

Vitebsk State Academy of Veterinary Medicine  
Faculty for International Relations

**THE FIRST  
INTERNATIONAL STUDENTS  
VETERINARY CONGRESS  
«StVC-2020»**

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## **THE PROBLEM OF TRANSBOUNDARY ANIMAL DISEASES IN LEBANON AND WAYS OF ITS SOLUTION**

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Cross-border animal diseases are critical to the economies, trade relations and food security of many countries. They are characterized by a wide interstate distribution on the scale of epizootics, which require coordinated efforts of several countries to deal with. These diseases cause high morbidity and mortality of animals, posing a threat to the country's livestock.

In Lebanon, the spread of cross-border diseases is associated primarily with the influx of refugees fleeing a military conflict in a neighboring country who carry a large number of susceptible animals.

According to the official data of the International Epizootic Bureau, three especially dangerous and economically significant infectious diseases of animals, with a tendency to cross-border spread, are spread in the Lebanese Republic – infectious nodular dermatitis in cattle, foot and mouth disease and small ruminant plague [1, 3, 4]. This group of diseases causes tremendous damage, which consists of: 1) deaths, destruction and forced slaughter of animals, disposal of corpses and waste, reduction of animal productivity due to their disease; lack of offspring due to illness and infertility of animals; loss of breeding value of animals; due to the reduction (rejection) of products and raw materials. These aspects lead to a threat to the economic and food security of the country due to huge losses of livestock products and, consequently, losses for the processing industry. In this regard, foot and mouth disease received the informal name «economically devastating livestock disease». Losses in the production of livestock products due to the depopulation of susceptible animals as an effective measure to combat this disease, a decrease in the supply of meat, dairy products, live animals, reach a loss of millions of dollars; 2) damage associated with special veterinary (quarantine and control and preventive) measures; 3) dangers for the population of the country with anthroozoonoses (for example, with foot and mouth disease); 4) the possibility of mass death

of a population of susceptible wild animals, which can lead to environmental disaster, etc.

In the fight against cross-border animal diseases, Lebanon is greatly assisted by international organizations. The Food and Agriculture Organization, in collaboration with other countries, is running a program called «Improving Resilience to External Factors to Ensure Food and Nutrition Security» along the border between Syria and Lebanon. In Lebanon, the Food and Agriculture Organization is providing government support for a vaccination campaign for livestock in border areas. These measures reduce the number of infected animals, thereby protecting vulnerable populations living in rural areas from livestock deaths from transboundary animal diseases. By the way, the Food and Agriculture Organization and the World Organization for Animal Health pledged to eradicate the plague of sheep and goats in Lebanon by 2030 [2]. The program supplies high-quality feed, organizes field schools that allow farmers to share advanced livestock and crop production technologies with each other.

Thus, cross-border animal diseases are highly contagious and spread rapidly, regardless of national borders. They cause high morbidity and death of animals and therefore have serious socio-economic consequences, and sometimes dangerous to human health.

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**THE USE OF INHALATION ANESTHESIA FOR THE COMBINED ANESTHESIA IN SURGICAL OPERATIONS IN SMALL CATTLE AT THE DEPARTMENT OF SURGERY AT THE VITEBSK STATE ACADEMY OF VETERINARY MEDICINE**

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In this article I would like to share the experience of using inhalation anesthesia during combined anesthesia in small cattle on the example of sheep and goats at the Department of Surgery of the Vitebsk Academy of Veterinary Medicine. Taking into account the world's trends, sheep breeding is the most acceptable and promising for the republic, there are meat and meat-haired areas of sheep productivity. Treatment and prevention of diseases in these animals requires a lot of economic costs and modern approaches in the treatment and prevention of diseases. But also it requires modern approaches and ways to provide medical care for these animals as xylazine in mono mode is not enough for some operations.

Research was conducted in 2018-2020 on the basis of the surgical clinic, vivaria, laboratory of the Department of Surgery of the Vitebsk State Academy of Veterinary Medicine, also using animals received for treatment from private farms. Animals such as sheep and goats belong to the group of small cattle. Drugs: anesthefol 1%, sedamedine, allervet1%, lactic acid. In ruminants the use of anesthesia is complicated by the specific anatomy and physiology of animals of this species. To reduce the likelihood of complications, we predict before surgery and monitor the patient after surgery. Pre-medicine is a set of measures designed to prepare patients for general anesthesia and surgery. As a preliminary medicine, we kept the animals on a 24-hour starvation diet, 12 hours before the operation was limited to water, and 0.5 hours before the operation, the animal was given "80% lactic acid" diluted with water as a means against fermentation [1], allergic reactions, and also it helps to reduce the impact of external stress factors on the body during the preparation of the animal for surgery. Also, "allervet 1%" potentiates the

