy. Branches of the economy and their connection through monetary and commodity flows. The mechanisms of self-regulation and their violation. The cyclical nature of economic growth. The regulatory task of the state.

Regulatory Objectives. The concept and the laws of the market. Perfectly competitive market. The free market, regulated market. Subsidies, patronage, guarantees for the price. Customs tax. The impact on cost structure and price formationat the agricultural enterprise. The negative impact on the market

conditions. The market of imperfect competition. Monopoly, oligopoly. Cartel and pricing agreement.

Kazakhstan in the systemof international division of labor. Foreign trade turnover of Kazakhstan: Import, Export. Place of Agriculture in AIC. The value of agricultural production for the economy of the country. Food security.

Agriculturalmarket. General terms: RK regulation of the agricultural market, and a universal bilateral trade agreements, market orientation and the preservation of the structure, indirect measures (e.g., funding stimulation, etc..), the sales structure and the status of processing stages, access to export markets.

Objectives such as: protection from price fluctuations, adjustment of the amount of output. Tools, such as market-oriented pricing policy, monetary compensation, established quotas.

2. Defines the role of enterprise in market economy conditions

Enterprise in the system of the national economy. Business and organizational-legal forms of enterprise. Private enterprise. Collective enterprises: partnership, such as a simple partnership, the company [the company] with raised capital (LLP, JSC). Other: partnerships, associations, unions.

Material and technical base of the enterprise. Human resources, the efficiency of their use, wages in the enterprise. Production costs, calculation, cost of production, the formation of prices for products.

The production system in agriculture: market enterprise, producing cereal crops, feed production enterprises, the companies, engaged in perennial crops, livestock enterprises (e.g., cattle, sheep, pig, poultry, bee, animals breeding, etc.), and enterprises of mixed forms.

Associations, unions. Association of agricultural or fishing enterprises owners. Circle of manufacturers. Stations of machine and tractor equipment.

The essence of small and medium-sized enterprises: farm management, profitability, competitiveness, supply and sales.

3. Understands the role of management and marketing in production process

The concept, the essence, the functions of organization management. Creation, registration, licensing and liquidation of the company. Enterprise property. The responsibility of the company, bankruptcy. Technological and production process management.

Planning in the organization management. Organizational structure. Management and leadership in the organization management. Control of the organization activities. Strategic management. The process of strategy planning. Analysis of alternatives and the selection of strategy. Strategy implementation management. Innovative processes management. Anti-crisis management.

Functions and personality of manager. The company and management. Levels of management: the problem, the distinction between “chain of command”. Management structures: linear, functional, combination structure (cross-functional). The need for systemic changes. Changes management. Changes in human behavior. Human entry into the organization. Motivation of activities. The value of the group method of work in the modern organization of work. Traits of a successful manager. Terms of a good leader. The communication process. Communication model:

the basics (sender - recipient, text, coding, etc.), disruption of communication. Communicationstyles. Communication and management.

Marketing concept, its objectives, functions, principles, classification, the basic marketing concepts, market segmentation, facilities and marketing agents, marketing environment, marketing tools, methods of research, formation, forecasting and elasticity of demand, sales promotion, promotion of goods and services on the market, advertising, marketing and pricing. Tasks and pricing strategy, price classification, marketing research of market, marketing information system, marketing strategy and tactics.

Applied software and information resources in the field of management and marketing, expert systems and support systems for decision making, modeling and forecasting in the professional activity.

4. Observes occupational health and safety

The concept of labor law. The concept of the right to free labor. Labor legislation. The notion of security of labor protection. Legal guarantees of workers to health and safety. The concept of health and healthy lifestyles. Occupational Health. Sources of danger at the enterprise: industrial noise and vibrations, harmful substances in the working zone, radiation, heat, dust, specific professional infectious diseases and their prevention.

Typical accidentsituations (on the example of agricultural enterprises). The procedure for the accidents investigation. The process of occupational accidents and diseases registration.

Statistics and analysis of accidents. Safety on the different types of production. Protective equipment: for building structures; for machines and equipment when working with animals. Protective designations. Industrial hygiene. Personal protection equipment of people. Employer responsibilities. Work time. Labor obligations. Employer. Industrial protection against accidents, industrial injuries. Terms of first aid provision. Fire safety in agriculture. The value of professional work.

Factors affecting the productivity of man. The main provisions of work place organization, taking into account ergonomic aspects.

5. Knows the farming economy

Factors, influencing the location: the soil (production facilities, evaluation), the climate (the height of location, of the average annual precipitation, the average annual temperature, growing season), the location, relatively to transportation routes.

Land resources as the basic factor of production. Human resources: distribution of labor force; assessment of labor ability, labor costs. The main and working capital: buildings and civil engineering structures, machinery and equipment, livestock, stocks. The value of the qualification of the director.

The ecological principle: the production, taking into account the location of farming, animal breeding, taking into account the specialization, the production rate.

The economic principle: fixed and variable costs, the law of declining productivity, the law of costs savings per unit of output. Assessment of natural resources (cadastral method). Promotion ofrational environmental management (tax policy). The cost-effectiveness of environmental protection measures.

The movement of inventory. Gross and marketable products: costs, prices. The price structure.

Production costs contents: basic costs, direct costs, indirect costs. Overheads. Total costs: general economic, general production. The share of cost recovery. The total share of cost recovery. Performance [production] costs of the enterprise – enterprises profit. The income of the enterprise. Benefit. Profitability. Liquidity. Activity. Turnover and profit.

Comparison of the share of cost recovery for: enterprises, production lines, manufacturing industry. On average by the region, country, world. Pricing for poor quality goods. Pricing for substitute products. Counter-cyclical response of manufacturers to price. Problems of price formation of forward contract for the enterprise.

Characteristics of the expenditure side of agricultural enterprises (some industries at the enterprise have high investment costs, fixed costs). Vertical integration as a possible strategy for the agricultural enterprises to increase the difference between procurement price and sale price. The company of mixed type as the ability to manage risk.

6. Performs the main types of calculations

The main types of calculations. The account of hierarchy, rational accuracy of the results. Transposition of tables into the chart, such as land use in Kazakhstan, the structure of sown areas. Frequency and frequency chart, for example: enterprise sizes classes, precipitation and temperature chart. Rules of drawing up tables and graphs.

Calculations of profit and loss, for example, proportional costs due to excessive use of cars. Mean values.

Loan costs. Price scan, purchase by cash through a loan. Listed price, the price of goods purchased for cash, the price of net payment.

Consumption per 1 kg. of pure nutrient. Calculations with many variables.

To recalculate the cost of compound fertilizer (NPK fertilizer) on net costs payments.

The share of costs for the purchase and operation, such as: agricultural machinery by types.

Pricing: wholesale, retail price. Guaranteed prices by the state.

Calculation of prime cost coverage shares in various sectors: crop production, animal breeding, farming machinery.

The connection of costs cover share with the factors of production, available in limited quantities: the share of costs coverper 1 person / hour, the share of cost recovery per 1 ha, the share of cost recovery per unit of capital employed. Determination of the profit size.

7. Is able to operate farm machinery and equipment.

Classification of tractors and agricultural machinery. Basic mechanisms of tractors. Internal combustion engine: the general structure and operation of the internal combustion engine; fuel for automotive engines; actual processes in engines, determination of the main dimensions of the engine. Crank mechanism and the mechanism of gas-distribution: kinematics and dynamics of the crank mechanism; Design and operation of the crank mechanism; structure and operation

of the gas-distribution mechanism. The power supply system and the motor controller. Lubrication and cooling systems. Electrical equipment. Start of engines. Specifications and testing of automotive engines. Power transmission of tractors and cars. Chassis, tractors and vehicles control mechanisms. Work and supplementary equipment for tractors and cars.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	**Assessment criteria A student should**
LO1. Knows the basics of economics and agricultural products market.	1.1 Explain the characteristics of money and commodity flows in the economy, understand the balancing function of the market and the regulatory role of the state; 1.2 Understand the features of pricing in the market economy, as well as the function of antitrust agencies to prevent monopolization and the emergence of oligopolies; 1.3 Understand the economy of Kazakhstan in the system of relationships with the international flows of goods, services and payments; 1.4 Understand the meaning and the place of agriculture in the national economy as a whole; 1.5 Have an idea of the agricultural market and its mechanisms; 1.6 Identify the classification of agricultural machinery by type of and purpose of work
LO2. Specifies the role of the enterprise in a market economy.	2.1 Describe the location of an agricultural enterprise in the framework of the national economy; 2.2 Compare the organizational and legal forms of companies and determine their legal status; 2.3 Identify the impact of general economic conditions on the agricultural enterprise; 2.4 Identify and evaluate the system of management and specialization forms in agriculture; 2.5 Rationalize necessity and characterize forms of business entities, unions, multi-industry integration; 2.6 Evaluate the chances of small and medium enterprises to market niches in the context of globalization.
LO3. Understands the role of management and marketing in production process	3.1 Represent the basic principles of management and management functions, and evaluate the different organizational and managerial structures of agricultural enterprises; 3.2 Understand modern management and administrative structure in terms of the processes of adaptation and changing conditions and the importance of management style; 3.3 Know the basic principles of interpersonal communication and understand them in the framework of working conditions in the agricultural enterprise; 3.4 Understand marketing as the company management, focused on the optimal marketing organization 3.5 Present facts and opinions in oral, written, and computer readable form, using professional language; 3.6 Simulate business processes.

LO4Observes occupational health and safety	4.1 Understand the importance of occupational health and safety in connection with the feature of the employment situation in the agricultural enterprise; 4.2 Know the causes of occupational diseases and regulate hazards; 4.3 Know the reasons and use the most important prevention regulations, that cause typical accidents, and avoid them with the help of control and preventive measures; 4.4 Understand the rights, duties and functions of the company's management on safety; 4.5 Understand the importance of fire safety, fire safety system to know and to introduce workers with the behavior in case of fire; 4.6 Determine the relationship between productivity and the organization of the workplace.
LO5. Knows the farming economy	5.1 Explain the importance of natural factors of farm location, as providing economic impact on the performance of agricultural production; 5.2 Describe the production factors of agricultural production and know their importance for profitability; 5.3 Understand the agricultural production in the field of economic and environmental aspects; 5.4 Explain the commodity-money flows at the agricultural enterprise and be able to calculate the cost of production; 5.5 Understand the most important indicators of production and economic success and analyze the economic efficiency of enterprises by industries; 5.6 Carry out comparison of the proportion of the cost of production with the statistical averages. 5.7 Understand the infrastructure of agricultural markets, and particularly the pricing of agricultural products and determine the production strategies on the basis of this; 5.8 Assess specialized and mixed enterprises in terms of risk 5.9 Observe safety measures and environmental protection.
LO6 Performs basic types of calculations	6.1 Use the software for commercial and business calculations; 6.2 Collect data and make up simple graphs/ charts; 6.3 Carry out calculations of profit and loss, calculate the mean values and the shares; 6.4 Check and evaluate proposals for the sale and the cost of credit; 6.5 Calculate expenditure for tools to fertilize the soil, for the maintenance of machinery and equipment; 6.6 Carry out trade and commercial calculations in the field of animal breeding, crop production and agricultural machinery
LO 7 Is able to operate farm machinery and equipment	7.1 Know the types and classification of agricultural machinery, tractors and cars 7.2 Know the configurationof agricultural machines and attachable equipment 7.3 Carry out maintenance of agricultural machines and attachable equipment 7.4 Be able to manage agricultural machines and attachable equipment

BGM02 Preparation of the soil for seeding and planting

The objective

Transmission of knowledge concerning the technologies of soil preparation for seeding, planting and basic working agricultural machinery necessary for the implementation of professional activities and operations.

Introduction to the module

In the module students study and evaluate directly measures and cultivation technology of plant products, crop rotation and crop areas, taking into account the needs of the regions in the production of cereals, oilseeds and grain legumes, root and tuber crops, vegetable growing in the field, grassland farming and foragefields husbandry, maize production . This module covers the topics on the operation of various machines, devices, equipment and tools in compliance with the occupational health and safety measures to prevent accidents.

To create optimal growth conditions it is necessary to obtain knowledge on the basic biological and physiological processes, occurring in plants, growth factors, as well as their dependence on the environment, climate, weather and type of soil. In addition, the knowledge of crops and organisms harmful to them, as well as measures to improve productivity and quality through the application of fertilizers, plant protection and cultivar improving processing representthe central importance and the condition for the study.

The successful development of the company requires understanding of the involvement of the agricultural enterprise in the general standard terms and conditions of the economic system, developing to the market economy, with particular emphasis on agricultural markets in the region, as well as segments of the market of production and services, production factors.

The module includes practical training, consolidating the knowledge gained through the formation of skills and abilities.

On the basis of this knowledge, the technology of cultivation of the typical areas of production in crop production in the regions, particularly activities to achieve an economically successful and long-term production plant, are demonstrated within the module.

Learning outcomes

LO1 Knows the main factors of crop production.

LO2 Performs agricultural practices of seedbed preparation, in compliance with safety regulations.

LO 3 Selects the methods of planting and planting material.

Module content

1. Know the basic factors of crop production

Meteorological factors, their interaction and measurement of temperature, air pressure, cyclone, anticyclone, wind, humidity, precipitation, weather fronts. The value of meteorological forecasts. Collection of weather data. Weather observation.

The concepts: ecology, habitat, biocenosis, ecosystem, biological balance. Metabolism and energy: producers, consumers, heterotrophic organisms / decomposers.

Food pyramid / chain. Possible violation of biological equilibrium, for example, due to monocultures, excess fertilizer, mass animal breeding, use of chemicals, water eutrophication and nitrate pollution. The consequences of land utilization.

Natural plant communities and the conditions of their location, for example, wet areas, arid and infertile areas, forest plantations, plantations. Crop rotation. Groups of agricultural production plants, for example, tillage vegetation, pasture vegetation, forest vegetation. Changes in the landscape, history of use and alteration. The importance of cultivation and management, depending on the location. Natural-economic zones of Kazakhstan (the steppe, forest-steppe, forest zones, mountain areas). Measures to protect water resources, measures to protect the environment and energy saving.

Legislation of the Republic of Kazakhstan in the field of agricultural production. Agricultural market of Kazakhstan. General terms: the regulation of the agricultural market of the RK; bilateral and universal trade agreements; market orientation and conservation structures; indirect measures (e.g., stimulation fund, etc..); sales structure and the status of the processing stages; access to export markets.

2. Performs agricultural practices of seedbed preparation in compliance with safety regulations.

The origin of the soil: the parent rock, igneous rocks and metamorphic rock, sedimentary and layered rocks, marsh. Soil formation modes. The formation of soil: physical forces, chemical forces, biological forces.

Soil composition: mineral components, sand. The pulverized sand. Clay, lime. Organic components: humus, soil horizons. Soil types: definition, importance.

Types of soil: sandy soil, loamy soil, clay soil, loamy soil, limestone, humus soil. Characteristics of soil structures, such as water content, air permeability and thermal conductivity, the content of nutrients,treatment.

Clay and humus as a soil colloids: sources, shrinkage, flocculation, buffering. Soil reaction, pH value.

A sample of hydrochloric acid. Sample by pH-meter indicator, the method of min.N.

Overview of agricultural machinery and equipment. Basic information about tractors, internal combustion engines. Mechanisms and systems of internal combustion engines. Machines and tools for the main, surface treatment of the soil. Seeding and planting machines, fertilizing machines. Safety measures and environmental protection. The principles of trafficregulation. Planning of maintenance work conduction at the agricultural enterprise: life expectancy and durability of structural parts, preventive replacement of wearing parts, plans to carry out lubrication work, assessment of the costs, associated with machine failure during the in-season period.

3. Selects the method of seeding and planting material

The structure of the plant cell in comparison with the animal. Components of the cell. Mitosis. Syncytium (tissue).

Seed: structure, germination. Root: the root system, the structure of the root.

The absorption of water and nutrients.The structure of the leaf: parts, veining, shape, cross-sectional view. Leaf functions: photosynthesis, respiration, transpiration.

Forms of sprout: elevated and underground sprouts, buttons, sprout changes.

Vascular bundle and nutrients transportation.

The configuration and the rules of work with a microscope. Observation under the microscope: the onion skin cells, seaweed, air pore, the cut of the stem. Plant diseases. Pests of plants and animals, useful for plants.

Flower: structure, types of inflorescences and shapes. Fruit: fruit types, availability of seed.

Asexual reproduction of plants: meaning, type, example, slip, tollers. Springs. Tissue crops. Sexual reproduction of plants: the formation of germ cells (meiosis), the ovule, fertilization.

Chromosomes as carriers of heredity. Mendel's laws of heredity: Mendel's laws of heredity: uniformity of the law, the law of the independent combination of genes, the law of independent partition. The order of heredity: dominance, recessive, intermediate.

Selection. Hybridization. Hybrids. Biotechnics, for example, genetic engineering. Breeding using genetic engineering.

The quality factor. Weight of a thousand kernels. The power of germination. Seed germination. Methods of preparation of seeds for seeding. Seeding approbation of crops.

Plant systematization by type, class, family. Procedure for determining the plant.

Identification of useful plants by seeds, sprouts, springs: grass, wheat, legumes, weeds and weed grass. Hard-separable weeds and seedclean.

Signs and causes of parasitic and non-parasitic diseases and injuries. Terms of development and life cycles. Forms and methods of plant protection. Consulting organizations on plant protection issues. Legal requirements, for example, the law on the protection of plants.

Learning outcomes and assessment criteria

Learning outcomes after the successful completion of this module, a student	Assessment criteria a student should
LO1 Knows the main factors of crop production;	1.1 Explain the environmental factors, biogeochemical cycles, ecological balance, preservation of biodiversity and describe landscape protection principles; 1.2 Understand the factors, which determine the weather conditions and weather events, as well as the methods of their measurement; 1.3 Justify decisions on land use, according to environmental requirements; 1.4 Explain the main factors of crop production for the company and its operation with the use of natural and economic conditions of the location; 1.5 Describe the need for crop rotation; 1.6 Have an idea of the agricultural market and its mechanisms; 1.7 Planactivities for environmental protection in the field of crop production;

LO1 Knows the main factors of crop production;	1.8 Explain the weather maps and weather forecasts; 1.9 Analyze the annual rainfall in the region, observe and record the appropriate weather events; 1.10 Take into account the existing legal acts, the laws in the field of agriculture.
LO2 Performs agricultural practices of seedbed preparation, in compliance with safety regulations.	2.1 Explain the soil origin processes and identify the constituent elements of the soil; 2.2 Identify the factors, that affect the structure of the soil; 2.3 Analyze the structure and composition of the soil, assess its fertility; 2.4 Explain the need for soil treatment in accordance with the requirements of agricultural crops; 2.5 Prepare classification of soil types, with the use of information resources; 2.6 Describe the purpose of different tillage techniques; 2.7 Carry out calculations of cost-effectiveness of tillage machinery and equipment; 2.8 Know the tractorsconfiguration and their use in tillage and planting; 2.9 Explain the need for work conduction on maintenance schedules; 2.10 Justify the rational use of energy and material resources; 2.11 Offer materials and tools against corrosion measures protection, taking into account the regional context; 2.12 Perform safety measures and traffic regulations;
LO 3 Select the method of seeding and planting material.	3.1 Describe the structure and function of plant organs; 3.2 Explain the processes: germination, photosynthesis and respiration; 3.3 Distinguish the stages of plant development; 3.4 Explain the processes of metabolism; 3.5 Justify and calculate the cost of seeding and planting processes; 3.6 Know the quality criteria for the assessment of the planting material selection; 3.7 Carry out the analysis of the producers of seeds and planting material in order to assess competitive bids, based on quantitative and qualitative aspects; 3.8 Select seed machines and equipment, respectively to planting; 3.9 Describe the classification of the types of crops on reproduction types; 3.10 Carry out experiments and draw conclusions in relation to the germination of seeds of different crop types.

BGM03 Growing crops, care and harvesting

The objective

To obtain basic knowledge concerning the techniques of cultivation, care, collection, transportation, storage and sale of products.

Introduction to the module

In the module students study and assess directly measures and industry technologies of growing, care, collection, transportation to the places of storage, as well as delivery to consumers for sale, taking into account regional specialization map for production of cereals, oilseeds and grain legumes, root and tuber crops, vegetable growing in the field, grassland farming and foragefields husbandry, maize production. This module covers the topics on the operation of various mechanized units, lift-up and trailed equipment, cars, tractors and combines fertilizer application, crop protection, harvesting, transportation and storage of the crop,in compliance to the rules of labor protection and safety measures to prevent accidents.

To create optimal growth conditions it is necessary to obtain knowledge on the basic biological and physiological processes, occurring in plants, on plants and organisms, harmful to them, as well as measures to improve productivity and quality through the application of fertilizers, care and protection of plants, harvesting and storage technologies. Whereby, preservation of crops and the production of healthy and high-quality products, that meet the requirements of the processing industry, are of top priority.

The successful development of the company requires understanding of business processes and relationships in areas, such as business economics, the organization of the enterprise, taking into account the work performed and services provided, monitoring of the results of operations and production planning. The content of the module includes the main trade-commercial and cost-accounting aspects, understanding of the cost. Plant growing allows understanding, that the estimated budget drawn up for the use of enterprise funds, are critical to achieve success or loss,only through carrying out accurate calculations for the sphere. Accounting, operating calculations, accounting of profitability give basic knowledge and form skills to perform accounting and evaluation of production data, as well as to account operations, occurring in agricultural enterprises. The correct preparation of accounting records of typical business operations and control, as well as the correct preparation of the annual balance sheet and its closure is based on the accounting and valuation of the property business through inventory. At the same time, the calculations, using electronic data processing,are carried out with the help of known examples, taken from the sphere of plant growing operations.

This module will enable students to consolidate the knowledge gained by skills formation through practical activities.

Learning outcomes:

LO1 To know the technology of cultivation, protection and care of fruit and vegetables with appropriate agricultural units and equipment;

LO2 To solve practical problems, requiring independent analysis of the work situation during transportation and storage of the harvest;

LO3 To understand the role of agricultural marketing.

Module content

1. Know the technology of cultivation, protection and care of fruits and vegetables crops, using appropriate agricultural machines and equipment

Soil conditions of growth and development of fruit and vegetable plants. Tillage system in the care of plants. Determinants of plant growth: light, temperature, CO2, O2, water, nutrients (basic, additional microelements, non-mineral nutrients).

Thelawofdiminishingreturns.

Organic and mineral fertilizers, methods, terms of application. Nitrogen, phosphorus, potassium, lime and magnesium fertilizer: the composition and form of the action, and the signs of lack and excess, application examples. Problems, such as removal, gaseous losses, water pollution, and their impact on the ecosystem. The characteristic features of complex fertilizer (NPK): division into groups, the composition, the use, action. Advantages and disadvantages. Calculation of the content of the pure substance: the need for nutrients as the pure substance, the concentration of fertilizer and the quantity, concentration with the calculation of proportion. Calculation of combined fertilizers: amount of pure substance, quantitative ratio. Micro fertilizers: composition, action, and methods of use. Liquid manure, liquid fertilizer, green manure, compost: composition, action, problems, such as eutrophication of waters. Nitrogen losses and their impact on the ecosystem. Determination of organic and mineral fertilizers. The balance of soil nutrients and quantity of fertilizers.Fertilizers application plan compilation. Fertilizer. Storage of fertilizers. Mixing Rules. Drafting and calculation of nutrient balance.

Technologies and equipment for the application of organic and mineral fertilizers: mineral fertilizers, liquid fertilizers, solid manure, liquid manure; the exact number of spreader, spreader, disc spreader, solid manure spreader, machine for liquid fertilizer application. Structural elements of machines and equipment and their functions: the structural elements of cars for mineral fertilizers, the structural elements of machines for liquid fertilizer, the structural elements of the solid manure spreader, the structural elements of the machine for liquid fertilizer application.

Technologies and equipment for holding plants protection events by: a method of application (injection, spraying, dusting, aerosol dispersion, etc..), stages of development (soil treatment, seed treatment, grass processing, etc.), prevention or treatment through the principle of harmfulness threshold. The structural parts of the equipment to carry out protective measures and their functions: the structural parts of dressing machines, the structural parts of the sprayer, pump systems, types of sprayers.

Technology and equipment for irrigation:rainulators, sprinklers, drip irrigation, special systems (hydroponics,ceramsite cultures and so forth.). The structural parts of the irrigation equipment and their functions: the structural parts of the sprinklers, the structural part of the drip irrigation system.

Technology of harvesting and harvesting equipment: technology of direct combining, separate combining, threshing technology (swath threshing, straight threshing), harvesting process chain, and professional division of work, technology of fodder conservation (for silage corn, silage from grasses, hay and so forth.), special equipment (potato harvesters, harvesters of sugar beet). The structural parts of harvesting equipment and their functions: the structural parts of the combine harvester, the structural parts of the harvester, the structural parts of feed mincer, the structural parts of other harvesting equipment.

Safety measures and environment protection while usingagricultural machinery and equipment in the process of soil fertilizing, carrying out measures to protect the plants, irrigate, harvest. Typical situations of accidents (on the example of the statistics of agricultural enterprises and farms). The procedure for the investigation of accidents. The process of occupational accidents and diseases registration.

2. To solve practical problems, requiring independent analysis of the work situation, during transportation and storage of the harvested crop

Vegetables and fruits as storage and processing objects. Preparation of products for storage and processing. The concept of the quality of agricultural products, the way of its increase. Types of product losses during storage: weight loss, loss of quality. Classification of storage. Combined storage modes. Physical properties and chemical composition of fruits and vegetables. Physical and thermal properties of fruits and vegetables. The physical properties of the fruit mass: free-running, demixing, interparticle, mechanical strength. Fruits and vegetables storage methods.

Field storage. Types and methods of fruit and vegetables packaging. Field storage of vegetables. Typical storing bunkers and trenches. Modified storing bunkers and trenches. Storage of fruits and vegetables in stationary warehouses. General characteristics of the storage. Storage - refrigerators. Methods of chambers cooling. Methods of refrigeration chambers humidification. RotoconditionerLN-1A. The steam humidifier BCA. Technology of storage of certain types of vegetables and potatoes. Types and methods of commodity processing of fruits and vegetables. Commodity processing. Post-harvest treatment of the commodity products.

Safety measures and environment protection while usingagricultural machinery and equipment during transportation of crops to storage places. Typical situations of accidents (on the example of the statistics of agricultural enterprises and farms). The procedure for the investigation of accidents. The process of occupational accidents and diseases registration.

Factors affecting productivity. The main provisions of work place organization, taking into account ergonomic aspects.

3. To understand the role of agricultural marketing

The concept of marketing system, its functions, role in the agricultural sector and the national economy as a whole. Approaches and form agriculturalmarketing. Resource markets for agricultural production: the geographical position of the region, type of product, implementation time, level in the marketing system, an analysis of prices in the region in comparison with the dynamics of world prices. Market functions: sharing and pricing. Modern technologies of company marketing activity management, effective methods to increase sales in retail and in the market.

The main types of calculations. Calculations of profit and loss. Loan costs. Price scan, purchase by cash through a loan. Listed price, the price of goods purchased for cash; price of net payment. Consumption per 1 kg of pure nutrient. Calculations with many variables. Recalculation of the cost of compound fertilizer (fertilizer NPK) on expenses, net payments. The share of costs for the purchase and operation.

Applied software and information resources in the field of sales and marketing, expert systems and decision support systems, modeling and forecasting in the professional activity. Safety measures when working with personal computers and software.

Factors, affecting productivity. The main provisions of work place organization, taking into account ergonomic aspects.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student will:	**Assessment criteria A student should:**
LO1 Know the technology of cultivation, protection and care of fruit and vegetable crops with the use of appropriate agricultural machines and equipment	1.1 Understand the laws of agricultural productivity; 1.2 Know the biogeochemical cycles; 1.3 Know the signs of plants disease and damage, understand a way of life of certain pests and useful insects; 1.4 Distinguish kinds, types and characteristics of the timing of fertilizer application; 1.5 Describe the impact of simple, complex and micro fertilizers on soil, groundwater and plants; 1.6 Distinguish between mineral and organic fertilizers; 1.7 Know the principles for determining fertilizer needs; 1.8 Analyze the proportion of different fertilizers in accordance with the economic criteria and the plant soil requirements; 1.9 Carry out quantitative calculations for the fertilizers; 1.10 Conduct the examination of the soil; 1.11 Define the types of machines for fertilizer application by accuracy and performance; 1.12 Produce operational calculations and profitability accounting; 1.13 Describe the biological, economic, legal and environmental implications of growing fruit and vegetables; 1.14 Make up a plan for growing plants on order; 1.15 Observe the rules of occupational health and safety.
LO2 Solve practical problems, requiring independent analysis of the work situation during transportation and storage of the harvested crop	2.1 Know the legal and regulatory framework in the field of occupational health and industrial hygiene; 2.2 Be aware of the principles of inventory monitoring and assessment; 2.3 Study the modern methods of quality and development improving in the field of transportation and storage; 2.4 Justify the need for the storage of grown products; 2.5 Apply the physical, chemical and biological processes of service and warehousing; 2.6 Compare the costs of the proposed measures for the storage and make cost-effective decisions on the basis of elaborated economic comparison schemes; 2.7 Keep and provide documentation on maintenance of the warehouse; 2.8 Analyze and explain the effects of lack of stock maintenance.
LO3 To understand the role of agricultural marketing.	3.1 Have a basic knowledge of marketing tools; 3.2 Assess the enterprise marketing policy in accordance with the situation on the market; 3.3 Identify the most important channels for agricultural products sale; 3.4 Observe the market and customer preferences; 3.5 Conduct a market analysis of a particular crop; 3.6 Explain the types of documentation and analysis of sales revenues; 3.7 Conduct professional discussions with customers on sales; 3.8 Develop marketing support for a particular company; 3.9 Provide professional documentation of the sales revenue; 3.10 Be able to prepare proposals for the sale of new products.

BGM 04. Fundamentals of breeding and keeping of farm animals

The basics of farm animals keeping
Types of feed and rations for agricultural animals
Basics of farm animal breeding
Maintenance and care of farm animals

Aim and objective. Students have the basic and general knowledge of animal breeding: area study, feeding, handling, placement and care.

Introduction to the module

The classes of this module are aimed at transfer of knowledge concerning technology and basic engineering work, required for the implementation of professional activities and operations. The content of classes includes basic biological, physical and chemical aspects. Based the basic knowledge, acquiredduring the module study, students introduce and learn to evaluate the activities and the successful technology of livestock production. At that, the livestock industries, such as the breeding and fattening of cattle, dairy cattle breeding, breeding of horses, pigs, camels, sheep, poultry and rabbits are studied especially deeply. Use of various machines, devices, equipment and treatment of animals at agricultural enterprise necessitates a thorough study of techniques and regulations for prevention of accidents.

Livestock sector management is very important for success in the production of livestock products. Optimum performance and a comfortable well-being of animals requires knowledge of the basic biological and physiological processes, occurring in the body of animals, the requirements for the microclimate of livestock buildings, feeding and care of animals, and the natural behavioral traits of farm animals. These skills are also a prerequisite for the study of other subjects in the field of animal breeding.

The module contains sections of industrial training, which form the skills to characterize and evaluate the animal production technology, based on the integrity of the livestock industries and areas.

Learning outcomes:

LO1. To know the basics of farm animals keeping

LO2. To explain the purpose of different types of fodder and to make up ration for animals

LO3. To know basics of farm animals selection

LO4. To understand the importance of maintenance and care of farm animals

Module content

1. To know the basics for agricultural animal keeping

The basic idea of ecological agriculture, environmental and regional conditions for the livestock industries. Food supply: fodder supplies for livestock and their sources. Key points: Livestock, taking into account the squares, crop rotation, soil and crop protection. Safety measures and environmental protection, industrial sanitation and hygiene.

2. To explain the purpose of different types of fodder and to make up ration for animals

Classification of fodders. Feed intake, their major components, functions of nutrients and active ingredients, digestion, resorption. Digestibility. Decomposition of nutrients. Metabolism. Use of nutrient in the animal body. Energy of net lactation. Converting energy. Starch equivalent. The need for a supportive and productive fodder. Minimum requirements for the components: crude fiber, energy, Ca, P. Minerals. Nutritional supplements. Vitamins. Components of fodders and their significance. Dry substance. Water. Crude protein. Fats. Crude fiber. Nitrogen-free extractives. Specific components and their significance for the individual species.

Feed quality and valuation control points. Calculation of the proportion of dry matter. Typical feedstuffs of the region. The most significant components.

Simple calculations of feed rations. Multivariate calculation of feed rations.

Warehousing and storage, losses, quality standards.

3. To know basics of farm animals selection

Description of the exterior parts of the body. The skin and its derivatives. The structure of the bones and the skeleton. The meaning of muscle. The composition of the blood. Blood circulation: heart, vessels. The bodies of breath and digestion.

Location of organs, genitals, hormonal control of oestrus, maturity. Sexual reproduction of animals: the formation of germ cells, fertilization, tupping and beginning of pregnancy, embryonic development, parthenogenesis. The chromosomes as carriers of hereditary traits. Mendel's laws of heredity: uniformity of the law, the law of independent inheritance, law of independent dispersion. The order of heredity: dominance, recessive, intermediate. The basic concepts and technologies of practical breeding of farm animals:selection, livestock breeding, cross-breeding. The types of cross-breeding: hybridization, inbreeding, tupping season. Biotechnology: artificial insemination, embryo transfer. Genetic technologies. Inbreeding (close inbreeding).

4. To understand the importance of animals keeping and care of them

General arrangement, accommodation and sanitary equipment of livestock farms and complexes. Types, layout and placement of the animals. Ventilation, heating, lighting of facilities, depending on the species.

Influence of weather conditions and indoor climate on livestock health. Sanitation requirements for livestock buildings. Hygiene of stabling animals.

Symptoms and causes of parasitic and non-parasitic diseases. Terms of development and life cycle, such as hepatic Fasciola.

Preventive measures, such as the microclimate of livestock premises, keeping, feeding, preventive vaccination, quarantine, hoof care.

Organization for Animal Health: Veterinary Service. Legal frameworks.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	**Assessment criteria A student should**
LO1. Knows the basics of farm animals keeping	1.1 Identify the main factors for the development of animal breeding; 1.2 Prove the principles of ecological knowledge and use of regional conditions for the livestock industries; 1.3 Justify theselection of animals species, taking into account natural and regional conditions.
LO2.Explains the purpose of different types of feed and draw ration for animals	2.1 Identify the characteristics of feed quality and compare with the standards; 2.2 Explain the principles of correct feeding of animals in accordance with the type; 2.3 Carry out calculations for typical livestock rations by species; 2.4 Design a plan for feeding process; 2.5 Observe the feed storage rules; 2.6 Carry out safety measures.
LO3.Knows the basics of livestock breeding	3.1 Know the basics of reproduction and heredity; 3.2 Describe the technologies and methods of practical breeding; 3.3 Make the schedules of the animal breeding by species.
LO4. Understands the importance of maintenance and care of farm animals	4.1 Explain the basic requirements for keeping and care of animals; 4.2 Explain the relationship between the breed (constitution) and the production of livestock products; 4.3 Justify the use of ACS for animals keeping; 4.4 Carry out hygiene requirements for animal health; 4.5 Observe safety and environmental protection rules; 4.6 Evaluate the results of the farm.

BGM 05. Theoretical Driving Course: Fundamentals to obtain a tractor driver's license (III class) (Categories A, B, D)

The objective: To provide basic theoretical content of the driving course. Students should acquire knowledge of traffic rules, personal behavior while driving vehicles, road safety rules, as well as the basic rules of behavior at the scene of accident.

Introduction to the module

College provides each student with the opportunity to obtain a certificate of tractor-driver class III (category A, B, D), namely:

The theoretical content of the training on the tractor, self-powered agricultural machinery driving and practical training content for tractor equipment, its maintenance and care is revealed in the classroom in the study of the vocational modulescontent.

The college provides each student with practical lessons on driving the tractor and the combine after school hours outside the schedule. This driving course ends with the practical and theoretical exam to obtain further certificate of class III tractor driver. Certification of the class III tractor-driver gives the right to drive on public roads.

Each student has 28 hours of driving on a tractor with a trailer and attached implements and combine.

Module content

Requirements to the driver: requirements for vision, concentration, fatigue and distraction, alcohol and drug use, mental and social conditions, the human factor risk (fear, stress, overestimation of self and others.)

The duties of road users:

Terms and conditions: vehicles driving, the admission and testing of vehicles, insurance of the vehicle registration, driver's license (classes).Documents required for the vehicle driving.

The duties of road users: drivers, passengers and pedestrians.

The movement of special vehicles (police, medical, fire, military police), the disabled drivers, the list of documents for driving

Traffic system and its use. Road signs and traffic facilities (including railway crossings). Traffic constructions. Right of way and priority of movement. Railway crossings. Safe and environmentally conscious behavior at railway crossings. Speed and safety distance. Lane status and weather conditions. Environmentally friendly driving. Maneuvers of movement. Impact of vehicles on road safety. Traffic safety of vehicles.

Traffic accidents. The sequence of actions of the accident participants. First aid at the accident site.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	**Assessment criteria A student should**
LO1 Knows the rules of the road and traffic safety of vehicles	1.1 Know and comply with the most important rules of the Republic of Kazakhstan traffic; 1.2 Know the signs, types of marking and labeling, light signals and symbols in the organization of traffic, their classification, basic characteristics and purpose. Observe their implementation; 1.3 Know and respect the rules of priority, the rules of railway crossings travel; 1.4 Correctly evaluate personal behavior of the driver and behave in appropriate way; 1.5 Know and apply the requirements to ensure the safety of traffic and operation of vehicles.
LO2. Describes the behavior of the driver in traffic accident site	2.1 Know the procedure and its appropriate execution in the event of traffic accidents, have a general concept for the provision of first aid.

PM01 Productionplanning, work preparationand control, accounting

The objective:

Students must have basic knowledge about production planning, preparation and registration of working processes in farms. They need to know accounting principles.

Introduction to the module

Classes on the module "Production planning, preparation and operation control, accounting" are intended to introduce the students with the basic concepts of planning the organization and basic functions of the organization of production, as well as associated with these planning operations, organization and documentation, at an early stage of their professional career. It is expected that students with qualifications "Farmer" will be able to independently carry out these planning operations, organization, management and documentation. within their limited labor tasks.

This module will contribute to the understanding of evaluation issues and the characteristics of agricultural production technologies, will introduce them with the appropriate documentation and assessment methods, adopted by the agricultural enterprises, thereby strengthening interest in self-improvement and professional development to the level of the head.

Moduleclasses provide basic knowledge, facilitating a common understanding of industrial technological processes and relationships in areas, such as business economics, the organization of the enterprise, taking into account the work performed and services provided, monitoring of the results of operations and production planning. Organization and planning of the company, the use of material and technical means and equipment, land resources, the organization of production processes in plant growing and animal breeding, services provision, performance of works, insurance. The content of classes also includes issues of accounting fundamentals: balance of the enterprise, operating calculations, taking into account profitability and calculation aspects.

Learning outcomes:

LO1. To apply basics of accounting;

LO2. To carry out an assessment of the property at the enterprise and to know the balance sheet structure;

LO3. To know classification of accounts plan, as well as prepare financial statements

LO4. To perform calculations of production costs and profitability records.

1. To apply the basics of accounting

The objectives and significance of accounting. Obligation of accounting.

Basic principles of proper book records: clarity, reliability, discretion, the current account records. Tax and accounting. The system of accounts and double-entry accounting. Starting balance. Current transactions. The calculation of profit and losses. Annual balance

2. To carry out valuation of the company assets and to know the balance sheet structure

Property assets. The types of property. Classification. Inventory List. Valuation of property. Inventory. Various possibilities of inventory conduction. Types of property in the enterprise-sample. Property records on enterprise-sample. Property valuation in the enterprise-sample. Inventory at the enterprise-sample. Balance sheet structure. The components of the balance. Balance parts: the use of funds and their origin, the definition of equity, balance changes due to business transactions.

3. To know the classification of accounts plan, as well as prepare financial statement

Classification of accounts. Accounts plan. Holding inventory on theaccounting books and accounts: the opening of accounts, current accounting records with a simple and complextransaction, closing of accounts through the profit and loss accounts, the account of the final balance. Closing a balance sheet. Keeping and making up oftransactions documentation. Carrying outthe records in: accounting journal, general ledger.

Control by comparison: the amounts of debit and credit, accounting records, bank balance and account statements. Alteration of incorrect recording.

Balancing: active and passive inventoryaccounts, financial assets and liabilities, income and expense accounts, personal accounts, natural and financial accountings, inventory lists. Implementation of corrective accounting entries for the retired and received amounts: depreciation, personal withdrawals, investments, share.

Determination of tax profits through: the profit and lossescalculation, the comparison of the initial equity and total balance.

4. To carry out calculations of production costs and profitability accounting

Reasons for the enterprise valuation. Analysis opportunities: income, changes in shareholders' equity, coverage of borrowed capital. The concepts of success in agriculture: the net profit, the profit ratio, gross income, changes in shareholders' equity, the limit for subsistence transactions payments. Direct unit costs and general overheads. Fixed and variable costs. Cost-accounting expenses. Determination of cost centers. A simple statement of production accounting. Accounting of general expenses. Classification of the total expenditure ordering. The selection of method for calculation in the allocation of costs. The distribution of the total costs. Calculation scheme. Disadvantages of the full costs calculation. Basic concepts and assumptions. The possibility of using the reserves to reduce costs. The use ofagriculturecrops areas. The share of expenses covering per 1 ha of agricultural area. The share of profit per 1 ha of agricultural area. Comparison of production technologiesper 1 haof agricultural area. The use of the "labor" factor. The share of expenses covering pet 1 person / hour. The share of profit per 1 person / hr. The comparison of production technology per 1 person / hr. Typical data. Analysis and evaluation of data in the production direction of "animal breeding". Typical data. Analysis and evaluation of data in the production direction of "crop growing". Typical means of production in the agricultural enterprise. The ability to perform analysis and evaluation. Analysis of results of operations based on numerical characteristics: own profitability, the profitability of the total capital, cash flow.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	**Assessment criteria A student should**
LO1. Applies accounting basics.	1.1 Understand the significance and principles of accounting for agricultural enterprises; 1.2 Identify the features of agricultural production, affecting the planning and organization of the enterprise; 1.3 Explain the principles of the modern organization of the enterprise; 1.4 Understand the role of the enterprise as a legal, formal and social organization; 1.5 Know the principles of accounting and the documents, proving business operations.
LO2. Carries out valuation of the assets in the company and knows the balance sheet structure.	2.1 Carry out a valuation of the property of agricultural enterprises and classify it by categories; 2.2 Carries out an inventory of the enterprise property with the use of the software, on the example of a fictitious agricultural enterprise; 2.3 Understand and explain the components of the balance sheet, changes in the balance in connection with business transactions.
LO3. Knows classification of accounts plan, as well as prepares financial statements	3.1 Compile correctly a balance, conduct appropriatelythe accounts, close correctly the balance; 3.2 Conduct correctly business transactions on the accounts of accounting, on the basis of documents and monitor the accounting record; 3.3 Compile the annual balance
LO4 Performs calculations of costs of production and profitability records.	4.1 Understand the basic principles of business valuation and know the different methods of analysis; 4.2 Distinguish between types of costs and expenses; 4.3 Describe the main methods for general (overhead) costs allocation via cost accounting statements; 4.4 Carry out a calculation of total costs as anitemized calculation; 4.5 Carry out calculation of cost on direct expenses (with the allocation of overhead costs to product groups) and valuate the replacement possibilities; 4.6 Understand the importance of the analysis of soil resources; 4.7 Analyze and evaluate the efficiency of agricultural enterprises; 4.8 Observe, analyze and evaluate parameters of livestock and crop farming enterprises; 4.9 Observe, analyze and evaluate the basic parameters of the enterprise; 4.10 Analyze and evaluate the use of the agricultural enterprise means of production; 4.11 Use software capabilities to conduct enterprise analysis and evaluation

PM02 The results of the enterprise activities

The objective

Students learn the basics of management accounting, perform calculations of enterprise performance and determine financial success indicators.

Introduction to the module

The module contains the sections and topics of fundamentals of management accounting and financial management.

This module introduces students to the basic concepts of management accounting and financial management, and related processes for the enterprise valuation and profitability, stability and liquidity, cost and management accountingindicators determination. The study of this module will contribute to the understanding of the financial position of the company, introducing to the contents and the composition of the financial statements, the basic techniques, ways and methods of financial calculations of financial ratio, indicators of financial stability, as well as the method of analysis of profitability and the factors influencing their change. Moreover, in the framework of the module students will be introduced to the structure of the business - plan and method of its execution, as well as to the concept and principles of marketing, merchandising and pricing, communication policy.

This module will enable students to acquaint with the principles of management accounting at the level of production, cost classification, as well as to carry out the calculation of indicators of economic efficiency of production processes and certain costs, associated with the production of goods, performance of works and provision of services.

Learning outcomes:

LO1. To know the purpose, structure and method of a business plan preparation.

LO2. To know the basics of marketing

LO3. To perform the basic requirements for the drawing up of the business plan sections.

Module content

1. To know the purpose, structure and method of a business plan preparation

The significance of business plan as a tool for the current direction of the company, contributing to the achievement of the planned results, identification of problems and determination of a set of measures to address them. Conduction of a systematic accounting of the technical characteristics of the enterprise and the environment, where it operates: the analysis of business activities, the study of the accompanying circumstances (conditions). To carry out the selection of essential information only. To conduct a SWOT analysis:

- “S” dignities, advantages (strengths of the company)
- “W” weaknesses, shortcomings (weaknesses of the enterprise)
- “O” capabilities (supporting factors in the environment)
- “T” threats and risks (inhibiting factors in the environment)

The approach to the solution:

Improve “W” through “O”

Protect “S” against “T”.

Collection of information. Assessment of the situation. Development of various

strategies. The costs of different strategies. Selection of a strategy. Marketing. Financing of the general strategy. The selection and use of specific strategies to develop data analysis of economic activities of the enterprise. The use of capital and source of capital. Causes of funding - approval of funding in time with financing purposes (eg, project phases). Balance and balance indicators. Types of funding: on capital origin, on the legal position of investors, special forms. Funding costs.

2.To know the basics of marketing

Marketing aim and objectives. Marketing conceptions. Sales tools: Product Design, marketing and sales of the product channels, pricing and determination of the content and form of the contract, advertising. Customer Service. Market research. Target groups. Target markets. Combining the tools of marketing policy: policy development and release of new products, pricing policy, communication policy in the field of marketing policy. Legal conditions. The possibilities of collecting information. The impact on the individual sales success. The basic principle of sales ethics: to convince, not to persuade.

3. To perform the basic requirements for the drawing up the sections of the business plan

Work in accordance with the a business plan development steps, set out in the educationalaim.

Depending on the characteristics of AIC industries, as well as on the specific circumstances (novelty, production volume, type of product, services) - the composition and structure of the plan may be different, but the content side must be identical. Elaboration of the main sections of the business plan:

- Summary of the business plan or business description,
- Enterprise,
- Enterprise management, organizational plan,
-Goals of the enterprise,
- Marketing events,
- Production plan
- Financial plan,
- Legal plan,
- Risk and insurance assessment.

The summary of the business plan should reflect the previous activities of the enterprise, the current state of the business, indicate the property at the disposal of the enterprise, give the description of the products or services, as offered, describe a market, as well as short-term and long-term plans.

The enterprise section sets out all the information about the company, which are necessary to ensure the successful management.

The enterprise management section describes the necessary management skills.

The marketing events records the following issues: market strategy, industries analysis, market and customers, sale system, advertising, private trade, prices determination, competition, products and services, market research.

In the production plan section the manufacturer must describe how to create their products, i.e. give the description of its activities.

The aim of the financial plan section is to provide a general idea of financial accounting forms and propose means, which will help in the assessment and

discussion of financial issues.

The enterprise objectivessection summarizes enterprise plans and results of the company, which it wishes to achieve. It is advisable to describe them using figures and numbers to make it possible to count and measure them.

The purpose of the legal section of the plan is to describe the type of business in terms of property, determining the legal status.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	**Assessment criteria A student should**
LO1. Knows the objectives, structure and method of business plan drawing up.	1.1 Understand the legal, economic and market conditions, specific to the agricultural enterprise, and determine the conditions of production and the location of production unit; 1.2 Understand the business plan as a tool for strategic planning of the dynamics of business activity (strategic business development; 1.3 Identify the production and technical data, as well as know the cost of production; 1.4 To elaborate the business model and describe its financing, as well as explore the products market; 1.5 Carry out a SWOT analysis.
LO2. Knows the basics of marketing	2.1 Represent marketing as enterprise managing, focused on the optimum sales organization; 2.2 Show the possibility of obtaining the information about the market. 2.3 Know the policy of product development, sales channels and the branches of trade chain and explain the use of marketing tools, customer service; 2.4 Know the significance of behavior, professional skills, personality for sales results.
LO3. Carries out the basic requirements for the drawing up the sections of the business plan	3.1 Develop a business plan for a farm enterprise, based on the specific objectives of the educational practice, offered forindependent work and present the results.

PM 03 Cultivation of crops
PM 03-1 Growing of cereals

The objective

To obtain comprehensive knowledge of small grain crops from planting to harvesting

Introduction to the module

In the module students study and evaluate directly measures and area research industry technologies, plowing and tillage, cultivation, maintenance, harvesting, transportation to the places of crops storage, as well as delivery to consumers for

sale, taking into account regional specialization map for production of crops. This module covers topics onoperation of mechanized devices, mounted and trailed equipment, motor vehicles, tractors and combines for tillage, fertilization, crop protection, harvesting, transportation and storage of the crop,in compliancewith the rules of labor protection and safety measures to prevent accidents.

To create optimal growth conditions it is necessary to obtain knowledge on the basic biological and physiological processes, occurring in plants, on plants and organisms, harmful to them, as well as measures to improve productivity and quality through the application of fertilizers, care and protection of plants, harvesting and storage technologies. Whereby, preservation of crops and the production of healthy and high-quality products, that meet the requirements of the processing industry, are of top priority.

The successful development of the company requires understanding of business processes and relationships in the fields of economics and organization of the company, records of work performed and services rendered, control over the results of operations and production planning. The content of the module includes the main trade-commercial and cost-accounting aspects, understanding of the cost. Only exact calculations allow to understand, that the cost estimates on the use of enterprise funds are critical to achieve success or loss. Accounting, operating calculations, accounting of profitability give basic knowledge and form skills to perform accounting and evaluation of production data, as well as to account operations, occurring in agricultural enterprises.The calculations using electronic data processing are carried out with the known examples, taken from the field of activities of crops growing.

This module will enable students to consolidate the knowledge, gained by formation of skills and professional competences at the job training and professional practice.

Learning outcomes:

LO1 To know basic factors of cereals production;

LO2 To master technologies for preplant soil treatment for crops growing;

LO3 To apply grain crops seeding technologies;

LO4 To use technology of cultivation of crops in the region in order to obtain high and stable harvests;

LO5 To master technologies for crops storing and protecting;

LO6 To represent marketing as the company management, focused on the optimal marketing organization

Module content

1. To know the basic factors of small grain crops production

Natural and climatic conditions of the region. Factors, affecting the placement of the farm.

The ecological balance and environmental problems of the region, taking into account the location of the production facilities. Biogeochemical cycles: carbon cycle, nitrogen cycle, the cycle of sulfur, phosphorus cycle. Factors, influencing the formation of soils in the region. The mechanical composition, soil structure and types. Terms of soil fertility conservation and increase of tillable land returns.

Brief description of the small grain crops of region on the basis of morphological, chemical composition, vegetation season. Place in the rotation of crops. Schemes of recommended crop rotation. Fertilizer system in crop rotation.

The Convention on Biological Diversity (CBD). Biodiversity of natural ecosystems, agro-ecosystems, the microbial world. The main trends of the biological diversity change and causes of exhaustion. Priorities and measures of protection of biological and landscape diversity in the region.

Land resources as the main factor of production. Human resources. The main and working capital. Factors, affecting the efficiency of small grain crops production. The grain market in the region: objectives, features, problems and ways of their solutions.

2. To know the secondary tillage for crop cultivation

Soil structure and fertility of soils, substrates, requirements to the small grain crops. The secondary tillage for crops seeding.Agro-technical requirements for pre-seeding treatment and prepared soil: types of bursting, harrowing, quality indicators etc. Tillage machines and units. The general configuration oftractorsand classification of tractors. Tractor control techniques, basics of the internal combustion engine operation, a crank mechanism, block and cylinder head, distributing gear, engine power system, regulators. Engine lubrication system, engine cooling system, motor starters, clutch and gearbox, rear axle and tractor management mechanism, tractor undercarriage, hydraulic lift-up system and other equipment, technical maintenance of tractors. Major repairs of machinery and equipment, general information about the repair. Machinery maintenance rules. Occupational safety and fire safety when working on tractors and cars.

3. To use technologies for small grain crops seeding

Types and varieties of crops, germination, stages of development, metabolism, gestation period, maturity, the comparison between varieties. Technology and equipment for crops planting. Agro-technical and technological requirements for the planting of crops, usingthe technology of cultivation. Terms of quality planting of crops. The organization of work and the selection of seeding units, based on theterms of application, arrangement of working bodies, such as seeding machines, type of traction, the way of seeds movement and the ways to connect with the tractor.Marking of seeding units. General principal device. Principle of operation. The main assembly units. Technological adjustment.

The advantage of modern seeding machines and units for crops seeding in comparison with those used on farms.

Tractor control techniques, basis of the internal combustion engine operation, a crank mechanism, block and cylinder head, distributing gear, engine power system, regulators. Engine lubrication system, engine cooling system, motor starters, clutch and gearbox, rear axle and tractor management mechanism, tractor undercarriage, hydraulic lift-up system and other equipment. Machinery maintenance rules. Prophylactic change of wearing parts, plans to carry out lubrication works, assessment of the costs associated with machine failure during the in-season period. Planning of maintenance works conduction at the plant. Occupational and fire safety when working with agricultural machinery.

4. To use technology of crops cultivation in the region in order to obtain high and stable harvests

Biological features of nutrition and agricultural machinery for region crops cultivation.Soil examination in the field on the morphological characteristics: soil structure (the identification of genetic horizons), soil depth and its individual horizons, coloring, moisture, texture, structure, composition, new formations and insertions. Fertilizers and their rational use. Determination of the balance of nutrients in the soil. Determination of optimum doses of fertilizers. Mineral and organic fertilizers; Green manure.The role of the separate elements of mineral nutrition for crops. Determination of the cost-effectiveness of the developed fertilizer application system. Fertilizer application technologies and equipment. Chemical reclamation of soils. Farming equipment for the chemical protection of plants. Biogeochemical cycles. Terms of the rational use of fertilizers. Terms and methods of application. Seeding machines. Harvesting technology and grain harvesting equipment: the direct and separate combining. Machines for post-harvest processing of grain. Safety measures when working with machinery and equipment.

5. To know the crops storage and protection technologies

The requirements for warehouses and granaries: technical, technological, operational and economic. Accommodation and storage modes of grain. Methods of grain storing. The requirements for the parameters of grain condition during storage: temperature, humidity, content of impurities, pest infestation and freshness of grain (color and odor). Plan of grain reception and accommodationon warehouses and elevator silos. Physical, chemical and biological processes. Organization of control over the state of the grain. The fight with pest of grain during storage: chemical treatment, cooling with cooling machines, chemical disinfection of grain, gas disinfection (fumigation). Stock appreciation. Documentation management: Legal regulation. Occupational health and safety at work when working with machinery during grain storage.

6. To understand marketing as the company management, focused on the optimal marketing organization

Market research, target groups. Marketing aim and objectives. Marketing conceptions. Combining the tools of marketing policy: pricing policy, communication policy, policy in the field of marketing. Legal conditions. The links of the trade chain. Sales tools: advertising, product sales and distribution channels, pricing and determination of the content of the contract form, clearance of goods, customer service. The communication model as the basis of a conversation with the buyer: the construction and the course of the conversation, the ability to behave in specific situations, the impact on the individual sales success. The basic principle of sales ethics: to convince, not to persuade.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student will:	**Assessment criteria A student should:**
LO1 Know the basic factors of cereals production;	1.1 Justify the conditions of enterprise functioning, taking into account the geographical location and economic conditions of the region; 1.2 Observe, record, log and analyze the weather patterns in the region; 1.3 Work with the data of metrological services in the region; 1.4 Explain the environmental factors, ecological balance, biogeochemical cycles, the importance of conservation of biological and landscape diversity; 1.5 Know and take into account the normative legal acts, the rules, relating to the conservation of biological and landscape diversity; 1.6 Explain the main factors for the production of grain farming; 1.7 Identify the main economic conditions of the location of various crops; 1.8 Describe the need for crop rotation; 1.9 Prepare proposals for the farming activities, that take into account environmental factors, the principles of crop rotation and the market situation; 1.10 Observe the rules of occupational health and safety.
LO2 Master the technologies for preplant soil treatment for crops growing;	2.1 Know the characteristics and classification of soil types, substrates, crops requirements; 2.2 Use professional tools and reference books to determine the type of soil; 2.3 Analyze samples and explain the formation of the soil structure in their region; 2.4 Explain the need for soil treatment in accordance with the requirements of crops and soil properties; 2.5 Select equipment for the flat and deep tillage,accordfing to the stages of work; 2.6 Explain the structure and operation of the basic mechanisms and the internal combustion engine systems, designation of details, processing materials; 2.7 Identify the main components of driving chassis; 2.8 Perform disassembly and assembly of the crank mechanism, the mechanism of gas-distribution, adjusting of gas-distribution and decompression mechanisms, check of atomizer state; 2.9 Substantiate the maintenance and repair of tillage machinery; 2.10 Conduct work on soil treatment with the appropriate equipment, taking into account the safety measures and traffic regulations; 2.11 Describe the possibilities of rational use of energy and material resources; 2.12 Know the general arrangement, the operation principle of electrical cultivating equipment;

LO2 Master the technologies for preplant soil treatment for crops growing;	2.13 Know about the rules of preparation and operation, maintenance and repair, the rules of checking the technical condition of electrical tillage equipment; 2.14 Provide measures to protect materials and tools against corrosion; 2.15 Know the traffic rules and regulations for the prevention of accidents; 2.16 List the major manufacturers of tillage equipment, to assess their products; 2.17 Understand and perform calculations of efficiency and effectiveness of tillage machinery; 2.18 Compare the calculations of economic effectiveness oftillage equipment from different manufacturers; 2.19 Comply with safety regulations and industrial sanitation, electrical and fire safety.
LO3 Use technology for crops seeding	3.1 Know the morphological structure of grain crops; 3.2 Describe the characteristics of the various organs of grain crops andcompare them; 3.3 Explain the process of germination and periods of the life processes of plants; 3.4 Explain the metabolic processes; 3.5 Explain the phase of crops ripening; 3.6 Carry out experiments and research of germination processes of different types of crops; 3.7 Prepare the findings of experimental activities; 3.8 Know the classification of grains by reproduction types; 3.9 Receive the information about different seed producers to evaluate the proposal; 3.10 Substantiate the decisions about the selection of seeds, taking into account the quantitative and qualitative evaluation criteria; 3.11 Explain the operation principle of seeding units (seed drill); 3.12 Be able to design and produce the calculations during the preparation for the planting of crops; 3.13 Know the types of seeding equipment and justify their selection for different types of crops; 3.14 Comply with safety regulations and industrial sanitation, electrical and fire safety during crops seeding.
LO4 Use the technology for crops cultivation in the region, in order to obtain huge and stable harvests	4.1 Conduct research of enterprise soil; 4.2 Determine the amount of nutrients, taking into accountthe growing of cereal species; 4.3 Distinguish between mineral and organic fertilizers; 4.4 Select the types of fertilizers in accordance with the economic criteria, the soil and cereals needs; 4.5 Substantiate the use of environmentally friendly fertilizers; 4.6 Describe the effect of fertilizers on soil, ground water and the atmosphere; 4.7 Be aware of the significance of nitrogen for the growth of various types of grain; 4.8 Analyze the ratio of different fertilizers and carry out quantitative calculations;

LO4 Use the technology for crops cultivation in the region, in order to obtain huge and stable harvests	4.9 Select the types of machines for fertilizer application, according to the accuracy and efficiency; 4.10 Explain the types and timing of fertilizer application; 4.11 Perform calculations of work performance costs; 4.12 Describe the biological, economic, legal and environmental implications of crops growing; 4.13 Prepare a business plan for the company, based on a specific task.
LO5 Know the technologies for crops storage and protection	5.1 Know the regulations and rules for grain storage; 5.2 Apply modern methods and techniques for the cereals storage; 5.3 Develop economic schemes of comparisons to evaluate the different options; 5.4 Explain the technical, technological, operational and economic requirements for the granaries and warehouses; 5.5 Accept, place and store grain in a warehouse, in accordance with the documentation; 5.6 Justify the need to maintain stocks; 5.7 Conduct and compare the results of monitoring the main indicators of the grain state; 5.8 Identify and combat pests during the storage of grain; 5.9 Explain the significance and principles of accounting on the basis of the documentation on warehouse maintenance; 5.10 Analyze and explain the effects of lack of maintenance in stock; 5.11 Carry out safety measures.
LO6 Represent marketing as the company management, focused on the optimal marketing organization	6.1 Have the basic knowledge of marketing tools; 6.2 Study the market and prepare an analysis; 6.3 Identify the most important crops distribution channels; 6.4 Explain the types of documentation and analysis of sales revenues; 6.5 Evaluate the company sales policy, according to the market situation; 6.6 Conduct professional discussions on sales with customers; 6.7 Elaborate marketing support for a particular farm; 6.8 Identify the grain distribution channels; 6.9 Discuss the use of innovative industrial technologies for crops growing; 6.10 Provide professional documentation of the sales revenue.

PM 03-2 Growing root crops

The objective

To obtain comprehensive knowledge on root crops from seeding to harvesting

Introduction to the module

In the module students study and evaluate directly measures and industry technologies ofarea research, plowing and tillage, cultivation, maintenance, harvesting, transportation to the places of storage of crops, as well as delivery to consumers for sale, taking into account regional specialization map on production of root crops. This module covers topics manual mechanized units, mounted and trailed equipment, motor vehicles, tractors and tillage, fertilization, crop protection,

harvesting, transportation and storage of the crop subject to the rules of labor protection and safety measures to prevent accidents.

To create optimal growth conditions it is necessary to obtain knowledge on the basic biological and physiological processes, occurring in plants, on plants and organisms, harmful to them, as well as measures to improve productivity and quality through the application of fertilizers, care and protection of plants, harvesting and storage technologies. Whereby, preservation of crops and the production of healthy and high-quality products, that meet the requirements of the processing industry, are of top priority.

The successful development of the company requires understanding of business processes and relationships in the fields of economics and organization of the company, records of work performed and services rendered, control over the results of operations and production planning. The content of the module includes the main trade-commercial and cost-accounting aspects, understanding of the cost. Only exact calculations allow to understand, that the cost estimates on the use of enterprise funds are critical to achieve success or loss. Accounting, operating calculations, accounting of profitability give basic knowledge and form skills to perform accounting and evaluation of production data, as well as to account operations, occurring in agricultural enterprises.The calculations using electronic data processing are carried out with the known examples, taken from the field of activities of crops growing.

This module will enable students to consolidate the knowledge, gained by formation of skills and professional competences at the job training and professional practice.

Learning outcomes:

LO1 To know the basic factors of root crops production;

LO2 To know the tillage for root crops cultivation;

LO3 To apply planting techniques of root crops;

LO4 To use the technology of growing root crops in the region in order to obtain high and stable harvests;

LO5 To master technologies for storing and protecting crops;

LO6 To represent marketing as the company management, focused on the optimal marketing organization

Module content

1. To know the basic factors of horticultures cultivation

Natural and climatic conditions of the region. Factors, affecting the placement of the farm.

The ecological balance and environmental problems of the region, taking into account the location of the production facilities. Biogeochemical cycles: carbon cycle, nitrogen cycle, the cycle of sulfur, phosphorus cycle. Factors, influencing the formation of soils in the region. The mechanical composition, soil structure and types. Terms of soil fertility conservation and increase of tillable land returns. Brief description of the root crops in morphology of the region, according to the chemical composition, in the growing season.The place in the rotation of root crops. Schemes of recommended crop rotation. Fertilizer system in crop rotation.

The Convention on Biological Diversity (CBD). Biodiversity of natural

ecosystems, agro-ecosystems, the microbial world. The main trends of the biological diversity change and causes of exhaustion. Priorities and measures of protection of biological and landscape diversity in the region.

Land resources as the main factor of production. Human resources. The main and working capital. Factors, affecting the efficiency of the production of root crops.Sales market in the region: objectives, features, problems and ways of their solutions.

2. To know the technologies for root crops cultivation

Soil structure and fertility of soils, substrates, root crops requirements. Soil preparation for seeding. Agro-technical requirements for tillage treatment and prepared soil: types of bursting, harrowing, quality indicators etc. Tillage machines and units. The general arrangement and classification of tractors, plows with coulters, potato-planter. Tractor control techniques, basis of the internal combustion engine operation, a crank mechanism, block and cylinder head, distributing gear, engine power system, regulators. Engine lubrication system, engine cooling system, motor starters, clutch and gearbox, rear axle and tractor management mechanism, tractor undercarriage, hydraulic lift-up system and other equipment, technical maintenance of tractors. Major repairs of machinery and equipment, general information about the repair. Machines and units maintenance rules. Occupational safety and fire safety when working on tractors and cars.

3. To apply technologies for root crops planting

Types and varieties of root crops, germination, stages of development, metabolism, ripening time, the comparison between varieties. Seeding machines and technologies. Agro-technical and technological requirements for planting root crops under the used cultivation technology. Qualitative seeding conditions. The organization of work and the selection of planting units based on application, arrangement of working bodies, such as seeding machines, type of traction, a method moving the tubers, a method of connection to the tractor. Marking of sowing units. General principal device. Principle of operation. The main assembly units. Technological adjustment.

The advantage of modern planting machines and equipment for root crops in comparison with those used on farms.

Tractor control techniques, basis of the internal combustion engine operation, a crank mechanism, block and cylinder head, distributing gear, engine power system, regulators. Engine lubrication system, engine cooling system, motor starters, clutch and gearbox, rear axle and tractor management mechanism, tractor undercarriage, hydraulic lift-up system and other equipment. Machinery maintenance rules. Prophylactic change of wearing parts, plans to carry out lubrication works, assessment of the costs associated with machine failure during the in-season period. Planning of maintenance works conduction at the plant. Occupational and fire safety when working with agricultural machinery.

4. To use technologies for root crop cultivation, in the region in order to get high and stable harvests

Biological features of nutrition and agricultural machinery for root crops cultivation in the region. Soil examination in the field on the morphological

characteristics: soil structure (the identification of genetic horizons), soil depth and its individual horizons, coloring, moisture, texture, structure, composition, new formations and insertions. Fertilizers and their rational use. Determination of the balance of nutrients in the soil. Determination of optimum doses of fertilizers. Mineral and organic fertilizers; Green manure. The role of the separate elements of mineral nutrition. Determination of the cost-effectiveness of the developed fertilizer application system. Fertilizer application technologies and equipment. Chemical reclamation of soils. Farming equipment for the chemical protection of plants. Biogeochemical cycles. Terms of the rational use of fertilizers. Terms and methods of application. Harvesting technology, harvesting machines and units. Safety measures when working with machinery and equipment.

5. To know the technologies for root crops storage and protection

Requirements to places of root crops storage: technical, technological, operational and economic. Accommodation and storage modes. Methods of root crops storage. Requirements for condition status of products in storage: temperature, humidity, pest infestation. Plan of reception and accommodation of on root crops in potato piles. Physical, chemical and biological processes. Organization of control over the state of the roots. Combat with pest of root crops in storage: chemical treatment, cooling with cooling machines, chemical disinfection of grain, gas disinfection (fumigation). Stock appreciation. Documentation management: Legal regulation. Occupational health and safety at work in the potato.

6. To understand marketing as the company management, focused on the optimal marketing organization

Market research, target groups. Marketing aim and objectives. Marketing conceptions. Combining the tools of marketing policy: pricing policy, communication policy, policy in the field of marketing. Legal conditions. The links of the trade chain. Sales tools: advertising, product sales and distribution channels, pricing and determination of the content of the contract form, clearance of goods, customer service. The communication model as the basis of a conversation with the buyer: the construction and the course of the conversation, the ability to behave in specific situations, the impact on the individual sales success. The basic principle of sales ethics: to convince, not to persuade.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student will:	Assessment criteria A student should:
LO1 Know the basic factors of root crops production;	1.1 Justify the conditions of enterprise functioning, taking into account the geographical location and economic conditions of the region; 1.2 Observe, record, log and analyze the weather patterns in the region; 1.3 Work with the data of metrological services;

LO1 Know the basic factors of root crops production;	1.4 Explain the environmental factors, ecological balance, biogeochemical cycles, the importance of conservation of biological and landscape diversity; 1.5 Know and take into account the normative legal acts, the rules, relating to the conservation of biological and landscape diversity; 1.6 Explain the basic factors of production of root crops for the farm; 1.7 Identify the basic economic conditions of the location of various root crops; 1.8 Describe the need for crop rotation; 1.9 Prepare proposals for the farming activities, that take into account environmental factors, the principles of crop rotation and the market situation; 1.10 Observe the rules of occupational health and safety.
LO2 Know the technology of seedbed preparation for the cultivation of root crops	2.1 Know the characteristics and classification of soil types, substrates, root crops requirements; 2.2 Use professional tools and reference books to determine the type of soil; 2.3 Analyze samples and explain the formation of the soil structure in their region; 2.4 Explain the necessity for soil treatment in accordance with the requirements of root crops and soil properties; 2.5 Select the appropriate agricultural techniques for soil treatment at appropriate stages of the work; 2.6 Explain the structure and operation of the basic mechanisms and the internal combustion engine systems, designation of details, processing materials; 2.7 Identify the main components of driving chassis; 2.8 Perform disassembly and assembly of the crank mechanism, the mechanism of gas-distribution, adjusting of gas-distribution and decompression mechanisms, check of atomizer state; 2.9 Substantiate the maintenance and repair of tillage machinery; 2.10 Conduct work on soil treatment with the appropriate equipment, taking into account the safety measures and traffic regulations; 2.11 Describe the possibilities of rational use of energy and material resources; 2.12 Know the general arrangement, the principle of electrical tillage equipment operation; 2.13 Know about the rules of preparation and operation, maintenance and repair, the rules of checking the technical condition of electrical tillage equipment; 2.14 Provide protective measures against corrosion of materials and tools; 2.15 Know the traffic rules and regulations for the prevention of accidents; 2.16 List the major manufacturers of tillage equipment, to assess their products; 2.17 Understand and perform calculations of efficiency and effectiveness of tillage machinery; 2.18 Compare the calculation of economic efficiency of tillage equipment from different manufacturers; 2.19 Comply with safety regulations and industrial sanitation, electrical and fire safety.

LO3 Apply root crops planting techniques	3.1 Know the morphological structure of root crops; 3.2 Describe the organs characteristics of root and tuber crops and compare them; 3.3 Explain the process of germination and periods of life processes; 3.4 Explain biological characteristics; 3.5 Understand the phase of maturity; 3.6 Carry out experiments and research of germination processes of different types of roots and tubers; 3.7 Prepare the findings of experimental activities; 3.8 Know the classification of root crops for consumer purposes and ripening times; 3.9 Get information about various producers of planting material for the evaluation of the proposal; 3.10 Make a decision about the choice, taking into account the quantitative and qualitative assessment criteria; 3.11 Explain the operation principle of seeding units (potato); 3.12 Be able to design and produce the calculations during the preparation for root crops planting; 3.13 Know the types of seeding equipment and justify their selection for different kinds of tuber and root crops; 3.14 Comply with safety regulations and industrial sanitation, electrical and fire safety at root crops planting.
LO4 Use the technology of growing root crops in the region in order to obtain high and stable harvests;	4.1 Conduct farm soil research; 4.2 Determine the amount of nutrients, taking into account the type of cultivation of root crops; 4.3 Distinguish between mineral and organic fertilizers; 4.4 Select the types of fertilizers in accordance with the economic criteria, the needs of soil and root crops; 4.5 Substantiate the use of environmentally friendly fertilizers; 4.6 Describe the effect of fertilizers on soil, ground water and the atmosphere; 4.7 Know the about the importance of nitrogen and potash fertilizers, for growth; 4.8 Analyze the ratio of different fertilizers and carry out quantitative calculations; 4.9 Select the types of machines for fertilizer application, according to the accuracy and efficiency; 4.10 Discuss and agree on the types and timing of fertilizer application; 4.11 Perform calculations work performance costs; 4.12 Describe the biological, economic, legal and environmental implications of grain growing; 4.13 Prepare a business plan for the company, based on a specific task.

LO5 Master technologies for crops storing and protecting;	5.1 Know the regulations and rules of root crops storage; 5.2 Study the modern methods and techniques for the storage of small grain crops; 5.3 Elaborate economic comparison circuit to evaluate the different options; 5.4 Explain the technical, technological, operational and economic requirements for potato warehouses and storing bunkers; 5.5 Take, place and store the harvest in a warehouse in accordance with the documentation; 5.6 Substantiate the need for maintaining the conservation of stocks; 5.7 Conduct and compare the results of monitoring of the main indicators of the root crops state; 5.8 Identify and combat pests during storage period; 5.9 Explain the significance and principles of accounting based on documentation of potato warehouse maintenance; 5.10 Analyze and explain the effects of lack of maintenance; 5.11 Carry out safety measures.
RO6 Represent marketing as the company management, focused on the optimal marketing organization	6.1 Have the basic knowledge of marketing tools; 6.2 Study the market and prepare an analysis; 6.3 Identify the most important sales channels for root crops; 6.4 Track customer preferences; 6.5 Explain the types of documentation and analysis of sales revenues; 6.6 Assess the farm sales policy, according to the situation on the market; 6.7 Conduct professional discussions on sales with customers; 6.8 Elaborate marketing support for a particular farm; 6.9 Determine the product distribution channels; 6.10 Discuss the use of innovative industrial technologies for root crops growing; 6.11 Provide professional documentation of the sales revenue; 6.12 Prepare proposals for the sale of new products.

PM 03-3 Growing fruit and vegetable crops

The objective

To obtain comprehensive knowledge about horticultural crops from seeding to harvesting

Introduction to the module

In the module students study and evaluate directly measures and industry technologies ofarea research, plowing and tillage, cultivation, maintenance, harvesting, transportation to the places of storage of crops, as well as delivery to consumers for sale, taking into account regional specialization map on production of horticultural crops. This module covers topics manual mechanized units, mounted and trailed equipment, motor vehicles, tractors and tillage, fertilization, crop protection, harvesting, transportation and storage of the crop subject to the rules of labor protection and safety measures to prevent accidents.

To create optimal growth conditions it is necessary to obtain knowledge on the basic biological and physiological processes, occurring in plants, on plants and organisms, harmful to them, as well as measures to improve productivity and quality

through the application of fertilizers, care and protection of plants, harvesting and storage technologies. Whereby, preservation of crops and the production of healthy and high-quality products, that meet the requirements of the processing industry, are of top priority.

The successful development of the company requires understanding of business processes and relationships in the fields of economics and organization of the company, records of work performed and services rendered, control over the results of operations and production planning. The content of the module includes the main trade-commercial and cost-accounting aspects, understanding of the cost. Only exact calculations allow to understand, that the cost estimates on the use of enterprise funds are critical to achieve success or loss. Accounting, operating calculations, accounting of profitability give basic knowledge and form skills to perform accounting and evaluation of production data, as well as to account operations, occurring in agricultural enterprises. The calculations using electronic data processing are carried out with the known examples, taken from the field of activities of crops growing.

This module will enable students to consolidate the knowledge, gained by formation of skills and professional competences at the job training and professional practice.

Learning outcomes:

LO1 To know the basic factors of horticultural crops production;

LO2 To master technologies for preplant soil treatment for horticultural crops growing**;**

LO3 To apply horticultural crops seeding technologies;

LO4 To use technology of cultivation of horticultural crops in the region in order to obtain high and stable harvests;

LO5 To master technologies for storing and protecting horticultural crops

LO6 To represent marketing as the company management, focused on the optimal marketing organization

1. To know the basic factors of horticultural crops production

The significance of fruits and vegetables in the diet. Natural and climatic conditions for the growth and development of horticultural crops in the region. Factors, affecting the placement of the farm.

The ecological balance and environmental problems of the region, taking into account the location of the production facilities. Biogeochemical cycles: carbon cycle, nitrogen cycle, the cycle of sulfur, phosphorus cycle. Factors, influencing the formation of soils in the region. The mechanical composition, soil structure and types. Terms of soil fertility conservation and increase of tillable land returns. Regional analysis of a typical production of horticultural crops. Classification and characterization of types of fruits: pomeceous, drupaceous, berries, subtropical, tropical, nut and vegetable crops: vegetative and generative.

The place in the rotation of root crops. Schemes of recommended crop rotation. Fertilizer system in crop rotation.

The Convention on Biological Diversity (CBD). Biodiversity of natural ecosystems, agro-ecosystems, the microbial world. The main trends of the biological diversity change and causes of exhaustion. Priorities and measures of protection of

biological and landscape diversity in the region.

Land resources as the main factor of production. Human resources. The main and working capital. Factors, affecting the efficiency of the production of horticultural crops.Sales market in the region: objectives, features, problems and ways of their solutions.

2. To know the tillage for horticultural crops cultivation

Soil structure and fertility of soils, substrates, horticultural crops requirements. Soil moisture and air zones and types of irrigation in the region. Soil preparation for seeding. Agro-technical requirements for pre-seeding tillage and prepared soil: surface tillage, further processing and preparation for seeding. Elements of tillage equipment and their functions: the structural elements of a plow, cultivator, harrow. Tractor control techniques, purpose, structure and principle of operation of the internal combustion engine with forced (spark) ignition of the working mixture, a crank mechanism, block and cylinder head, timing, engine power system, regulators. Purpose of lubricants. Regulations standards for motor oil: viscosity class, quality classification, winter and summer types of oils used in the economy. Engine lubrication system, engine cooling system, motor starters, clutch and gearbox, rear axle and tractor management mechanism, tractor undercarriage, hydraulic lift-up system and other equipment, technical maintenance of tractors. Major repairs of machinery and equipment, general information about the repair. Machines and units maintenance rules. Occupational safety and fire safety when working on tractors and cars.

3. To apply the technologies for horticultural crops planting

Types and varieties of horticultural crops, germination, stages of development, metabolism, ripening time, the comparison between varieties. Seeding machines and technologies. Agro-technical and technological requirements for the planting of fruit and vegetables (protected and open field) with the seeding and planting technology used, as well as equipment for seeding: broadcast applications, ordinary seeding, dotted seeding, planting, mechanical means, pneumatic means, vegetable crops planting machinery. The structural parts of seeders and their functions: seed box, drive and a distributor of seed, compression and smoothing. The structural parts of the equipment for the seeding works. Total configuration and manufacturing process of combined drills, adjustment of the seeding rate.

Qualitative seeding conditions. The organization of work and the selection of seeding units, subject to the conditions of application, arrangement of working bodies, such as seeding machines, type of traction, movement of planting material and seeds, ways to connect with the tractor. Marking of sowing units. General PrincipalDevice. Principle of operation. Themainassemblyunits. Technologicaladjustment.

The advantage of modern planting machines and units for fruit and vegetables compared with those used on farms.

Tractor control techniques, basis of the internal combustion engine operation, a crank mechanism, block and cylinder head, distributing gear, engine power system, regulators. Engine lubrication system, engine cooling system, motor starters, clutch and gearbox, rear axle and tractor management mechanism, tractor undercarriage, hydraulic lift-up system and other equipment. Machinery maintenance rules. Prophylactic change of wearing parts plans to carry out lubrication works,

assessment of the costs associated with machine failure during the in-season period. Planning of maintenance services. Occupational and fire safety when working with agricultural machinery.

4. To use technologies of horticultural crops cultivation on the region, in order to obtain high and stable harvest

Biological features of nutrition and agricultural machinery for horticultural crops cultivation in protected and open field. Soil examination in the field on the morphological characteristics: soil structure (the identification of genetic horizons), soil depth and its individual horizons, coloring, moisture, texture, structure, composition, new formations and insertions. Determination of the balance of nutrients in the soil. Fertilizers and their rational use. Determination of optimum doses of fertilizers. Mineral and organic fertilizers; Natural green fertilizers: the rules for selection of green manure crop cultures and ways of their incorporation into the soil.

The role of the separate elements of mineral nutrition. Determination of the cost-effectiveness of the developed fertilizer application system. Technologies and equipment for application of fertilizers: organic, mineral; application of mineral fertilizers, liquid fertilizers, solid manure, liquid manure; the exact number spreader, spreader, disc spreader; solid manure spreader, a machine for making liquid fertilizer. The structural elements of machines, equipment and their functions: the structural elements of cars for mineral fertilizers; the structural elements of the machine for liquid fertilizer application; the structural elements of solid manure spreader; the structural elements of the machine for making liquid fertilizer.

Chemical reclamation of soils. Technologies and equipment for holding plants protection events by: application method (injection, spraying, dusting, aerosol spraying, and so on.); stage of development (soil treatment, seed treatment, grass treatment, etc.); prevention or treatment by the principle of harmfulness threshold. The structuralelements of the equipment to carry out protective measures and their functions: the structural elements of the treater; the structural elements of the sprayer pump systems; types of sprayers. Biogeochemical cycles. Terms and methods of fertilizer application.

Technology of harvesting and harvesting equipment: direct combining technology, separate combining harvesting; harvesting process chain, and professional division of work; special equipment (potato harvesters, harvesters of sugar beet).

The structuralelements of harvesting equipment and their function: the structural elements of the combine; the structural parts of other harvesting equipment. Harvesting technology, harvesting machines and units. Safety measures when working with machinery and equipment.

5. To know the technologies for horticultural crops storage and protection

Horticultural crops storing organization. Requirements for storage places: technical, technological, operational and economic. Accommodation and storage modes. Storage modes: storage in piles, the location of air ducts. Container storage, cooling circuit, the advantages and disadvantages of the storage container. Storage of fruits, table of fruit storage modes.

Requirements for condition status of products in storage: temperature, humidity, pest infestation. Plan of reception of horticultural crops in stores and warehouses.

Fruit storage technology: the effect of ethylene, carbon dioxide, oxygen, biochemical processes, taking place inside the fruit. Additional fruit surface treatment by compositions, preventing decay, sprouting, the evaporation of moisture, but leads to a loss of identity, and the nutritional value of the fruit: treatment with formaldehyde, chlorine water, sulfur dioxide, ozonation, waxing, waxes irrigation, impact on the vegetables and fruits by ultraviolet light. Requirements for premises for piles storage and container storage.

Organization of control over the state of the horticultural crops. Stock appreciation. Documentation management. Legal regulation. Occupational health and safety at work in storages and warehouses.

6. To understand marketing as the company management, focused on the optimal marketing organization

Market research, target groups. Marketing aim and objectives. Marketing conceptions. Combining the tools of marketing policy: pricing policy, communication policy, policy in the field of marketing. Legal conditions. The links of the trade chain. Sales tools: advertising, product sales and distribution channels, pricing and determination of the content of the contract form, clearance of goods, customer service. The communication model as the basis of a conversation with the buyer: the construction and the course of the conversation, the ability to behave in specific situations, the impact on the individual sales success. The basic principle of sales ethics: to convince, not to persuade.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student will:	Assessment criteria A student should:
LO1 Know the basic factors of horticultural crops production	1.1 Justify the conditions of enterprise functioning, taking into account the geographical location and economic conditions of the region; 1.2 Observe, record, log and analyze the weather patterns in the region; 1.3 Work with the data of metrological services; 1.4 Explain the environmental factors, ecological balance, biogeochemical cycles, the importance of conservation of biological and landscape diversity; 1.5 Know and take into account the normative legal acts, the rules, relating to the conservation of biological and landscape diversity; 1.6 Explain the basic factors of horticultural crops production for the farm; 1.7 Identify the basic economic conditions of the location of different horticultural crops; 1.8 Describe the need for crop rotation; 1.9 Prepare proposals for the farming activities, that take into account environmental factors, the principles of crop rotation and the market situation; 1.10 Observe the rules of occupational health and safety.

LO2 Know the preplant tillage for cultivation of horticultural crops	2.1 Know the characteristics and classification of soil types, substrates, root crops requirements; 2.2 Use professional tools and reference books to determine the type of soil; 2.3 Analyze samples and explain the formation of the soil structure in their region; 2.4 Explain the necessity for soil treatment in accordance with the requirements of root crops and soil properties; 2.5 Select an effective agricultural techniques for soil treatment at appropriate stages of the work; 2.6 Explain the structure and operation of the basic mechanisms and the internal combustion engine systems, designation of details, processing materials; 2.7 Identify the main components of driving chassis; 2.8 Carry out disassembly and assembly of crank rod mechanism, gas-distribution mechanism, adjustment of gas-distributionand decompression mechanisms, check the nozzle state; 2.9 Substantiate the maintenance and repair of tillage machinery; 2.10 Conduct work on soil treatment with the appropriate equipment, taking into account the safety measures and traffic regulations; 2.11 Describe the possibilities of rational use of energy and material resources; 2.12 To know the general arrangement, the principle of electrical tillage equipment operation; 2.13 Know about the rules of preparation and operation, maintenance and repair, the rules of checking the technical condition of electrical tillage equipment; 2.14 Provide protective measures against corrosion of materials and tools; 2.15 Know the traffic rules and regulations for the prevention of accidents; 2.16 List the major manufacturers of tillage equipment, to assess their products; 2.17 Understand and perform calculations of efficiency and effectiveness of tillage machinery; 2.18 Compare the calculation of economic efficiency of tillage equipment from different manufacturers; 2.19 Comply with safety regulations and industrial sanitation, electrical and fire safety.
LO4 Use the technology of growing fruit and vegetables in the region, in order to obtain high and stable harvests	3.1 Know the biological characteristics of the structure of fruit and vegetable crops; 3.2 Describe the characteristic of organs of horticultural crops and compare them; 3.3 Explain the process of germination and periods of life processes; 3.4 Explain biological characteristics; 3.5 Understand the phase of maturity; 3.6 Carry out experiments and research of germination processes of different types of fruit and vegetables; 3.7 Prepare the findings of experimental activities;

LO4 Use the technology of growing fruit and vegetables in the region, in order to obtain high and stable harvests	3.8 Know the classification of horticultural crops for consumer purpose and ripening times; 3.9 Get information about various producers of planting material for the evaluation of the proposal; 3.10 Make a decision about the choice, taking into account the quantitative and qualitative assessment criteria; 3.11 Explain the operation principle of seeding units; 3.12 Be able to design and produce the calculations in the process of preparation of horticultural crops for planting; 3.13 Know the types of seeding equipment and justify their selection for different types of planting material; 3.14 Comply with safety regulations and industrial sanitation, electrical and fire safety at planting of horticultural crops.
LO4 Use the technology of horticultural crops cultivation in the region, in order to obtain high and stable harvests	4.1 To conduct farm soil research; 4.2 Determine the amount of nutrients, taking into account the type of cultivation of root crops; 4.3 Distinguish between mineral and organic fertilizers; 4.4 Select the types of fertilizers in accordance with the economic criteria, the needs of the soil and horticultural crops; 4.5 Justify the use of environmentally friendly (green) fertilizers; 4.6 Describe the effect of fertilizers on soil, ground water and the atmosphere; 4.7 Know about the importance of nitrogen and potash fertilizers, for growth; 4.8 Analyze the ratio of different fertilizers and carry out quantitative calculations; 4.9 Select the types of machines for fertilizer application, according to the accuracy and efficiency; 4.10 Explain the types and timing of fertilizer application; 4.11 Perform calculations of work performance costs; 4.12 Describe the biological, economic, legal and environmental implications of horticultural crops cultivation; 4.13 Prepare a business plan for the company, based on a specific task.
LO5 Know the technology for horticultural crops storage and protection	5.1 Know the regulations and rules for horticultural crops storage; 5.2 Study the modern methods and ways to store crops; 5.3 Elaborate economic comparison circuit to evaluate the different options; 5.4 Explain the technical, technological, operational and economic requirements for the storages and warehouses; 5.5 Take, place and store the harvest in a warehouse in accordance with the documentation; 5.6 Substantiate the need for maintaining the conservation of stocks; 5.7 Conduct and compare the results of monitoring of fruit and vegetables key indicators; 5.8 Identify and combat pests during storage period; 5.9 Explain the significance and principles of accounting based on documentation of storage and warehouse maintenance; 5.10 Analyze and explain the effects of lack of maintenance; 5.11 Carry out safety measures.

LO6 Represent marketing as the company management, focused on the optimal marketing organization	6.1 Have a basic knowledge of marketing tools; 6.2 Study the market and prepare an analysis; 6.3 Identify the most important sales channels for fruit and vegetables; 6.4 Track customer preferences; 6.5 Explain the types of documentation and analysis of sales revenues; 6.6 Assess the farm sales policy, according to the situation on the market; 6.7 Conduct professional discussions on sales with customers; 6.8 Elaborate marketing support for a particular farm; 6.9 Determine the product distribution channels; 6.10 Discuss the use of innovative industrial technologies for fruit and vegetables growing; 6.11 Provide professional documentation of sales revenue; 6.12 Prepare proposals for the sale of new products.

PM 0.3-4 Cultivation of forage grasses and rationale use of pastures

The objective

To obtain complex knowledge about the cultivation of forage grasses and rational use of pastures.

Introduction to the module

In the module students study and evaluate directly measures and industry technologies of area research, plowing and tillage, cultivation, maintenance, harvesting, transportation to the places of storage of crops, as well as delivery to consumers for sale, taking into account regional specialization map on production of root crops. This module covers topics manual mechanized units, mounted and trailed equipment, motor vehicles, tractors and tillage, fertilization, crop protection, harvesting, transportation and storage of the crop subject to the rules of labor protection and safety measures to prevent accidents.

To create optimal growth conditions it is necessary to obtain knowledge on the basic biological and physiological processes, occurring in plants, on plants and organisms, harmful to them, as well as measures to improve productivity and quality through the application of fertilizers, care and protection of plants, harvesting and storage technologies. Whereby, preservation of crops and the production of healthy and high-quality products, that meet the requirements of the processing industry, are of top priority.

The successful development of the company requires understanding of business processes and relationships in the fields of economics and organization of the company, records of work performed and services rendered, control over the results of operations and production planning. The content of the module includes the main trade-commercial and cost-accounting aspects, understanding of the cost. Only exact calculations allow to understand, that the cost estimates on the use of enterprise funds are critical to achieve success or loss. Accounting, operating calculations, accounting of profitability give basic knowledge and form skills to perform accounting and evaluation of production data, as well as to account operations, occurring in agricultural enterprises. Calculations, using electronic data

processing, use known examples, taken from the field of activity for fodder plants growing.

This module will enable students to consolidate the knowledge, gained by formation of skills and professional competences at the job training and professional practice.

Learning outcomes:

LO1 To know the basics of the arable fodder cropping;

LO2 To know technologies of fodder plants seeding;

LO3 To master methods of improving rangelands, taking into account the regional context;

LO4 To use the technologies of rangelands management and production storage

LO5 To understand the role of marketing in the organization of feed products sales.

Module content

1. To know the basics of arable fodder cropping

Classification, inventory and certification of natural forage lands. Phytocoenosis of vegetation of hayfields and pastures, internal and external reasons for the change. The system of measures the surface and radical improvement of natural forage lands.

The main plants of hayfields and pastures. Factors of location: water regime, climatic conditions, the soil and the level of location. Brief description of the meadow, perennial legume, annual grasses on the basis of morphological, chemical composition, growing season. Comparative productivity and feeding value of grass. Place in the farming rotation. Schemes of recommended crop rotation. Fertilizer system in crop rotation. Terms of soil fertility conservation and increase of tillable land returns.

The Convention on Biological Diversity (CBD). Biodiversity of natural ecosystems, agro-ecosystems, the microbial world. The main trends of the biological diversity change and causes of exhaustion. Priorities and measures of protection of biological and landscape diversity in the region.

2. To know technologies of fodder plants seeding

Direction and intensity of pastures use. Green fodder.

Factors, affecting the nutritional value of forage grasses and pastures. Main harmful plants. Determination of pastures productivity.

Tillage and its features by the methods, timing, agricultural units and machines. The order of operations.

Forage crop growing: varieties, seeds, selection of herbage mixtures. Special features of selection: the viability of the species, competitive activity of species, susceptibility to intense cultivation factors, flexibility of species, suitability for the intended purpose (grazing, mowing). Calculation of herbage mixtures. Careof crops: place in the rotation, the need for water and fertilizer. Performance comparison.

Farming equipment for forage plants cultivation in the region.Machinery maintenance rules. Prophylactic change of wearing parts, plans to carry out lubrication works, assessment of the costs associated with machine failure during the in-season period. Planning of maintenance works conduction at the plant. Occupational and fire safety when working with agricultural machinery.

3. To master the methods of rangelands improvement, taking into account the regional context

The structure of the region's soil. Biological features of nutrition and nutrient balance analysis. Methods to improve the natural grasslands and pastures: fencing or portional grazing, mowing in different phases of plant development, improvement of plant formation.Determination of the cost-effectiveness of the developed fertilizer application system.

The surface and radical improvement of pastures. Current care of pasture system. The mowing of uneaten leftovers. Fertilizing: cost-effectiveness of fertilization rates application system, methods of calculating the optimum fertilizer rates, based on agrochemical service data. Leveling of animal excrement. Leveling of molehills, bumps; weed control; plowing pennages with poor herbage followed by reseeding. The accumulation of moisture in the soil by snow retention, slotting, leaving uncut strips or high stubble field; complementary seeding; alternation of grazing with rest or mowing; repair of fences, cattle camps equipment etc.

National legal regulation of grazing, the law of RK "Concerning pastures". Implementation of Kazakhstan's model of sustainable pasture management in the region. Meaning of GIZ regional program for the sustainable use of natural resources in Kazakhstan.

Occupational safety and environmental protection when working with organic, mineral and chemical fertilizers.

4. To use the technologies of rangelands management and production storage

Multi-level pasture management through public-private partnerships. Recommendations for harvesting. Mowing grass in the pasture after the two etching. Pests: moles, mice, larvae of crane fly. Measures to combat pests. The relationship between the period of stay of cut grass on the field and the loss of dry matter. The relationship between the quality of silage and dry matter, energy and protein losses. Causes of decline in the quality of forages and methods of their evaluation. Health surveillance. Selection and laboratory testing of samples, comparison with State standards for different feedstuffs. Terms of storage of roughage feed from damage and loss of nutrients, feeder grains, animal feed, mealy feed, cattle cake and protein meal. Outdoor storage of grain raw materials. Storage equipment. Stock appreciation. Documentation management. Legal regulation. Veterinary (veterinary and sanitary) requirements for the organization of production, storage and sale of veterinary drugs, feed and feed additives (Order of the Minister of Agriculture of the Republic of Kazakhstan № 7-1 / 848 dated September 23, 2015.)

Occupational health and safety when working with lures mechanisms.

5. To understand the role of marketing in the organization of feed products sales

Market research, target groups. Marketing aim and objectives. Marketing conceptions. Combining the tools of marketing policy: pricing policy, communication policy, policy in the field of marketing. Legal conditions. The links of the trade chain. Sales tools: advertising, product sales and distribution channels, pricing and determination of the content of the contract form, clearance of goods, customer service. The communication model as the basis of a conversation with the buyer:

the construction and the course of the conversation, the ability to behave in specific situations, the impact on the individual sales success. The basic principle of sales ethics: to convince, not to persuade.

Learning outcomes and assessment criteria

Learning outcomes After successful completion of this module, the student will:	Assessment criteria A student should:
LO1. Know the basics of arable fodder cropping	1.1 Work with the data of metrological services in the region; 1.2 Know the classification of fodder plants; 1.3 Know the botanical differences of meadow, perennial legumes and annual grasses; 1.4 Explain the environmental factors, ecological balance, biogeochemical cycles, the importance of conservation of biological and landscape diversity; 1.5 Know and take into account the normative legal acts, the rules, relating to the conservation of biological and landscape diversity; 1.6 Explain the basic factors of production of forage grasses for farming; 1.7 Describe the need for crop rotation; 1.8 Prepare proposals for the rational use of pastures, taking into account environmental factors, the principles of crop rotation and the market situation; 1.9 Prepare an analysis of farm meadows ecosystem; observe safety regulations and industrial hygiene.
LO2. Know the technologies of fodder plants seeding	2.1 Know the characteristics of herbage mixtures planting; 2.2 Explain the relationship between the duration and intensity of hayfields and pastures use, between quality and quantity of meadow mowing; 2.3 Explain the process of germination and periods of life processes of fodder plants; 2.4 Carry out experiments and research of germination processes of different types of herbage mixtures; 2.5 Prepare the findings of experimental activities; 2.6 Make a decision about the selection of herbage mixtures, based on quantitative and qualitative evaluation criteria; 2.7 Explain the operation principle of tillage and seeding units and justify their selection for the economy; 2.8 Observe safety regulations and industrial sanitation, electrical and fire safety at fodder plants planting.
LO3. Master the methods of rangelands improvement, taking into account the regional context	3.1 Carry out the study of soil management; 3.2 Determine the nutrient intake of pasture plants; 3.3 Distinguish between mineral and organic fertilizers; 3.4 Select the types of fertilizers in accordance with the economic criteria, the needs of soil and forage grasses; 3.5 Substantiate the use of environmentally friendly fertilizers; 3.6 Describe the effect of fertilizers on soil, ground water and the atmosphere;

LO3. Master the methods of rangelands improvement, taking into account the regional context	3.7 Analyze the ratio of different fertilizers and carry out quantitative calculations; 3.8 Select the types of machines for fertilizer application, according to the accuracy and efficiency; 3.9 Explain the types and timing of fertilizer application; 3.10 Perform calculations of work performance costs; 3.11 Describe the biological, economic, legal and environmental implications of forage grasses growing; 3.12 Prepare a business plan for the territory of pastures based on the study of the current state and use.
LO4. Use the technologies of rangelands management and production storage	4.1 Know the regulations and rules for fodder storage; 4.2 Explore the experience of the implementation of Kazakhstan's model of sustainable management of pasture resources; 4.3 Study the modern methods and techniques for the storage of feed; 4.4 Develop economic comparisonschemes to evaluate the different options; 4.5 Analyze the effects of pasture management errors; 4.6 Identify and document the results of pasture production; 4.7 Describe the agronomic, environmental and economic needs, affecting the decision on the methods of feed stocks maintenance; 4.8 Explain the technical, technological, operational and economic requirements for the storage of feed; 4.9 Accept, place and store fodder in the warehouse in accordance with the documentation; 4.10 Apply the physical, chemical and biological processes in the warehouse services; 4.11 Filter fodder samples for laboratory tests; 4.12 Identify and combat pests during storage of feed; 4.13 Justify the need for measures to address the causes of the deterioration of feed; 4.14 Maintain and compare the results of monitoring the main indicators of the fodder state; 4.15 Analyze and explain the consequences of the lack of technical maintenance in a warehouse; 4.16 Explain the significance and principles of accounting, based on documentation of storage maintenance; 4.17 Observe safety rules when working in storage.
LO5. Understand the role of marketing in the organization of feed products sales	5.1 Have a basic knowledge of marketing tools; 5.2 Study the market and prepare an analysis; 5.3 Identify the most important channels of feed distribution; 5.4 Track customer preferences; 5.5 Explain the types of documentation and analysis of sales revenues; 5.6 Evaluate the company sales policy, according to the market situation; 5.7 Conduct professional discussions on sales with customers; 5.8 Elaborate marketing support for a particular farm; 5.9 Identify the feed distribution channels; 5.10 Discuss the use of innovative industrial technologies of fodder plants cultivation; 5.11 Provide professional documentation of the sales revenue; 5.12 Prepare proposals for the sale of new products.

PM04 The use of modern industrial technologies

PM 04.1 Greenhouse production
PM 04.2 Ecological agriculture,
PM 04.3 Energy crops,
PM 04.4 Fodder cultivation, forestry

The objective

To obtain complex knowledge about the application of modern industrial technologies in agriculture.

Introduction to the module

In the module students study and evaluate directly the events and modern industrial technologies used in agriculture of the region.

This module covers topics related to the development of "green" energy in Kazakhstan, the cultivation of horticultural crops using drip irrigation technology, cultivation and utilization of energy crops, tillage, nutrition and protection of plants in compliance with the rules of labor protection and safety measures to prevent accidents.

The successful development of the company requires understanding of the significance and impact of innovative technologies on the efficiency of production processes and their relationships in the fields of economics and organization of the company, record of the work performed and services rendered, control over the results of operations and production planning.

The module content includes calculations, that allow to understand, that the cost estimates on the use of enterprise funds are critical to achieve success or loss. Accounting, operating calculations, accounting of profitability give basic knowledge and form skills to perform accounting and evaluation of production data, as well as to account operations, occurring in agricultural enterprises.Calculations, using electronic data processing, use known examples, taken from the field of activity for fodder plants growing.

This module will enable students to consolidate the knowledge, gained by formation of skills and professional competences at the job training and professional practice.

Learning outcomes:

LO1 To know the technologies for agricultural crops growing in greenhouses;

LO2 To know the basics of ecological agriculture company. To observe environmental requirements in crop production;

LO3 To understand the perspectives of cultivation and utilization of energy crops in Kazakhstan;

LO4 To know the general classification of forage crops, their characteristics, chemical and biological composition of the fodder;

LO5 To master technology of placement, growing of forest ranges for different purposes and care.

Module content

1. To know the technology of agricultural crops cultivation in greenhouses

Greenhouse production, the main trends. Forms and types of greenhouses.

Classification of greenhouses on technical characteristics, cultivation technology,constructive features, structural features, type of fencing. Site preparation. Technology and construction stages of the greenhouse. Protection of greenhouses from wind. Greenhouse equipment. Materials for greenhouses, their advantages and disadvantages. Types of greenhouses heating. Greenhouse effect: causes and consequences, modern methods of problem solving. The ventilation system of the greenhouse. Artificial lighting in greenhouses. The soil and its preparation for the greenhouse. Plant shading. Watering. Factors of hothouse facility efficiency.

Cultivation of vegetables in hydroponic greenhouses. Methods of nutrient feeding, dripwatering. Irrigation systems. Regulation of a microclimate and photosynthesis in hydroponic greenhouses. The technology of vegetables growing: sprouts, cucumbers, tomatoes, peppers, eggplant and others. Protection of plants against pests and diseases in greenhouses. Diseases and pests of plants and measures of their control. Features, benefits and cost-effectiveness of hydroponic cultivation of vegetables in greenhouses. Automated control system of greenhouse farming.

2. To know the basics of ecological agriculture, to comply with environmental requirements in crop growing

The notion of an organic, ecological and biological agriculture. The agrarian ecosystem: biodiversity, biological cycles and soil biological activity. Organic standards: international private, basic operating standards, private standards of ecological production. Certification of organic food. Prospects for the development of organic agriculture in Kazakhstan.

The Standards of Commission of Codex Alimentarius is set of standards adopted by the international community for food products. The development of organic agriculture in Kazakhstan. The draft law "Concerning the production of organic products". Marketing of environmental and regional products. Comparative advantages of Kazakh products. The development of clean agricultural products market.

3. To understand the prospects for energy crops cultivation and use in Kazakhstan

The concept of energy crops. Types of energy crops: corn, sugar beets. Features of energy crops cultivation: osier, poplar, miscanthus. Fuel characteristics of energy crops. The concept of "green" economy in Kazakhstan. Key directions: the introduction of renewable energy sources; organic farming in agriculture, improvement of waste management system, improvement of water resources management system, the development of "green" transport, conservation and effective management of ecosystems. The benefits of "green" economy.

Renewable energy resources. Type of renewable energy source.

4. Know the general classification of forage crops, their characteristics, the chemical and biological composition of fodders

The soil and climatic conditions of the region. Characteristics of fodders. Types of fodders. Classification of fodders. Forage crops on arable land. Perennial legumes. Botanical description and biological features of clover, alfalfa and agricultural machinery. Legume-grass mixtures. Plant nutrition mode. Care for the crops of grass . Annual herbs in the green conveyor system. Row crops: maize, fodder beet.

Measures to combat weeds. Assessment of fodders in a particular company.

5. To master technology of placement, growing forest ranges for different purposes and of care

Biology of woody plants. Associated tree species. Ecology and environmental factors in the region. The need to protect the soil and plants from adverse natural phenomena. Agroforestry melioration mechanism. Forest belts systems. Forest belts design. Influence of forest belts in the climate of fields.

Transpiration and productivity of agricultural crops. Ecology of forested fields. Agroforestal inspection at land management. Marshy scrub, flow control, joist, gully forest zones and joist gully plantings. Protective plantations on grazing lands. Selection of tree species and their combinations for forest belts. Tillage. Mechanism of construction of forest belts. Inventory and addition of forest plantations. Agronomy care of forest plantations. Protection of forest plantations from pests and diseases.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	Assessment criteria a student should
LO1 To know the technologies for agricultural crops growing in greenhouses;	1.1 Describe the most popular choices of heating systems in greenhouses; 1.2 Explain the operation of devices for temperature control and ventilation of greenhouses; 1.3 Explain the difference between the positive and negative aspects of the Global Greenhouse Effect; 1.4 Justify the decision on the selection of materials for the foundation; 1.5 Compare the advantages and disadvantages of the material to cover the greenhouses; 1.6 Plan irrigation systems; 1.7 Plan activities for shading greenhouses; 1.8 Design heating greenhouses with the economic rationale for the enterprise; 1.9 Explain the operation of the Greenhouse Management System automated complex ; 1.10 Observe the rules of occupational health and safety.
LO2 Know the basics of ecological agriculture, comply with environmental requirements in planting	2.1 Describe the prospects for the development of organic agriculture in Kazakhstan; 2.2 Have a basic knowledge of marketing tools; 2.3 Explore the Kazakhstan beef balance for the CO2 content.
LO3 To understand the perspectives of cultivation and utilization of energy crops in Kazakhstan;	3.1 Know the Concept of development of "green" economy in Kazakhstan; 3.2 Explain the efficient use of renewable energy sources; 3.3 Calculate the useful biogas in farming.

LO4 To know the general classification of forage crops, their characteristics, chemical and biological composition of the fodder;	4.1 Know the classification of forage crops; 4.2 Describe the biological features of clover, alfalfa and their agricultural machinery; 4.3 To explain the basic factors of production of forage grasses for farming; 4.4 To know and take into account the normative legal acts, the rules, relating to the conservation of biological and landscape diversity; 4.5 Care for the crops of grass . 4.6 Explain the technologies of production and processing of various types of fodders, balancing rations of feeding of farm animals. 4.7 Observe the rules of occupational health and safety.
LO5 To master technology of placement, growing forest ranges for different purposes and of care.	5.1 Know the biological aspects of woody plants; 5.2 Explain the variety of forest belts structures; 5.3 Make charts the displacement of trees for forest belts of a particular enterprise; 5.4 Observe the rules of occupational health and safety.

PM 05. Food-producing animals breeding and keeping

PM 05.1: Breeding beef and dairy cattle
PM 05.2: Breeding goats for milk, wool and meat
PM05.3: Breeding productive horses
PM05.4: Breeding camels, milk and meat productivity of camels

Aim and objective. Training for the organization of production technology, primary processing and marketing of livestock products of meat and milk production, including the issues of feeding, breeding, care and maintenance of farm animals

Introduction to the module

Within the framework of this module, students learn such areas of animal farming as the breeding and fattening of cattle, dairy cattle, breeding horses, camels, sheep and goats. Much attention is paid to occupational health and safety issues to prevent accidents. Use of various machines, devices, instruments, animals on farms is considered.

This module addresses the issues in greater depth: feeding farm animals, a connection patterns between nutrition, on the one hand, physiological state, development and productivity on the other hand.

Cattle breeding, milk and beef production technology. Herding is the leading livestock sector providing population with high-value food products, and the industry-feed. Study of this module introduces the biological characteristics of cattle, types of dairy, milk and meat and meat productivity trends, technology of milk and beef production, rearing technology of meat and dairy breeds, the peculiarities of breeding work in animal husbandry. Horse breeding, technology of production of milk and horse meat.

In the course of the module study specialists are trained capable to organize the breeding, cultivation and use of horses, camels at the enterprises of different ownership on the basis of knowledge of biological and economically useful features

of horses, camels; the use of horses of different breeds and different productivity trends is studied, their priority development is justified.

The specialist of this area is prepared for organization of production technology, primary processing and marketing of livestock products, including the questions of feeding, breeding, care and keeping of farm animals, birds, bees, fish, methods and techniques of breeding industry (cattle, sheep, horses, and so on. d.).

The module provides practical training where students acquire the skills of organization and technology of livestock production; organization and breeding of cattle, dairy cattle, breeding horses, camels, sheep and goats.

Learning outcomes:

LO1 To know the basics of animal farming, to use milk and meat production technology of

LO2 To know the basics of goat breeding and apply the technology of production of goat milk and meat

LO3 To know the basics of horse breeding, to apply milk and horsemeat production technology

LO4 To know the basics of camel breeding, to apply shubat, meat and wool production technology

Module content

1. To know the basics of animal farming, to use milk and meat production technology of

Origin, constitution, exterior and interior of cattle. Properties and methods of studying exterior, interior, constitution of dairy, combined and beef cattle. Cattle breeds. Classification of breeds by productivity type: dairy, combined and beef. Reproduction of herd and technology of cattle breeding. Calving cycle and its periods: Pregnancy, service period, lactation, dry period, their relationship. Planning of insemination, starts and calving. Planning of rearing. Features of the technology of growing heifers in specialized farms.

Technology of production of milk Milk efficiency. Physiological basis of milk production. Factors affecting milk yield and milk composition. Milk production technology. Systems and methods for the content of dairy cows in winter and summer periods. Preparation and distribution of the fodder, use of natural and artificial pastures, green conveyor crops. Milking methods and technology. Primary processing and sale of milk. Thread-guild technology of milk production and herd reproduction: justification for length of stay of cows in workshops. Pricing signs when milk calculation. Content technologies effect on quantity and quality of milk. Feeding technology effect on quality and quantity of milk. Fodders quality effect on quantity and quality of milk. Cost factors in dairy production. Premises for the harness and loose maintenance of cattle. Issuance of fodders and waste management. The microclimate of livestock premises. Construction of livestock buildings and equipment. Time set for the implementation of labor tasks. Cost comparison. Technology of milk quality preservation: Need for milk cooling, cleaning of dairy equipment, a plan of work to clean up. Minimum requirements for the quality: quantitative content of microorganisms and cellular elements in unpasteurized milk, the prohibition of the use of silos for raw milk for the purpose of making cheese from raw milk, the criteria for determining the value of milk. Plan

of Implementation of cleaning: daily work, special cleaning work (replacement of teat cups). Frequency of the milk recess. Fixed and variable operating costs. Calculation and payment of production and economic indicators.

Use meat production technology.

Meat productivity. Factors affecting meat production, feeding and fattening of cattle.

Beef production technology. Feeding and fattening of animals. The concept of cultivation, rearing and fattening of animals. The "cow-calf" technology in the specialized beef cattle breeding. Preparing cattle for slaughter, transport of animals to slaughter points. Identification and assessment of fatness of animals. Tribal business in cattle breeding The techniques in livestock breeding and herds. Valuation of dairy and beef cattle. Selection and breeding work. Features of breeding farms in different categories. Breeding records.

Feeding: during watering, the first and second year of life. Dyspepsia Forms of stabling (climate and site requirements). The time set for the implementation of labor task. Costs comparison. Requirements to the feeding of different production and feeding periods: use of fodders, rate of growth, requirements for the quantity and quality of fodders, crude fiber content

Feeding at pasture and stabling animal confinement for fattening. Fattening bulls and maintenance of cows with offsprings: feeding, weight formation, checking meat productivity (Livestock Company), product quality classes and quality standards, forms of maintenance, the rules of labour safety. Features of fattening heifers and feeding calves. Health problems. Time set for the implementation of labor tasks. Cost comparison. Foot and mouth disease distribution capabilities. Mad cow disease (BSE). Flu. Viral infections. The obligation to report and register. Artificial insemination. Embryo transfer. Reproductive disorders. Pregnancy. Calving and assistance at calving. Care after the birth of a calf. Documenting the reproductive data Veterinary and sanitary measures. Typical signs. Cattle of double productivity direction. Meat breeds. Evaluation of the exterior. Steppe breeds and crossbreeding. Breeds with high milk productivity. Slaughter yield. Variable and fixed manufacturing costs. Calculation and payment of production and economic indicators.

2. To know the basics of goat breeding and apply the technology of production of goat milk and meat

Production of goat breeding Concept of wool. Effect of feeding, maintenance, genotype and other factors on milk, meat and wool productivity of goats. The notion of meat productivity of goats. Morphological composition of carcass. Chemical composition of the meat. Goat milk. Nutritional value, composition and properties of goat milk, the use of goat milk for cheese making, milking assessment of the goats. Goat breeds. The concept of a breed and a breed group. Zoological and industrial classification of sheep breeds. Imported breeds of goats that are of interest to Kazakhstan. Goat breeds.

Fundamentals of processing of goat breeding products Wool. Classification and standardization of wool. The procuring standard for wool. Determining the quality of wool. Determining the fatness of goats.

The technology of goat breeding product manufacturing The herd reproduction. Types of mating. Artificial insemination. Organization of the goat giving birth.

Growing goatlings. Feeding and maintenance of goats. Features of feeding goats, depending on gender, age, productivity and physiological state. Rational methods of fodder conservation for feeding. Fattening goats. Fattening types

Organization and technology of milking goats. Machine milking of goats, accounting and processing of milk. Mowing of goats. Mowing terms in different areas of Kazakhstan. The methods and techniques of mowing. Meat and dairy breeds, meat and milk and wool breeds.

Forms of stabling (the microclimate and site requirements). The need for working time.

Cost comparison. Variable and fixed manufacturing costs. Calculation and payment of production and economic indicators.

3. To know the basics of horse breeding, use the technology of milk and horsemeat production

Exterior, interior, and constitution of horses. Breeds of horses. The doctrine of the exterior and the constitution of horses. Interior of horses of different breeds and types. Principles of classification of horse breeds.

Reproduction and cultivation technology of horses. Organizing and conducting the mating campaign. Features of breeding horses. Terms and methods of mating of mares. The technology of preparation and conduct of the mating campaign in the breeding farms. Feeding and maintenance. Effect of feeding conditions, maintenance and operation of the horses on the sexual activity, the quality of semen of stallions and the pregnancy capability of mares. The technology of growing foals. Control the growth and development of young animals. Labeling and castration age of colts. Growing foals before weaning, feeding lactating mares and suckling foals. Working quality of horses and their use. Forms of working use of horses in agricultural production and on the transport in different natural and economic zones. Planning and accounting of work of horses. Load calculation and production quotas of workhorses. Technology of productive horse breeding. Meat productivity of horses. The chemical composition, calorie, nutritious and taste of horse meat. Processing of horse meat and side materials. Milk yield of horses. Evaluation of milk production of mares of different breeds and methods to define it. Koumiss production technology. Technology of horse breeding. Methods of cultivation of herd horses. Keeping horses in herds in summer, autumn, winter and spring seasons. Marking of foals Isolation and preparation for the sale of young animals.

Training technology and hippodrome testing of horses. Selection and breeding work in horse breeding Training and hippodrome tests of horses. Rules and technology of hippodrome tests of various breeds of horses. Horse riding and equestrian tourism. Types of equestrian sport. National horse games. The organization and operation of equestrian tourist centers and pony clubs. Horse breeding methods. Screening and selection in herd horse breeding and horse farming. Valuation of horses. Breeding work. Plans for breeding work with breeds and the principles of their compilation. Tribal accounting of horses.

4. To know the basics of camel breeding, use the technology of shubat, meat and wool production

Exterior, interior, and biological features of camels. The species breeds and hybrids between species of camels. Production qualities. Features of maintenance

and feeding. Reproduction and breeding of camels. Technology of production of camel breeding product in the conditions of farms. Breeding work in camel breeding. The economic efficiency of camel breeding production.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	Assessment criteria A student should
LO1 To know the basics of animal farming, to use milk and meat production technology of	1.1 Describe the properties and methods of studying exterior, interior, constitution of dairy, combined and beef cattle. 1.2 Understand fodders quality effect on quantity and quality of milk; 1.3 Choosing fodders for feeding ruminants taking into account the performance; 1.4 Prepare and evaluate the feeding ration meeting the requirements; 1.5 Understand the influence of the structure of the udder and physiological processes of lactation and milk production; 1.6 Perform sensory evaluation of milk and the products produced from it; 1.7 Organize the technology of preparation of the dairy products, butter and cheese; 1.8 To determine the chemical composition and nutritional value of milk processing byproducts and their use in animal husbandry; 1.9 To observe good personal hygiene by dairy farming workers; 1.10 Observe the rules of cleaning and disinfection of milking equipment, dairy utensils and other equipment; 1.11 Evaluate the dairy cattle breeding considering the economic aspects; 1.12 Evaluate the techniques of dairy cattle maintenance considering the breed conformity, environmental compatibility and profitability; 1.13 Describe methods of storage and processing of milk, corresponding to the established quality; 1.14 To identify, document, calculate and record the economic data of production of dairy products using the software. 1.15 Explain features of young animal breeding taking into account the type and belonging to ruminants taking into account the productivity and profitability; 1.16 Perform calculation of fodder with paddock and stall maintenance of animals for fattening; 1.17 Understand the features of fattening heifers and feeding calves. 1.18 Evaluate methods of meat production, taking into account economic and environmental aspects; 1.19 Describe the symptoms and course of typical diseases of cattle and choose the measures to prevent them; 1.20 Present arrangements for the conservation and management of performance, and to evaluate their practical work on breeding; 1.21 To distinguish the different breeds of cattle, indicate the purposes of the work on breeding and selecting a suitable breed for the enterprise; 1.22 To identify, document, calculate and record the economic data of production of meat products using the software.

LO2 To know the basics of goat breeding and apply the technology of production of goat milk and meat	2.1 Identify the fatness of goats and and calculate the slaughter weight and slaughter yield 2.2 To control the quality of products 2.3 To determine the chemical composition of milk and meat 2.4 To learn the sanitary requirement for meat processing enterprises 2.5 Organoleptic and laboratory indicators of high quality of meat 2.6 To perform processing and veterinary-sanitary examination of products of slaughter 2.7 Describe the symptoms and course of typical diseases and choose the measures to prevent them
LO3 To know the basics of horse breeding, to apply milk and horse-meat production technology	3.1 Distinguish between breeds and types of horses, principles of horse breeds classification; 3.2 To indicate the purposes of the work for reproduction and to choose the right breed for the enterprise; 3.3 To know foals growing technologies; 3.4 To identify the forms of working use of horses in agricultural production and on the transport in different natural and economic zones; 3.5 To understand the productivity of meat of horses; 3.6 To identify the chemical composition, calorie, nutritious and taste of horse meat; 3.7 To assess the milk production of mares of different breeds; 3.8 Evaluate methods of meat production, taking into account economic and environmental aspects; 3.9 Describe the symptoms and course of typical diseases and choose the measures to prevent them; 3.10 Present arrangements for the conservation and management of performance, and to evaluate their practical work on breeding; 3.11 To identify, document, calculate and record the economic data of production of horse meat products and horse milk using the software.
LO4 To know the basics of camel breeding, to apply shubat, meat and wool production technology	3.1 Understanding the biological and economic features of camels; 3.2 To know camel breeding technologies; 3.3 To use methods of care for camels in winter and summer; 3.4 To assess the milk production of camels of different breeds. 3.5 Evaluate methods of meat production, taking into account economic and environmental aspects; 3.6 Describe the symptoms and course of typical diseases and choose the measures to prevent them; 3.7 Present arrangements for the conservation and management of performance, and to evaluate their practical work on breeding; 3.8 To identify, document, calculate and record the economic data of shubat, meat and wool production.

PM 06 Meat animals breeding and keeping

PM06.1: Breeding sheep and technology of production of mutton and wool
PM06.2: Breeding pigs and the pork production technology
PM06.3: Breeding of rabbits and technology of industrial production of rabbit meat

Aim and objective. Training specialists for production technology, primary processing and marketing of meat of livestock, including the issues of feeding, breeding, care and maintenance of farm animals

Introduction to the module

Within the framework of this module, students learn in depth areas such livestock trends as the breeding and fattening of sheep, pigs and rabbits. Much attention is paid to occupational health and safety issues to prevent accidents. Use of various machines, devices, instruments, animals on farms is considered.

Sheep farming, the technology of production of wool, lamb and lamb fur. In modern conditions of managing the study of theoretical, methodological and practical issues of breeding, feeding and keeping sheep is extremely in demand. The module generates skills when working with methods of evaluation of productive and breeding qualities of sheep, valuation; methods of breeding plans, breeding programs, flow charts; modern technology of production of sheep breeding.

This module addresses the following issues: feeding farm animals, patterns of connections between nutrition, on the one hand, physiological state, development and productivity on the other hand.

The study of this module will provide knowledge to improve and enhance the competitiveness of pork, the methods of quality evaluation of pigs, pig breeding business, the new methods of evaluation of fodders and feeding pigs.

Within the framework of this module, students will learn safety precautions when working with rabbits; features of the interior and exterior of rabbits; features of formation of breeds and breeding work in rabbit breeding; productivity trends; organization of feeding, maintenance, reproduction and use of rabbits.

Learning outcomes:

LO1 To know the basics of sheep breeding, to apply wool and lamb production technology.

LO2 To know the basics of pig production, to apply innovative technologies in pig breeding

LO3 To conduct organizational and livestock works in rabbit breeding

Module content

1. To know the basics of sheep breeding, to apply wool and lamb production technology

Production of sheep breeding.The concept of wool. Effect of feeding, maintenance, genotype and other factors on the wool productivity of goats. Mutton. The concept of meat productivity of sheep. Morphological composition of carcass. Chemical composition of the mutton. Milk sheep. Nutritional value, composition and properties of sheep milk, the use of sheep milk for cheese making, milking assessment of the sheep. Breeds of sheep. The concept of a breed and a breed group. Zoological and industrial classification of sheep breeds. The breeds of thin wooled, semi-thin wooled, semi kemped, kemped sheep. Karakul sheep breeds and plant types. Imported breeds of sheep that are of interest to Kazakhstan. Goat breeds.

Fundamentals of processing of sheep breeding products Wool. Classification and standardization of wool. The procuring standard for wool. Determination of the quality of the wool on the factories of primary processing of wool. Determination of fatness of sheep.

The technology of production of sheep breeding The herd reproduction. Types of mating. Artificial insemination. Organization of lambing. Breeding lambs. Castration of rams. Feeding and maintenance of sheep. Features of feeding sheep, depending on gender, age, productivity and physiological state. Rational methods of fodder conservation for feeding. Feeding and fattening of sheep. Fattening types

Organization and technology of milking sheep. Machine milking of sheep, accounting and processing of milk. Shearing. Mowing terms in different areas of Kazakhstan. The methods and techniques of mowing. Meat breeds, meat and wool, short-haired, long-haired breeds. The Texel , the Polldorset, the Suffolk, the Clan-Forest, the Hampshire, the Oxfordshire, the Shropshire, the Border Leicester, the Kolbred, the Improver breeds and the prolific breeds, the Buruli, the Kol Bred, the Cambridge breeds.

Forms of stabling (the microclimate and site requirements). The need for working time.

Cost comparison. Variable and fixed manufacturing costs. Calculation and payment of production and economic indicators.

2. To know the basics of pig production, to apply innovative technologies in pig breeding

The factors affecting fertility. Technology of maintenance of sows. Stimulation of the oestrus and control over them; the insemination time, artificial insemination and free mating, farrowing monitoring.

Preparation for farrowing and control over it. Technology of breeding pigs; care in the first two weeks of life, prevention and treatment of diseases of piglets. Calculations for breeding and maintenance of sows in the early stages of gestation of sows a few days before farrowing, nursing sows.

Calculations for fattening: piglets before weaning, after weaning piglets, gilts, fattening the beginning, the final stage of fattening. Feeding means. Feeding piglets. Feeding breeding sows; full-feeding, combined feeding, feeding with data transmission, feeding with dry and liquid fodders.

Maintenance technologies. The microclimate of livestock premises. Diseases: swine fever, respiratory diseases. Time set for the implementation of the working labor tasks. Cost comparisons.

Feeding methods. Fodders: protein quality, phosphorus uptake. Feeding: needs, mixtures of fodders, phase feeding. Dosing of fodders.

Distribution ways. Transportation, protection of animals. Programme on the meat of the premium class and other alternative distribution options. Regulations for the cattle slaughter.

Pig breeding farms. The closed system. 3-week rhythm. The paddock and pen method. Cultivation in one or two phases. Performance, fattening productivity, slaughtering performance. The quality of meat. The breeding methods. The balance of labor resources. Evaluation of breeding stock; offspring and individual productivity. Selection signs. Variable and fixed manufacturing costs. Calculation and payment of production and economic indicators.

3 Maintain organizational and zootechnical works in rabbit breeding

State and prospects of rabbit breeding development. The origin of rabbits. Biological, morphological and physiological characteristics of rabbits. Rabbit breeds. The main product and by-products of livestock. Breeding work in rabbit breeding. Accident prevention. Placement of rabbit farms and the rabbit maintenance

systems. Feeding rabbits. Technology of production of rabbit breeding products. The technology of rabbit breeding.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	Assessment criteria A student should
LO1 To know the basics of sheep breeding, to apply wool and lamb production technology.	1.1 Identify the fatness of sheep and and calculate the slaughter weight and slaughter yield; 1.2 To control the quality of products; 1.3 To determine the chemical composition of meat; 1.4 To learn the sanitary requirements for meat processing enterprises; 1.5 Organoleptic and laboratory indicators of high quality of meat; 1.6 To perform processing and veterinary-sanitary examination of products of slaughter; 1.7 Describe the symptoms and course of typical diseases and choose the measures to prevent them
LO2 To know the basics of pig production, to apply innovative technologies in pig breeding	2.1 Identify the criteria for young animals breeding, taking into account the type and yield, to justify the activities for practical work on the breeding; 2.2 Perform calculation of fodders for pigs; 2.3 Choosing the technology of feeding pigs and sows with regard to economic aspects; 2.4 Revise the maintenance of fattening pigs, taking into account profitability, hygiene and type; 2.5 Identify the distribution channels and the yield in the production of pigs for fattening; 2.6 To justify organization of pig breeding businesses by production and economic conditions; 2.7 To justify the choice of breeds and crossbreeding techniques; 2.8 To identify, document, calculate and record the economic data of production of piglets and pigs for fattening using the software.
LO3 To conduct organizational and livestock works in rabbit breeding	3.1 To identify the features of the interior and exterior of the rabbits and the formation of breeds and breeding work in rabbit breeding; 3.2 To organize and manage the production of high quality products at the lowest costs in the conditions of intensive technology, farms; 3.3 To prepare and analyze the rations for rabbits based on their individual needs, preparation and storage of fodders; 3.4 To know the election technology and rabbit breeding; 3.5 To describe the technique of slaughter and primary processing of rabbit skins; 3.6 To organize assistance for the planned sanitary and veterinary preventive measures.

PM 07 Breeding of poultry and the technology of the egg production and poultry as well as fish, fur animals and bees

PM 07.1: The technology of production of eggs and poultry
PM 07.2: Breeding of fish and rearing of fur-bearing animals, bees

Aim and objective. Students have the basic and general knowledge of the implementation of technological challenges for the effective production and processing of quality poultry products.

Introduction to the module

Within the framework of this module, students learn in depth such livestock areas as breeding birds, fish, fur animals and bees. Much attention is paid to occupational health and safety issues to prevent accidents. Use of various machines, devices, instruments, animals on farms is considered.

Due to the fact that the poultry industry is one of the most intense and dynamic sectors of the agro-industrial complex of the country, the study of the module provides the formation of abilities of students for feeding and maintenance, evaluation and improvement of economically valuable qualities of birds. The module includes the study of the foundations of progressive and optimal manufacturing processes of production of quality and cheap poultry products.

Fish farming is one of the main areas of aquaculture and agriculture industry, engaged in fish farming, improvement and increase of fish stocks in the waters. Fish farming in marine waters is considered as one of the areas in mariculture. For fish farming natural or artificial bodies of water are used, including swimming pools, tanks, ponds and aquariums

Fur farming is an independent and promising branch of agriculture. Bred in the cellular environment fur-bearing animals are the product of human labor, and significantly different from their wild relatives, both in terms of productivity and in terms of maintenance and feeding. Fur farming, the use of non-food waste of the meat, fish, dairy, and other industries for feeding, thus preserving valuable wildlife species. Maintaining farming in order to save and restore the numbers of many endangered species. The technology of the works for fur farming, taking into account the biological characteristics of each species of animals.

Beekeeping is the industry that produces delicacy honey products.

Learning outcomes:

LO1 To use biological and productive features of poultry, chickens, ducks, turkeys, geese, guinea fowl, quail, musk ducks.

LO2 To apply technologies of fish farming, fur farming and beekeeping

Module content

1. To use biological and productive features of poultry, chickens, ducks, turkeys, geese, guinea fowl, quail, musk ducks.

The constitution and the exterior of birds of different species. Types of constitution and features of the exterior in relation to the productivity trend. Methods for assessing the exterior. Body parts, their change and characteristics depending on the physiological state and productivity of birds. The value of the exterior and interior for the evaluation and selection of productive and healthy birds. Egg, meat and

meat-egg breeds of chickens.

Egg productivity. Meat efficiency. Incubation of eggs and reproductive qualities of poultry.

Hens: the breeds with a tendency of incurring eggs, the broiler breeds, breeding technology. Classification: industrial, extensive. Hens: incubation, broiler hens, laying hens.

Breeds and breed groups of geese: The Adler, Chinese, Landes, Rhine, Italian, Kuban, large gray, Kholmogory, Romny breeds.

Geese breeding products and features of the production. The use of invaluable and cheap fodders in feeding geese.

Breeds and breed groups of ducks: The Beijing, Ukrainian, Indian runners, other, musk ducks. Crosses of ducks. Productive and reproductive qualities of ducks. Growing ducks for meat.

Breeds and breed groups of turkeys: the bronze and white broad-chested, white Moscow, black Tikhoretskaya breeds. Crosses of turkeys. Characteristic of meat qualities of turkeys. Prospects of development of turkey breeding in Kazakhstan: organization of the new modern enterprises for the production and processing of turkey meat, the use of high-productive heavy and medium crosses, even in the course of the year production of hatching eggs. Turkey production technology.

Food and taste qualities of eggs and meat of guinea fowls. The use of intensive technologies in the production of guinea fowl meat.

Beekeeping is the industry that produces delicacy products.

Features of feeding poultry. Meaning of full feeding. Features of feeding birds of various technological groups. Feeding in the agricultural sector (oviparous and broiler). The requirements for ingredients of fodders, feeding focused on production and productivity, the requirements for fodders depending on the age or the success of fattening.

Technology of processing, sorting and storage of food eggs. Technology of production of poultry meat.

Typical poultry diseases: avian influenza, a specific avian flu (H5N1), Rhinotrachitics, Marek's disease, Newcastle disease.

The forms of content (the microclimate and site requirements). Forms of poultry premises. The need for working time. Cost comparison. Variable and fixed manufacturing costs. Suitability for a variety of technology of maintenance: the breeds for industrial production of meat and eggs, the breeds for the paddock maintenance.

Calculation and payment of production and economic indicators.

2 To apply technologies of fish farming, fur farming and beekeeping

The breeds of the most significant in the region fur-bearing animals. Production technologies. Systems of maintenance. Feeding technologies. Animal health and hygiene. Product requirements. Economic indicators.

Regionally used fish species. Classification of production technology and systems of fish maintenance. Growing of the whitebait. Stocking ponds. Feeding technologies. Fish health and hygiene. Product requirements. Economic indicators.

Species of bees and artificial insemination. Production technology in beekeeping. Systems of maintenance. Summer meadows and winter feeding. Diseases of bees and their treatment. Quality requirements for honey. Economic indicators.

The learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	Assessment criteria A student should
LO1. Use biological and productive features of poultry, hens, ducks, turkeys, geese, guinea fowls, quails, musk ducks	1.1 To distinguish the different breeds of birds, indicate the purposes of the work on breeding and selecting a suitable breed for the enterprise; 1.2 Describe methods of poultry breeding and poultry production taking into account environmental aspects; 1.3 Describe the symptoms and course of typical diseases of poultry and choose the measures to prevent them; 1.4 To explain the methods of production of young birds taking into account productivity and profitability; 1.5 To identify, document, calculate and record the economic data of poultry and production of poultry meat using the software.
LO2 To apply technologies of fish farming, fur farming and beekeeping	2.1 To describe the production and technical characteristics and economic data of fur farming 2.2 To identify the production and technical characteristics and economic data of fish farming; 2.3 To identify the production and technical characteristics and economic data of bee farming

PM 08. Financial accounting, statistics and control. Capital and the law

The objective: Students receive a wide range in theory and actual knowledge of the overall analysis and accounting of the company, agricultural enterprises, investment and financing, the Law and administrative sciences.

Module content

Organization and tasks of agricultural accounting. Inventory procedures and systems. Basics of the double-entry bookkeeping system. The legal basis. From equipment to the balance sheet. The book of accounts, in particular on the inventory, income, private and VAT accounts - closing of accounts. Organization. The double-entry bookkeeping. Current orders. Registration of the preparatory closing. Registration of closing. Total amount. Regular taxation. Depreciation methods. Maintaining the General Ledger and the Ledger. Accounting procedures. Specific issues relating to the annual financial statements. Writing off. Accruals. Prepaid expenses. Accounting and evaluation. Types of financial statements. Definition of key figures. Analysis of the financial statements.

Formation of the hypothesis. Descriptive statistics. Development and management of tables. The derived statistics. Calculation and presentation of interest and limitations, the average value and variance measures, the frequency distribution. The calculation of the correlation and the use of contingency tables. Procedures of the parametric and non-parametric tests.

Calculation of costs / Analysis of industrial branches: The concept, content, purpose, scope management; Annual financial statements as a database for general

analysis of the company and industrial sectors; Basis for calculation of cost and productivity in the agricultural company; Calculation of partial costs (direct free service); Calculation of the total costs - accounting by types of costs, Cost Center Accounting, cost accounting units; Evaluation problems (domestic sales and non-market agricultural services); Allocation of overhead expenses; Fundamentals of the theory of planning and decision-making; Short and long term optimal organization of the company; Planning methods; General business planning (Comparing of the evaluation procedures, preliminary assessment of the cost, programming, linear programming); Practical implementation of the analysis of production subsidiaries - Application of accounting by types of costs, Cost Center Accounting and accounting of cost units in simple business cases in the agricultural enterprises; The use of distribution keys for the joint distribution; Values calculated for non-market and non-market agricultural services; partial area planning (the comparison of procedures); The use of computer programs of planning for the general business planning.

Investment planning. The basic principles of financial mathematics and their use in a spreadsheet program (interest and principal account, the annuity calculation). Profitability of investments (both static and dynamic methods). Fundamentals of financing. Financial instruments. Profitability and leverage. Financial plan. Collateral. The individual stages of investment planning and finance practice. Discussion of individual investment projects. Stimulating investments in Kazakhstan.

The learning outcomes and assessment criteria

Learning outcomes after successful completion of this module, the student will	Assessment criteria A student should
LO1. Keep records of the agricultural enterprises	1.1 To describe the system of double-entry bookkeeping to its structure, process, and completion; 1.2 To document the business operations on a systematic basis; 1.3 To use financial accounting as a tool to work with information and management for agricultural entrepreneurs.
LO2. To know basic statistical parameters and procedures, as well as related software.	2.1 To transfer their statistical knowledge about their daily lives and their expected work area, giving examples and discuss statistical reservations. 2.2 To apply and interpret statistical parameters and procedures, as well as to interpret the results obtained from the statistical analysis; 2.3 To demonstrate and explain the importance of statistics in everyday life and professional life. 2.4 To identify statistical issues, to use appropriate sources of information, to use appropriate methods, to formulate hypotheses and to evaluate the results.

LO2. To know basic statistical parameters and procedures, as well as related software.	2.5 To work independently in groups and to support each other, which contributes to the development of their explanations skills, to use lecture records, to cope with the exercises. 2.6 To discuss with other members of the group important decisions and to compare the result, to express their concepts and present them in a dispute with opposing views, to efficiently distribute works.
LO3. To conduct the general business analysis, operational analysis, planning of agricultural enterprises.	3.1 To describe the development of cost-based - calculation of the performance in the agricultural enterprises, and can compare the results of conducting trade settlements; 3.2 They know the rules and principles of general business planning of agricultural enterprises 3.3 To interpret assessment of the industry and to evaluate the suitability and influence of the various components of the control and accounting for the company's management; 3.4 They know the methods of planning of work on various operational levels; 3.5 To analyze the company's branches in terms of economic success; 3.6 To apply planning techniques for independent handling the planning of agricultural enterprises through simple software solutions.
LO4 To know the basics of investing and financing	4.1 To assess the economic efficiency of investments; 4.2 To develop a full financial planning; 4.3 To provide a discussion of the financial sector
LO5 To know the laws and administrative sciences	5.1 To use knowledge of the legislation to manage the company, and self-administration with relevance for the agricultural business. 5.2 They know how to work with legal problems that may arise, and act accordingly in these areas.

PM 09. Phytomedicine and plant selection

The objective:

Students will acquire basic knowledge of the herbal medicine (protection of plants and general plant pathology), diagnosis, biology and ecology of the major pests with practical guidelines for preventing and reducing the damage and will be aware of the most important legal framework for the protection of plants.

Module content

Introduction. History of herbal medicine. Plant health: definition, significance. Healthy plants as a basis for human and animal nutrition. Basics of phytopathology. Animal pests. The emergence and importance of pests. Diagnosis of pathogens and pests. Epidemiology and harmful effects. Plant protection measures. Legal basis for plant protection. Diagnosing of abiotic pathogens. Diagnosis of plant diseases. Recognition of pests. Application of appropriate plant protection measures. Review of the most important insecticides, acaricides, nematicides, molluscicides,

rodenticides, fungicides and herbicides. Biological plant protection, the use of micro-organisms, viruses, and higher animals. Characteristics of plant protection products, risk of the user, the consumer risk, methods of influence on the target and non-target organisms and ecotoxicity. Fighting against diseases, pests and weeds in important crops, such as: cereals, maize, sugar beet, oilseed rape and potatoes. Integrated protection of plants. Biotechnological processes, physical and chemical irritants, pheromones.

Biological bases of selection. The breeding methods. The objectives of selection. The techniques for determination of the breeding purposes. A practical approach to breeding. Efficiency of energy use in the selection resistance.

The learning outcomes and assessment criteria

Learning outcomes after successful completion of this module, the student will	Assessment criteria A student should
LO1. To apply basic knowledge of herbal medicine	1.1 To classify and evaluate the functions and importance of herbal medicine in agriculture; 1.2 To know the plant selection

PM 10. Methodology for the presentation of information

Objectives:

− students receive the basic knowledge of the area of presentation of information and effective speech;

− receive a comprehensive, differentiated and in-depth theoretical and factual knowledge of the rhetoric.

Module content

Fundamentals of scientific and technical information. Methodological approaches to the basic forms of presentation of scientific results. Practical guidance on the content and the formal registration of the scientific work: creating contours, formatting, inserting links and research, the creation of bibliographic and reference lists. Execution of written work and lectures. Scientific and research literature. Group work. GRADUATION PAPER Proper training, oral exam.

Actual knowledge - 20%:

Rhetoric and communication theory. Appearances.

Elements of rhetorical skills: Conceptual design. Linguistic expression. Effective blocking technology. Conscious body language. Psychological attitude. Dialogue.

Methodological knowledge - 80%:

Strategic preparation of speeches, reports, messages, for example, with the help of Mind Mapping. Analysis of the participants. The accurate setting method: The exact wording. Expanding vocabulary. Styles of words and sentences. The speech thought.

Verbal exercises and speech techniques: Pronunciation. Special attention.

Reducing dialect. Censorship.

Non-verbal means of communication: Mimicry. Motion. The eye contact. The mission of the speaker and the base positioning for audience. Methods of visualization and the atmosphere. Verbal attack and defense techniques. Overcoming anxiety during the utterance of speech and writing test.

The learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	Assessment criteria A student should
LO1. To know the information presentation methodology	1.1 To find and evaluate the literature relevant to the topic; 1.2 To know the different styles of speech and rhetorical means; 1.3 To develop and present own ideas and results in writing in accordance with the usual scientific standards; 1.4 To prepare the information in writing independently of each other, to communicate freely and critically reflect the oral presentation.
LO2 To know rhetoric	2.1 To describe the rhetorical elements in their works and to reflect them in the examples; 2.2 To structure the speech and to express it properly, to enrich its rhetorical non-verbal means, to represent and visualize it in an attractive manner. 2.3 To discuss with arguments and evaluate critically own and others' presentations

PM 11. Systems and technology of maintenance of animals

The objective:

Students receive comprehensive knowledge of the systems and technologies of animal breeding and skills of proper operation of machines and equipment.

Content of the module

Technology of feeding - of pigs, cattle, sheep. The method of maintenance of pigs, cattle, sheep. Milk production. Stable air conditioning, removal of manure, emissions. Storage of feed and grain. The regular transport. Methods for measuring the stall climate. Methods for assessing workplace. Methods of analysis of working time. Costing methods. The selected project management methods. Methodology of technical measurements. To determine power requirements of the tractor. Calculation of the costs of the production process.

Learning outcomes and assessment criteria

Learning outcomes after successful completion of this module, the student will	Assessment criteria A student should
LO1. To evaluate the production activities of a particular enterprise on maintenance and feeding of animals	1.1 To evaluate the key aspects of occupational safety and health; 1.2 To use technical installations regarding the requirements of natural-resource conservation, protection of human and animal health, and the economy; 1.3 To evaluate and select methods of work, according to their suitability for a new operational environment

PM12. The market and agricultural products trade, marketing, corporate governance and business start-up

The objective:

Students gain knowledge of key concepts, such as the functioning of markets and the behavior of the markets, supply and demand elasticity, and they acquire the skills of assessment of influence of relevant factors on the market results.

Module content

Introduction. Agronomic business and globalization. Market regulation tools. Market. Evaluation of intervention in the free market - market linkages. Fairground prices. Market analysis methods. Events on the main agricultural markets. Futures markets.

Some central issues and questions. The structure and tendencies in the field of international agricultural trade. International trade theory - "Why do we trade?". Labour productivity and comparative advantage. Specific factors and income distribution. Resources and foreign trade: The Heckscher-Ohlin model. The standard model of trade. Economies of scale, incomplete competition and international trade. Movement of international factors. International trade policy. Justification of trade policy theory of distribution. Motivation of agricultural protectionism. Tools of the agriculture trade policy and its consequences. The results of some empirical studies. Macroeconomics and international trade of agricultural products. Effect of exchange rate fluctuations. The relationship between interest rates and exchange rates. The impact of trade policy on the real exchange rates. Foreign direct investment and trade in processed food products. Economic integration. Institutions in world trade. Customs unions and free trade zones.

Concept of the project, objectives of the project. Project organization. Project management. Order. Complex of works. Plan of the project structure. Network plan. Report. Modern methods and tools of planning and project management. Maintaining the balance sheets and statements of profit and loss of companies.

Basic concepts and theoretical foundations of production management. Their application to products and services from their environment. The importance of sales. How to provide consultations. The most important terms and the theoretical basis of modern marketing. The use of the various stages of the process of marketing management of the products and services of agricultural business environment.

Corporate governance: The quantitative value of the agricultural and industrial complex. The structure of agricultural production in the Republic of Kazakhstan and the Eurasian Economic Community. Possible organizational and operational structure and organizational-legal forms of agriculture. Business plan. The importance and management of non-agricultural income. Taxation of business. Organization of the business transfer. The elements of success of the company. Entrepreneurs / workers. Resources / Location. Products / services (performance, quality, roll, number, equipment, certificates, ...). The structure of the company. Objectives (vision, operational goals, monitoring). Know-how (innovation, process optimization, ...). The processes (production processes, productivity, standardization, quality management, ...). Instruments for the implementation of operational and strategic control (balanced scorecard, the SWOT analysis, etc.)

The company management goals. Profitability (practical research, divisions of the company). Liquidity (identification, analysis, control). Stability (assessment, consequences). Exercises with cases from practice. Financing management. Objectives and strategies of financing. Adjustment of project financing. Comparison of complex financing.

The actual overall management of the company in a business simulation for several periods. Analysis of the external data and the data of a company.

The learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	Assessment criteria A student should
LO1. To be able to analyze the market	1.1 Can read and critically evaluate market forecasts.
LO2 To know the global markets of agricultural products and international trade of agricultural products	2.1 Know about the functioning of the world's agricultural markets and the comparative advantages and disadvantages of the agricultural sector of Kazakhstan; 2.2 Understand the tools of protection of the agriculture and able to explain the functioning of the customs unions.
LO3. To be able to manage projects	3.1 To structure the project, to work in accordance with the phases of the project; 3.2 Working under the direction of the plans of costs and opportunities; 3.3 Compliance with the basic parameters - time, cost and quality - at all stages of the project from the initiation of the project before the project starts.
LO4 To know methodology of agricultural market research	4.1 To know the institutional features of marketing and focus on agriculture and food; 4.2 To use the case studies of agricultural practices.

PO5 to know corporate governance and business startup.	5.1 To apply the tools and techniques needed for the targeted control in practice; 5.2 Ability to teamwork and presentation of complex relationships, during studies and in their professional lives; 5.3 To solve complex practical tasks; 5.4 To solve challenges - transferring theoretical knowledge into new business cases; 5.5 To identify the strengths and weaknesses using the horizontal and vertical comparisons of the company, and skills of analysis of their causes; 5.6 To propose measures to improve the production, organizational and financial areas.

PM13. Agriculture and Environment policies. Applied ecology.

Objectives:

- Knowing the relevance of agriculture to the natural balance;
- Socio-political importance of agriculture and the environment.

Module content

Abiotic and biotic factors of the area in their importance for agriculture. Systematic approach of ecology in agriculture. The impact of agriculture on the natural balance. Determining factors of the area. Preparation of the agricultural ecosystem. Assessing the impact of pollution on water quality. The spade check for soil evaluation.

The objectives and characteristics of organic farming. The basic framework conditions. Control. The basic principles of animal husbandry. Basic principles of crop production.

The social and political importance of the agricultural sector. Causes of structural changes. Hypotheses to explain income inequality. Interested parties and objectives of agricultural policy. Agricultural policy instruments related to current events. Developing the criteria for evaluating the effectiveness of measures. The environment as an economic good. Causes of environmental problems. Interested parties and objectives of environmental policy. Environmental policy in accordance with the general principle of burden. Measures to internalize external costs The costs and benefits of environmental policy measures. The importance of environmental policy for agriculture. Recent developments in the field of environmental policy, in particular, climate protection. Evaluation of measures on the basis of performance criteria. Evaluation of structural changes for the economy development. Application of the theory to the inequality in income. Evaluation of the objectives set out by practical politics. Assessing the impact of agricultural policies on society and agriculture. Classification of current events in the national and international context. The classification of environmental goods in the market economy with a social impact on the prosperity. Development of approaches to the practical realization of the goals. Comparative evaluation of individual approaches to the internalization of external costs. Evaluation of the inclusion of external costs and benefits of agricultural production. Classification of national and international policy on climate protection.

The learning outcomes and assessment criteria

Learning outcomes after successful completion of this module a student	Assessment criteria A student should
LO1 To know agroecology	1.1 Knowing the relevance of agriculture to the natural balance; 1.2 To assess the value for agriculture; 1.3 To analyze and present the terrain factors independently of one another; 1.4 To assess the soil structure and root growth; 1.5 Giving recommendations on tillage and cultivation; 1.6 To assess interconnections of factors of location according to the capabilities of agricultural production; 1.7 Assess the impact of agricultural activities on the environment; 1.8 To explain the agricultural ecosystems in their system context.
LO2 To know organic farming	2.1 To know the reasons, conditions, borders, issues and the basic approaches to organic farming; 2.2 To be able to compare them with the advantages and disadvantages of other products; 2.3 To assess the importance of organic farming in the Republic of Kazakhstan, both economically and environmentally, as well as to transfer certain processes in other systems.
LO3 To know social and political importance of the agricultural sector.	3.1 Able to illustrate the agricultural and ecological-economic relations by examples; 3.2 To explain the reasons for the agricultural structural changes with impact on society; 3.3 To understand the processes of agricultural and environmental policy of decision-making; 3.4 Provides an overview of the measures of agricultural and environmental policies and assess their significance; 3.5 To classify the issues of agriculture and environmental policy on the basis of theoretical knowledge and build a chain of reasoning; 3.6 To develop and apply the criteria for the assessment of policies; 3.7 To analyze political deficits in these areas; 3.8 To develop their own proposals to reduce the deficit; 3.9 To assess proposals based on various performance criteria; 3.10 Able to transfer theories of ecological economics on relevant topics and to receive suggestions for solutions.

7. Plan of the educational process (curriculum)

of technical and vocational, post-secondary education

Specialty: Farming (on a profile)

Qualification departments:

on the profile of livestock:"milking machine operator", "Horse Breeder", "Poultry Breeder", "Pig Breeder," "Camel Breeder"

on the profile of crop production: "Warehouse Worker", "Vegetable Grower", "Agriculturist"; "Gardener"; "Beet Grower", "Vegetable Grower" common ***to all profiles:*** "Accountant", "Agricultural Machinery and Tractors Setter", "Electrician of Electrical Maintenance", "Plumber Repairman", "Tractor Driver of Agricultural Production"

Farmer, Farmer Manager

Mode of study: Full-time

On qualification:

Advanced level qualification and Middle level specialist «Farmer» (2 years and 10 months)

«Farmer Manager» *continue training for* + 10 months

On the basis of basic secondary education

the total duration of training for all skill levels- 3 years and 10 months

Index	Names of modules, practices	Form of control			The amount of study time (hours)				Distribution by semesters
		exam	credit	course project / work	total	of them			
						theoretical lessons	Laboratory and practical, practical lessons	job training and professional practice	
1	2	3	4	5	6	7	8	9	10
CD.00	**Comprehensive disciplines**				**1448**				**1-3**
GHD.00	**General humanities disciplines**				**220**				**2-4**

BGM.00	**Basic general professional modules**				**442**	**180**	**148**	**114**	**2-4**
BGM.01	Fundamentals of planning and organization of the farm	+			90	36	30	24	
BGM.02	Preparing the soil for seeding and planting		+		90	36	30	24	
BGM.03	Growing crops, care and harvesting		+		110	44	30	36	
BGM 04	The basics of farm animals keeping				100	40	30	30	
BGPM 05	The theoretical driving course: the foundations for a tractor driver's license (III grade) (categories B, C)				52	24	28	+	
PM.00	**Professional modules**				**1656**	**662**	**310**	**684**	**3-6**
PM.01	Production planning, work preparation and monitoring, accounting	+			+	+	+	+	
PM.02	The results of the enterprise activities		+		+	+	+	+	
PM.03	Cultivation of crops	+	+		+	+	+	+	
PM 03.1	Growing of cereals				+	+	+	+	
PM 03.2	*Growing root crops*				+	+	+	+	
PM 03.3	*Cultivation of crops*				+	+	+	+	
PM 03.4	*Cultivation of forage grasses and rational use of pastures*				+	+	+	+	
PM 04.	Use of modern industrial technologies	+			+	+	+	+	
PM 04.1	Greenhouse production				+	+	+	+	
PM 04.2	Organic farming				+	+	+	+	
PM 04.3	Energy crops				+	+	+	+	
PM 04.4	Forage production				+	+	+	+	
PM 04.5	Forestry				+	+	+	+	
PM.05	Food-producing animals breeding and keeping	+			+	+	+	+	
PM 05.1	*Breeding beef and dairy cattle*				+	+	+	+	
PM 05.2	*Goat breeding*				+	+	+	+	

PM 05.3	*Breeding productive horses*				+	+	+	+	
PM 05.4	*Camel breeding*				+	+	+	+	
PM.06	Meat animals breeding and keeping	+			+	+	+	+	
PM 06.1	*Breeding sheep and technology of production of mutton and wool*				+	+	+	+	
PM 06.2	*Breeding pigs and the pork production technology*				+	+	+	+	
PM 06.3	*Breeding of rabbits and technology of industrial production of rabbit meat*				+	+	+	+	
PM.07	Breeding of poultry and technology of production of eggs, poultry, fish, fur animals and bees	+			+	+	+	+	
PM 07.1	The technology of production of eggs and poultry				+	+	+	+	
PM 07.2	Breeding of fish and rearing of fur-bearing animals, bees				+	+	+	+	
The farmer-manager qualification (Applied Bachelor)					***972***	***388***	***260***	***324***	**7-8**
PM.08	Financial accounting, statistics and control. The capital and the law	+			224	90	62	72	
PM.09	Phytomedicine and plant selection		+		90	36	18	36	
PM 10	Methodology for the presentation of information		+		90	24	30	36	
PM 11	Systems and technology of animal keeping		+		98	40	22	36	
PM 12	The market and agricultural products trade, marketing, corporate governance and business start-up	+			316	120	88	108	
PM 13	The agriculture and the policy in the field of environment. Applied ecology		+		154	62	56	36	
MEO.00	**Modules defined by the education**				**218**	+	+	+	**2-8**

	organization**								
PT and PP 00	**The module of production training* and professional practice**				**396**				**6-8**
PP 01	Technology (graduation) practice		+		180				8
GP	Graduation work project				216				8
IC	**Interim certification**				**252**				
FE 00	**Final examination**				**132**				
FE 02 (ALPTQ)**	Assessment of the level of professional training and qualification assignment;				**24**				6,8
	Total for compulsory education				**5760**				
C	**Consultations**				Not more than 100 hours per academic year				
E	**Extracurricular activities**				Not more than 4 hours per week				
	Total hours of study time				**6588**				

Note

In the development and implementation of work training programs and plans of the organization of technical and vocational education they can:

– change up to 30% of the training time devoted to the development of educational material for cycles and up to 30% in each subject (module) and up to 50% of the production training and professional practice while maintaining the total number of hours for compulsory education;

– choose a variety of training techniques, forms, methods of organization and control of the educational process;

– in accordance with the needs of employers to change the curriculum content up to 30% in humanities and socio-economic modules and up to 50% on professional modules, production training and professional practice.

– introduce additional modules in vocational modules on demand of employers while maintaining the total amount of academic time (hours/credit) for compulsory education;

– To choose forms, to define the order and frequency of ongoing monitoring of progress of students and interim assessment of students;

The distribution of the learning training modules for courses may vary depending on the learning technologies, the specifics of the specialty, and other regional specificities.

Plan of the educational process (curriculum)
of technical and vocational, post-secondary education

Specialty: Farming (on a profile)
Qualification departments:
on the profile of livestock:"milking machine operator", "Horse Breeder", "Poultry Breeder", "Pig Breeder," "Camel Breeder"
on the profile of crop production: "Warehouse Worker", "Vegetable Grower", "Agriculturist"; "Gardener"; "Beet Grower", "Vegetable Grower" common ***to all profiles:*** "Accountant", "Agricultural Machinery and Tractors Setter", "Electrician of Electrical Maintenance", "Plumber Repairman", "Tractor Driver of Agricultural Production"
Farmer, Farmer Manager

Mode of study: Full-time
On qualification:
Advanced level qualification and Middle level specialist «Farmer» (1 years and 10 months)
«Farmer Manager» *continue training for* + 10 months
On the basis of basic secondary education
the total duration of training for all skill levels- 2 years and 10 months

Index	Names of modules, practices	Form of control			The amount of study time (hours)				Distribution by semesters
		exam	credit	course project / work	total	of them			
						theoretical lessons	Laboratory and practical, practical lessons	job training and professional practice	
1	2	3	4	5	6	7	8	9	10
GHD.00	**General humanities disciplines**				**300**				**1-3**
BGM.00	**Basic general professional modules**				**442**	**180**	**148**	**114**	**1-3**
BGM.01	Fundamentals of planning and	+			90	36	30	24	

	organization of the farm								
BGM.02	Preparing the soil for seeding and planting		+		90	36	30	24	
BGM.03	Growing crops, care and harvesting		+		110	44	30	36	
BGM 04	The basics of farm animals keeping				100	40	30	30	
BGPM 05	The theoretical driving course: the foundations for a tractor driver's license (III grade) (categories B, C)				52	24	28	+	5-6
PM.00	**Professional modules**				**1656**	**662**	**310**	**684**	**2-4**
PM.01	Production planning, work preparation and monitoring, accounting	+			+	+	+	+	
PM.02	The results of the enterprise activities		+		+	+	+	+	
PM.03	Cultivation of crops	+	+		+	+	+	+	
PM 03.1	Growing of cereals				+	+	+	+	
PM 03.2	*Growing root crops*				+	+	+	+	
PM 03.3	*Cultivation of crops*				+	+	+	+	
PM 03.4	*Cultivation of forage grasses and rational use of pastures*				+	+	+	+	
PM 04.	Use of modern industrial technologies	+			+	+	+	+	
PM 04.1	Greenhouse production				+	+	+	+	
PM 04.2	Organic farming				+	+	+	+	
PM 04.3	Energy crops				+	+	+	+	
PM 04.4	Forage production				+	+	+	+	
PM 04.5	Forestry				+	+	+	+	
PM.05	Food-producing animals breeding and keeping	+			+	+	+	+	
PM 05.1	*Breeding beef and dairy cattle*				+	+	+	+	
PM 05.2	*Goat breeding*				+	+	+	+	
PM 05.3	*Breeding productive horses*				+	+	+	+	
PM 05.4	*Camel breeding*				+	+	+	+	

PM.06	Meat animals breeding and keeping	+			+	+	+	+	
PM 06.1	*Breeding sheep and technology of production of mutton and wool*				+	+	+	+	
PM 06.2	*Breeding pigs and the pork production technology*				+	+	+	+	
PM 06.3	*Breeding of rabbits and technology of industrial production of rabbit meat*				+	+	+	+	
PM.07	Breeding of poultry and technology of production of eggs, poultry, fish, fur animals and bees	+			+	+	+	+	
PM 07.1	The technology of production of eggs and poultry				+	+	+	+	
PM 07.2	Breeding of fish and rearing of fur-bearing animals, bees				+	+	+	+	
The farmer-manager qualification (Applied Bachelor)					***972***	***388***	***260***	***324***	***5,6***
PM.08	Financial accounting, statistics and control. The capital and the law	+			224	90	62	72	
PM.09	Phytomedicine and plant selection		+		90	36	18	36	
PM 10	Methodology for the presentation of information		+		90	24	30	36	
PM 11	Systems and technology of animal keeping		+		98	40	22	36	
PM 12	The market and agricultural products trade, marketing, corporate governance and business start-up	+			316	120	88	108	
PM 13	The agriculture and the policy in the field of environment. Applied ecology		+		154	62	56	36	
MEO.00	**Modules defined by the education organization****				**278**	+	+	+	**2-8**
PT and PP	**The module of production training***				**396**				**5-6**

00	**and professional practice**								
PP 02	Technology (graduation) practice		+		180				
GP	Graduation work project				216				
IC	**Interim certification**				**144**				
FE 00	**Final examination**				**132**				
FE 02 (ALPTQ)**	Assessment of the level of professional training and qualification assignment;				24				4,6
	Total for compulsory education				**4320**				
C	**Consultations**				Not more than 100 hours per academic year				
E	**Extracurricular activities**				Not more than 4 hours per week				
	Total hours of study time				**4960**				

Note

In the development and implementation of work training programs and plans of the organization of technical and vocational education they can:

– change up to 30% of the training time devoted to the development of educational material for cycles and up to 30% in each subject (module) and up to 50% of the production training and professional practice while maintaining the total number of hours for compulsory education;

– choose a variety of training techniques, forms, methods of organization and control of the educational process;

– in accordance with the needs of employers to change the curriculum content up to 30% in humanities and socio-economic modules and up to 50% on professional modules, production training and professional practice.

– introduce additional modules in vocational modules on demand of employers while maintaining the total amount of academic time (hours/credit) for compulsory education;

– To choose forms, to define the order and frequency of ongoing monitoring of progress of students and interim assessment of students;

The distribution of the learning training modules for courses may vary depending on the learning technologies, the specifics of the specialty, and other regional specificities.

8 Explanatory note to the plan of educational process (curriculum) of the specialty

The amount of training time allocated in the curriculum on the study of **general subjects** on the basis of basic secondary education with general secondary education, remains constant in accordance with the SES RK General secondary education.

General humanities disciplines.

The study of humanities disciplines provides knowledge of the specialty terminology, communication in the state language to work in the field of the professional activities.

When developing working curricula and plans technical and vocational education institutions are give the right to redistribute education time available to study the modules: the basics of law in the industry, the psychology of communication, record keeping in the state language.

Basic general professional modules occupy an important place in the overall structure of educational programs of professional training of qualified personnel. The basic knowledge and skills that students acquire in the course of development of basic modules influence on professional future competence to solve issues with the full awareness of the integrity of all processes and phenomena, to perform competently course works, theses and practical works on the specialty.

The study of the ***professional modules*** is the basis of professional training of students.

The educational program is designed on the basis of the modular competency approach and is described as a form of knowledge, skills, basic and professional competence of the farming specialists on 3 areas:

year	The General Agriculture profile	The Crop Production profile	The Livestock Production profile
1-2 **(1)**	***Compulsory modules:*** BGPM 0.1 Module BGPM 02 Module BGPM 03 Module BGPM 04 Module ***Selectable modules*:** BGPM 05 Module	***Compulsory modules:*** BGPM 0.1 Module BGPM 02 Module BGPM 03 Module BGPM 04 Module ***Selectable modules*:** BGPM 05 Module	***Compulsory modules:*** BGPM 0.1 Module BGPM 02 Module BGPM 03 Module BGPM 04 Module ***Selectable modules*:** BGPM 05 Module
2-3 **(1-2)**	***Compulsory modules:*** **PM 01 Module** ***Selectable modules*:** 1 Module PM 03 (1-4) 1 Module PM 05 (1-4) 1 Module PM 06 (1-3) 1 Module PM 07 (1-5)	***Compulsory modules:*** **PM 01 Module** 4 Modules PM 03 (1-4)	***Compulsory modules:*** **PM 01 Module** PM 05.1 Module PM 05.2 Module ***Selectable modules*:** 1 Module PM 06 (1-3) 1 Module PM 07 (1-2)
3-4 **(2-3)**	***Compulsory modules:*** **PM 02 Module** ***Selectable modules*:** **2** Modules PM 04 (1-5) **or** **2** Modules PM 05.2-PM 05.4	***Compulsory modules:*** **PM 02 Module** ***Selectable modules*:** 2 Modules PM 04 (1-5)	***Compulsory modules:*** **PM 02 Module** **PM 04.1 Module** ***Selectable modules*:** 1 Module PM 05 (3-4)
4 **(2-3)**	***PM08-PM13***	***PM08-PM13***	***PM08-PM13***

This curriculum provides distribution of hours by modules, forms of control and the interim and final certifications based on the qualification level of students.

*The proposed curriculum recommends a combination of industrial training with professional modules, which means the content of vocational training is distributed to professional modules.

The organization of vocational training and professional practice includes:

- training and production work to instil skills (job training in laboratories and workshops);
- training and production work to develop skills, production training in teaching laboratories and workshops, professional practice and training in the workplace);
- passing of professional practice (industrial, technological, graduation).

The duration of each type of practice is determined by the work training programs and plans in accordance with the selected and specified profile and level of qualification.

Production training is carried out in training workshops, educational farms and training grounds under the guidance of the master of production training. Students master certain number of interrelated competence by type of the corresponding level in the course of practice.

Professional practice is carried out in the relevant organizations, the workplace and aims at consolidating the knowledge gained during the training, skills and professional competences. To increase the level of qualification, it should preferably take place in places where conditions and approvals to operate are identified. Before the start of production and technological practices an instruction is mandatory for students in accordance with the curriculum. Details of the organization of professional practice should be part of the contract between the company, educational institutions and students. Companies- employers set their own requirements for admission of students to professional practice based on learning outcomes for the main modules.

The criteria for passing to a higher level are the successful passing of the qualification examination (interim and final) on competence.

The interim certification is held at the end of the academic year. The number of intermediate examinations depends on the qualification level.

The duration of the interim qualification examinations is defined in the preparation of working curricula and can be conducted in writing of tests and the implementation of practical work. Forms and types of interim qualification exams are determined by the organization of education in the development of job training programs and plans.

Interim exam(s) can be divided into two parts. The first part reflects the content of modules of the relevant training year. Another part reflects the problems and tasks associated with the appropriate level of training (3, 4 or 5 NQF level)

Related content of the interim exam is determined by the content of the modules that students learn in this academic year. In addition, objectives and tasks shall be defined in such a way as to reflect the appropriate level of training (level 3, 4 or 5).

As a result of interim certification for a modular curriculum and passing the qualification exam for working professions which includes professional readiness level assessment and award students are assigned to the achieved vocational qualification

level (category, class, category).

The final certification of students of technical and vocational education institutions includes:

- assessment of students in educational institutions;
- Assessment of the level of professional training and qualification (for the set and advanced training levels).

The final certification of students in educational institutions is carried out to determine the level of development of educational programs by students on the basis of the full course of study.

Possible forms of final certification in educational institutions on the basis of completion of training educational programs: exams on basic vocational modules and professional (special) modules, or the performance and protection of the thesis with the delivery of the final certification exam by one of the professional modules.

Assessment of the level of professional training (hereinafter - ALPTQ) and qualification for higher level qualifications in the specialty consists of two phases:

1) A theoretical test on disciplines (modules), defining training;

2) Implementation of practical tasks by qualification levels.

The amount of training time to carry out the final certification is determined by no more than 2 weeks. Of these, at least 12 hours are given for organization and implementation of ALPTQ per group (depending on the specifics of the specialty and the organization of educational process may vary upwards).

Consultations and extracurricular activities are aimed at ensuring the individual abilities and requests of students.

Advisory classes are conducted mainly in the disciplines and modules on which the plan of the training process provides interim and final certification of students.

The list of disciplines and content of educational materials, amount of instructional time for consultation, time and form of consultation (group, individual, etc.) are determined by educational organizations.

The content of extracurricular activities aim at ensuring the development of the individual abilities and requests of students. These kinds of extracurricular activities include technical creativity classes, related to the future qualification and classes of sports and physical culture.

Extracurricular activities are provided by the working curriculum of an educational institution at the rate of no more than 4 hours a week and are not mandatory for the study.

The amount of time and form of consultations (group, individual, written, etc.) are determined by educational organizations in the preparation of the working curriculum.

The form of completion of education of the Farmer-Manager qualification is the performance and protection of the graduation work project.

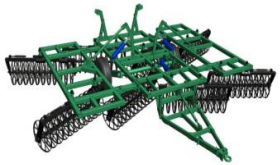
9. The list of recommended equipment

№	Name	Technical specification	Purpose of the equipment	The module (s) in which the equipment is used	Note
1	The Electrical materials standard set of training equipment, poster option, the ETM-SC computer version	Set of mini-modules. A set of conductors on electrical conductivity. The Hall sensor. A device for measuring the insulation resistance. Frame 2×4. Laboratory table with a two-compartment box. Set of connecting conductors. Guidelines, Technical Specifications, the USB oscilloscope software	Conductors and semiconductors. Study of the temperature dependence of the resistance of conductors. Study of the temperature dependence of the resistance of semiconductors (the definition of activation energy.) Determination of the resistivity of the conductor. Contact phenomena in conductors and thermoelectric power (specific thermal electromotive force). Photoconductivity. The contact phenomena in semiconductors and the barrier photoelectric effect (CVC of photodiode, photocurrent,	BGPM 01, PM 01, PM 02, PM 03	

			photo thermal electromotive force) Dielectrics Measurement of the dielectric constant of solid dielectrics Measurement of the dielectric loss of solid dielectrics Measuring the dependence of the dielectric constant and dielectric loss of temperature Measurement of the dielectric constant and dielectric loss of active dielectrics. Study of direct and inverse piezoelectric effect (the charge is in direct piezoelectric, piezoelectric modulus, the resonance frequency of the piezoelectric) Electrical breakdown in dielectrics (calculation of electric strength of air) Magnetic materials Removing the primary magnetization curve of a ferromagnet Study of ferromagnetic properties with the help of the		

			hysteresis loop (residual induction, coercive force, specific losses) Determination of the Curie point (the magnetic moment of the atom) Study of magnetic materials (coercive force, specific magnetic energy)		
	THE 2-ROW HINGED POTATO PLANTER L-201	Mk. Row spacing, cm The boot method Loading height, mm, not more Hopper capacity, kg Agrotechnical speed, km/ h, up to Productivity per 1 hour of basic time, ha Planting intervals, mm Drive unit Overall dimensions, mm Weight, kg	For seed planting of not germinated potato tubers		

	MILLING CULTIVATORS SF-2,8 (4,2)	Productivity ha/h 1.8-2.7 Working speed, km/h 6-9 Number of processed rows 4 Row spacing 70-75 cm Working depth 2-12 Working width 2.8-3 m	For inter-row soil cultivation and fertilizer application for all types of crops: maize, sugar beet, sunflower, tobacco, soybeans, vegetable crops.		
	BOLKO POTATO HARVESTER	Working width 0.625-0.750 m Working speed, km/h 1.5-5 Productivity ha/h 0.15 Bunker kg 1250 Weight kg 1800	In order to harvest potatoes and other root crops. The machine carries out digging tubers, cleaned from the ground and foliage, and further congestion.		
	Storage of potatoes and fruit and vegetable products (hangars of sandwich panels)	The optimum temperature and relative humidity during storage of potatoes, fruits and vegetables after cooling, and the approximate timing of the possible storage.	Storage of vegetable products up to 12 months		
	HARROW UNIT HU-24	HU-24 and its modifications are aggregated with tractors of 1,4 ... 4,0 m drawbar category with **the pressure** in the hydraulic	Closing of moisture during the preplant harrowing, harrowing after germination, stubble processing (straw collection into rolls)		

		hitch up rear up to 16 MPa (160 bar). Application of the spring-claw harrow provides: high-quality processing of topsoil, effective weed control, the creation of the layer of loose mulch on the field surface, accumulation and prevention of moisture evaporation.			
	TOWED DISK HARROW, Leader-4H	The modular design provides aggregated with tractors of classes from 1.4 to 6.0 ton	Highly efficient moisture conservation, combing weeds, field alignment.		
	SOIL CULTIVATING SEEDING MACHINE "OB"	– subsurface soil loosening retaining root crop residues to a depth of 4-8 cm; – formation of seedbed, agro-physical state which is close to the equilibrium density; – broadband direct seeding (20-25 cm) of grain and leguminous crops;	Direct band-sowing of crops		

		– compacting the subsurface - creation of a seal layer in the area of seeding (seed bed) under formed by it layer of mulch; created in such a way "hydro-lock" prevents the evaporation of moisture from the lower layers of the soil, as well as to effectively accumulate precipitation, use morning and evening dew; – trimming and combing on a surface of up to 98% of weeds (equivalent to chemical weeding); – soil crumbling; – quality leveling of the field surface in the transverse direction; – introduction of the starting dose of fertilizer.			

	UNIVERSAL GRAIN SEEDER UGS-21	Working speed, up to 10 km/h Width 205 cm Row spacing 23 cm Seeding depth of 4-8 cm Number of seeding apparatus in section 9 pcs Length 3920 mm Width 2230 mm Height 1800 mm Weight kg 1250	Sowing seeds of grain and leguminous crops on cereal backgrounds with simultaneous cutting of weeds, fertilization and pressing.		
	ROD SPRAYER, Patriot PS 2000.21	Width 18/21 m Capacity 2000 liters Working solution flow l/ha 10-80 Productivity ha/day, 50-120 Working speed, km/h 6-12	Designed for chemical protection of plants in a field from weeds, pests and diseases by treating field crops.		
	THE HEADER ROLLER, HR-10.7	Productivity per hour 8 ha Width 10.7 m Cutting height of 70 to 250 mm Working speed, up to 8 km/h Weight kg 2650 Length 4400 mm Width 12500 mm	Mowing cereal crops followed by laying in swath		

		Height 1900 mm			
	HARVESTER, ESSIL H-760	Performance, 18t/h Грузоподъемность, /h Length, 10850 mm The width at the header, 7600 mm Height, 4500 mm Weight with header, 16600 kg Uploading	For direct and separate arvesting of grains		
	GRAINTHROWER, GT--90-20-01M	The mobile grainthrower, with the capacity of up to 90 t/h, is designed for mechanization of loading and unloading operations in the following process steps: – loading and unloading of grain storages; – loading grain into vehicles; – mechanical shoveling of grain outdoors during the transportation of grain from the combine-harvester; – turners formation of heaps of grain delivered	The mobile grainthrower for mechanization of loading and unloading operations, formation of turners of grain heaps		

		by vehicles at the sites during the transportation of grain from the combine-harvester; – separation of grain from stripping.			
	THE SAD GRAIN CLEANING EQUIPMENT	**Performance:** previous cleaning - up to **6** t/h primary cleaning - up to **4** t/h on calibration (sorting) - up to **2** t/h **Consumption capacity:** 2.5 kW **Dimensions:** Length - 2565 mm. Width - 700 mm. Height - 1850 mm. **Weight -** 313 kg.	The SAD Separators - machines for treatment of cereal seeds		
	GRAIN DRYER, GD-16	– wheat, oats, barley moisture removal from 19% to 15% (by foreign techniques); – wheat, oats, barley moisture removal from 20% to 14% (by GOST	For drying of grains of cereals, legumes, oilseeds of any humidity degree		

		5886-84); – rye moisture removal from 20% to 14%; – sunflower moisture removal from 19% to 9%; Capacity control limits, t/h ... 5-25. Specific fuel consumption for grain drying from 20% to 14% not more than 6 tonnes.			
	KAMAZ, MAZ	The wheel formula 4x2. Weight, kg 18650. Gross vehicle weight, kg 44000. Permissible front axle load, kg 7150. Permissible rear axle load, kg 11500. Permissible load on the saddle, 10600 kg. Load capacity, kg Square platform m2 Platform capacity, m3 Curb weight of car, kg Maximum speed (km/h) Engine YaMZ-6582.10 Engine power (hp) 330 Gearbox YaMZ-239 or	Transportation of grain		

		9JS135A Number of gears 9. The gear ratio of drive axles Air or spring suspension Tire size 315/80R22,5 315/70R22,5. The fuel tank 500. Large cabin with low roof Ecological type of Euro-3.			
	Subsurface cultivators KPSh-9	1. width, m - 9 2. Working speed, km/h - 8 ... 10 3. Productivity, ha/h - 7.2 ... 9 4. Transport speed, km/h - 15 5. Working depth, cm - 7 ... 18 6. Overall dimensions, mm: length - 4770; working width - 9580; transport width - 4270; 7 Weight, kg - 3000 8. Traction tractor class - 5	For basic soil cultivation		
	Trailed mower, BERKUT 3200	Productivity per 1 hour of the main time, ha/hour, up to 4.5	Mowing natural and scattered grasses for hay		

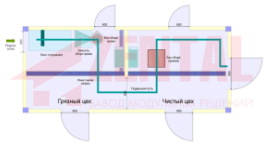
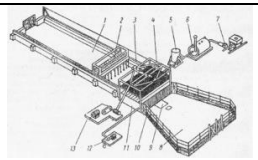
		Productivity per 1 hour of operating time, ha/hour, up to 3.38 Width, m 3.2 Working speed, km/h, up to 18 Travel speed, km/h, up to 20 Weight, kg, not more: The mower with air conditioning 1530 Without air conditioning 1360 PTO speed r/min 1000 Rotor speed, r/min, to 3000 The width of the tractor track, mm 1600 Transport clearance, however, mm 280 Overall dimensions, mm length 6730			

		width 3100 height 1490			
	Mower-crusher mounted, MCM-F-1500	Capacity per hour of basic time, t/h. 18 Working width mm .. 1500 Capacity kg/s, at least (during harvesting green mass of the yield of not less than 20 t/ha, and the humidity not less than 80%). 5 Cutting length, mm. up to 200 Operating speed, km/h. 8 Transport speed, km / h. 20 Dimensions in working position, mm: - length/width/height . 7650/3800/4000 Weight, kg ..900	For mowing green grass, corn with simultaneous chopping and loading into vehicles		
	Round baler, RB-F-145	• Total weight, kg: 2200 • Width, m: 1.4 • Productivity, ha/h0.6-1.3	Selection of rolls of hay, straw, pressing them into rolls with the subsequent winding of twine		

		• Length:2700 • Width: 2400 • Height: 2300			
	Self-propelled forage harvester SFH-600	• The transport speed not more 20 km/h. • Operating speed, max km/h 12. • Number of wheels: controlled/leading 2/2 pcs • Base/ground clearance 2025/250 mm • Wheel track: controlled/leading 2710/2600 mm • Overall dimensions and weight of a self-propelled chopper without adapters • Length 6400 mm • Width 3640 mm • Height 3640 mm • Cutter weight 7800 kg • Dimensions and weight of a self-propelled chopper in transport	For cutting corn in any ripeness stage, sunflower and other tall crops with simultaneous chopping and loading into vehicles		

		position with the pick-up • Length 8400 mm • Width 3700 mm • Height 3700 mm			
	Rotary mounted rakes kolibri ZIS-2.0	Productivity, ha/h, up to 5,4 Width, m, up to 4.7 rotor diameter, 3.6 m Swath width, m 1.4 Working speed, km/h, to 12 Weight, kg, not more 600 Overall dimensions 4500x4000x1200 PTO speed, r/min, 540 with tractors t/s 1.4	It performs a thorough raking swaths of grass in smooth rolls		
	Universal tractor feeder, UTF-10	Brand *CT-10* *()* Type trailer Load capacity, kg 4000 Body capacity, m^3 10 Overall dimensions, mm - length 6700- width 2300 -height 2470 Weight, kg 2000 Track, mm	Transport and distribution of crushed fodders		

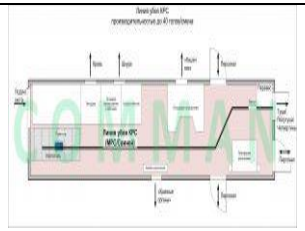
		1600/1800			
	Grain crusher, BDK-10P	Productivity t/h 10 Installed capacity, kW/h 75 Overall dimensions, mm: length 3020 width 1500 height 3170 Weight, kg 1900	For grinding wheat, barley, etc.		
	Drinker for cows Model-60	Cast iron enameled bowl. Flowing tubular brass valve. Connecting to the water supply v.p. ½" above and below. Water flow through the valve without splashing. With 4 fixing holes	For automatic watering of animals		
	Manure scraper conveyor, MSC-3B	Scraper MSC-3,0B allows you not only to clean up the manure, but also to - make its loading into a - vehicle. In contrast to the MSC-2,0B it has separate	Manure fastened maintenance of livestock and simultaneous loading on vehicles		

		drives horizontal and inclined conveyors, as well as other traction design.			
	Modular butchery, M1	Modular butchery is a container assembled from metal structures and sandwich panels, equipped with a production line and special devices. The slaughter performance **up to 10 heads per hour**.	To slaughter sheep		
	Set for bathing sheep	The MKU-1 Installation (Fig. 87) consists of a pen 1, a pushing cart 2 and a track 3, a bath tube 11, a platform frame 4, platform for the sheep redeems 8, lifting bath wall 10, pump 12 and actuator 13. For the preparation of an emulsion the installation is equipped with a boiler 6 and the mixer 5.	For preventive treatment (washing) of sheep with disinfection solutions		

	Segment-finger mowing, SFM 2.1	• Working width: 2,1 m • Cutting height: 40-80 mm • Power on the drive; up to 7.5 kW • Operating speed: up to 12 km/h	Designed for mowing of wild and cultivated herbs on flat areas.		
	Sheepfold	The height of the fence in a paddock must be at least 1 meter, although it is desirable to do more than 1.4-1.5 meters. Columns for fastening the fence, are driven over a distance of two meters from each other and filled with cement mortar or concrete, for reliability. Boards, Rabitz net or shaped sheet can be used as the boundary material that will be engraved on the frame of the timber. Do not also forget about the canopy, because the sheep most of the day are found in the	Sheepfold required for stall-pasture or stall maintenance way.		

		pen, and so they should be protected from rain, snow and sun. As a canopy cover usually the slate or corrugated board or other roofing materials are used.			
	The cattle shearing machine MSU-200	High-frequency electric shearing machines MSU-200 are powered by the inverter. The inverter converts the alternating current with the primary voltage of 220 V and the frequency of 50 Hz into safe 36 V and the frequency of 200 Hz to power electric machines. 200 Hz allows the machine to issue 10,600 rev/min compared to other machines in the turns the knife moves faster which allows to cut quickly	Designed for a quick shearing of cattle		
	Carts for forage	They vary in shape, size (capacity from 100 to 600 liters), weight (20 to 250 kg) and the manufacture materials that must meet	They are used in stables for fast and convenient delivery of forage to horses.		

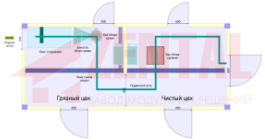
		health and safety standards. Forage carts can be equipped with stable covers and additional dividers that allow you to post in a convenient manner the various components and to create the desired feed mixtures for horses in place.			
	Manger for stables	Made of galvanized and stainless steel in the form of gratings of various shapes or made of plastic. Volume - from 50 to 300 liters. A variation is a forage table, i.e. combined version, combining 2 types of forage - for cereal mixtures and hay.	Manger-feeders are designed for short storage and economical feeding horses with roughage.		
	Forage preparation equipment for stables	Weight (40 to500 kg), but also by manufacturing material, form of the roll working surface, the motor power (kW 0,55-11,0) and technical performance (40-2000 kg/hr)	Designed for rolled oats, peas, beans, maize and other coarse grains without the formation of flour in order to preserve its nutritional value and improve the quality of fodder for horses.		

	Drinking bowls for horses	The material of production of drinking bowls for horses is traditionally plastic, enameled cast iron, stainless steel and aluminum, which provide the required level of hygiene and safety.	For watering horses in stalls		
	AD-02SK "Farmer"	The capacity of the milking bucket, (litres) 20 Net power of motor, (kW) 0.75 Length, mm 750 Width mm 440 Height 650 mm Weight kg 34	The milking device for horses		
	Slaughterhouse for horses	The maximum carcass weight of 500 kg Maximum productivity, g/shift 40 Water consumption per 1 carcass, 80 litres The consumption of water for cleaning the line, 2 m3 Jobs up to 6 people	To slaughter horses		

	"Burenka" the milking machine for horses, goats, camels	This milking machine is very reliable and quite easy to operate. Anyone can master the technique of milking horses, goats, and camels. With the help of the milking machine udders are emptied completely, manual milking is not required.	For milking camels		
	The camel shearing machine MSU-200	High-frequency electric shearing machines MSU-200 are powered by the inverter. The inverter converts the alternating current with the primary voltage of 220 V and the frequency of 50 Hz into safe 36 V and the frequency of 200 Hz to power electric machines. 200 Hz allows the machine to issue 10,600 rev/min compared to other machines in the turns the knife moves faster which allows to cut quickly	Designed for a quick shearing of camels		

	Round baler, RB-F-145	• Total weight, kg: 2200 • Width, m: 1.4 • Productivity, ha/h0.6-1.3 • Length:2700 • Width: 2400 • Height: 2300	Selection of rolls of hay, straw, pressing them into rolls with the subsequent winding of twine		
	Trailed mower, BERKUT 3200	Productivity per 1 hour of the main time, ha/hour, up to 4.5 Productivity per 1 hour of the operating time, ha/hour, up to 3,38 Width, m 3.2 Working speed, up to 18 km/h Transport speed, up to 20 km/h Weight, kg, not more: The air conditioner mower 1530 Without air conditioning 1360 PTO speed r/min 1000 Rotor speed, r/min, to	Mowing natural and scattered grasses for hay		

		3000 The width of the tractor track, mm 1600 Transport clearance, at least, 280 mm Overall dimensions, mm Length 6730 Width 3100 Height 1490			
	Grain crusher, BDK-10P	Productivity t/h 10 Installed capacity, kW/h 75 Overall dimensions, mm: Length 3020 WIdth 1500 Height 3170 Weight, kg 1900	For gri ing eat, barley, etc.		
	FEEDER FOR PIGS, THE KA-10	This feeder consists of: • polyethylene, soft hopper (flex under strong pressure and shocks), with capacity of 65 liters, it also has the forage flow rate; • Stainless steel dispenser with uniform feed and food control; • A manger and a feed	**For rearing of fattening pigs**		

		sprinkler to it, of stainless steel;			
	Automatic nipple drinker 1/2 x 3/4 for sows	Pipe connection - threaded 1/2 "; Carcass- 3/4" Length - 80 mm • Recommended for pigs weighing from 120 kg	For watering pigs		
	Forage chopper, LH 2000	Brand LH 2000 Capacity 2 kW Voltage 220 V asynchronous motor type Productivity kg/h Overall dimensions mm 360 325 *285* 215 Weight Kg 19	Designed for crushing wheat, barley, rye, peas, corn in the preparation of pet food		
	Modular butchery, M1	Modular butchery is a container assembled from metal structures and sandwich panels, equipped with a production line and special devices. The slaughter performance **up to 10 heads per hour**.	To slaughter pigs		
	Stall for breeding piglets, Agrivan	The height of the barrier is 800 mm (3 plastic rungs DUR 200/30 + 2x ¾ "ZN pipe). Lower construction is also of hot dip galvanized steel. PVC piping 125 for	For breeding piglets		

		removal of slurry on the valve is also a part of the stall.			
	Industry cages for rabbits	Cell width 2.05 m length 2.45 m. The cells can be used without automated systems, but they should be installed in a warm room, that is, in winter the temperature should be no lower than 10-12 degrees.	For breeding rabbits		
	Automatic feeding system for "The Practice" series cell	The actuators are designed for feed production lines with the length of up to 80m, but the most efficient is the length of the cell battery 40-45m. The system allows the use of one or more types of feed. The system is driven by electric motors located in the end of each pipeline	For automatic feeding of rabbits		
	Automatic watering system for the "Practice" series cell	The system allows for the supply of vitamins and medicines, the dispenser is mounted directly on the pipeline and is supplying the necessary drugs in water.	For automatic watering of rabbits		

	Twin-shaft paddle mixer, the SG-1	The performance up to 5 tones per hour. Engine power kW: mixer/agitator/Screwer 7,5 / 1,5 / 1,5]Uniformity of mixing 98% The duration of mixing 1-2 min Entering liquid components up to 10% Hopper capacity of 1 m3 Dimensiones, mm 2016 x 1560 x 1623 Wieght	Designed for the production of animal feed		
	The equipment for slaughter of rabbits	**Operations in carrying out the slaughter:** 1. Stun or anesthesia of rabbit. 2. Slaughter and bleeding. 3. Dressing and trimming the front paws. 4. Evisceration. 5. Trimming the hind legs. 6. Packaging, labeling. 7. Cooling.	For industrial slaughter of rabbits		

	Bath "Octopus-12" for scalding poultry	Power: 12 kW Voltage: 380 V Volume: 250 litres Диапазон регулировок температуры: 30 - 90 °C Overall dimensions: 900x800x600 mm Valuable container size: 700x700x500 mm Weight - 16kg Housing material: food polypropylene Operating temperature: from 0 to +85 °C. Service staff: 1 person. Payback: 1 month	For heat treatment of quails, chickens, hens, ducks, geese, and other agricultural and wild birds.		
	Bunker feeder 3 litres	Volume: 3 litres Height: 230 mm The outer diameter of the pan: 230 mm The outer diameter of the glass: 150 mm Pallet height: 30 mm Glass color: translucent Pallet color: red Operating temperature: from 0 to +50C.	For feeding the birds		

	Drinking bowl	Setting parameters: hose thread channel 1/2 " Cup capacity: 20 ml Cup height: 30mm Operating pressure of water: 150 - 400 mm of a water column The direction of the impact on the pusher: any (possible side) Serviced number of birds: up 10 heads at the floor maintenance Allowable water losses: no more than one drop in 2 minutes Weight: 2 kg.	For watering birds		
	Cages for poultry	Material: Plastic Manufacturer: Russia cells size: 25x25 Section size: 25x25 Number of Units: 1 Number of levels: 1 Giving to drink: nipple Feeding: bunker tray	To keep the birds		

	Mini carnage, "Octopus Prof-200"	Performance: 200 carcasses/hour Capability: 14,55 kW Occupied area: 30m2 Weight: 200kg Cold water consumption: 1m3h Applicability: chicken, duck, goose, turkey	To slaughter poultry		
	SANOVO SW6 Compact Egg Washing Machine	Cleaning time 48 s Capacity up to 10,800 eggs/hour Water consumption 20 l/h Steam consumption 35 kg/h at 4 bar Electrics 3x380 VAC, 50-60 Hz The installed capacity of 3.75 kW	For the egg wash		

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