action of many drugs used for sedation and anesthesia. After the introductory anesthesia, we put the animal in a side position on the right side. After installing the tube, we inflate the cuff of the tube in the animal's trachea, and the other end can be fixed and on the lower jaw of the animal, such as a piece of bandage. We put the concentration of the inhalation mixture at the level of 2-3%. Depending on the operation and the patient's indicators, this concentration can be changed [3]. The monitoring of vital indicators is carried out by an anesthesiologist with the help of the patient's monitor (it shows such important indicators as body temperature, pulse, heart rate, systolic and diastolic pressure, pulseoxymetry - the amount of oxygen in the blood, capnography - concentration of carbon dioxide in the inhaled and exhaled mixture, the number of breathing motions) [2]. Monitoring allows to identify in the early stages of deviation, to start a set of measures to eliminate complications, thereby preventing more serious, non-reversible consequences in the body, which can lead to organ failure and death of the animal. At the end of the operation, the animal was also monitored by an anesthesiologist and a patient monitor, and the monitoring is carried out until a swallowing reflex appears, which tells us that the endotracheal tube can be removed. After removing the tube, the goats and sheep usually quickly begin to be active, after 20-30 minutes after the removal of the tube, they stand on their own limbs and move. After surgery and anesthesia, rumination was measured every hour (the number of reductions in most cases increases over time). After 5-6 hours after surgery, the animals reached about 3-5 movements depending on the type and the sex of animal underwent surgery [4].

In comparison with other methods of general anesthesia, the use of combined anesthesia has a number of advantages: low level of toxicity of drugs used for combined anesthesia; rapid awakening of the patient; the possibility of using during long operations; high analgesic effect in combination of drugs; it has minimal impact on the internal organs, which allows to use this method of anaesthesia when handling animals are in a serious condition or in old age. Our research has shown that the combined anesthesia has a large list of advantages compared to other methods. With proper postoperative care, the survival rate of patients in



the postoperative period and their recovery are faster, compared to other types of anesthesia.

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## **GRASS OF THE DESERT: COMPOSITION, PROPERTIES, VETERINARY USE**

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Motherwort herb was widely used in the Middle Ages, then it was forgotten. Only at the end of the XIX century it was again used as a remedy for heart diseases. In the 30s. of the XX century grass motherwort began to replace valerian. As for its sedative effect, motherwort was 1.5 times more effective than drug valerian [1]. Motherwort grass is collected in the phase of the beginning of flowering and dried grass of a wild-growing and cultivated perennial herb of the heartwort (motherwort ordinary) – *Leonurus cardiaca* L. and five-bladed motherwort – *Leonurus quinquelobatus* Gilib., Family Lamiaceae (Lamiaceae). Only these species of the motherwort genus are used as medicinal raw materials.

Motherwort grasses bloom in July – September and bear fruit in August – September [3]. Cardiac motherwort is widespread in the Mediterranean, Atlantic, Central and Eastern Europe, Scandinavia, Asia Minor, Mongolia, China, as an alien plant in North America [4].

The authenticity of motherwort grass is established by external signs, using microscopy, as well as using thin layer chromatography [5].

The pharmacological properties of motherwort grass are inextricably linked with its rich chemical composition: stems and leaves contain carbohydrates, alkaloids (0.035-0.4%), essential oil, tannins (up to 2 %), bitterness, flavonoids (rutin, quercetin 7- glucoside, quercetrin, quinqueloside, cosmosyin, isocvercitrin, hyperoside), alkaloids (leonurin, leonuridine), saponins, glycosides, paracoumaric and ascorbic acids (23,6 – 65,7 mg %), beta-carotene. The flowers also contain stachidrin alkaloid (up to 0,4 %), which has a cytoprotective effect, increasing the activity of antioxidant enzymes superoxide dismutase, glutathione peroxidase. Motherwort seeds are rich in fatty oils (up to 30 %). The motherwort contains numerous mineral components: macrocells - potassium, calcium, magnesium; trace elements - manganese, iron, copper, zinc, molybdenum, chromium, vanadium, selenium, nickel, strontium, lead, boron [6]. Motherwort herb stabilizes the heart rhythm and strengthens the myocardium, has sedative, antispasmodic and anticonvulsant effects, reduces blood pressure, cholesterol, glucose, pyruvic and lactic acids, stabilizes protein metabolism and removes excess fats. Motherwort is effective for the treatment of gastrointestinal diseases, especially with stomach cramps and catarrh of the large intestine. It has diuretic, anti-inflammatory and expectorant properties [4, 5].

In veterinary medicine, drugs are used on the motherwort base. "Motherwort tincture" is used for cardiovascular neurosis, increased nervous irritability, cardiosclerosis, coronary heart disease, myocarditis, heart defects and mild forms of basedovoy disease. It is used internally for horses and cattle – 10-15 ml, for small cattle – 3 - 5 ml, for pigs – 2 - 3 ml, for dogs – 0,5 - 1,5 ml 2-3 times a day. FITEX soothing drops for dogs and cats are prescribed for dogs and cats for soft correction of psychogenic behavioral disorders: increased irritability, including during sexual hunting (increased vocalization, meowing, tagging, intraspecific aggression), a sense of fear, irritability, during various events and manipulations. It is applied inside forcibly to the root of the tongue or to the buccal region. You can apply drops directly to the treat and let the animal eat it 1 hour before the main feeding at the rate of 1 drop of the drug per 1 kg of the animal's weight 3 times a day. The duration of use is

15 - 30 days, depending on the condition of the animal and the individual characteristics of the body. "Cat Bayun infusion" is used, starting from 10 months of age, to correct the behavior of cats and dogs: aggression, phobias, violation of sexual behavior, hyperactivity, causeless constant barking, coprophagy. The drug is administered orally: cats 2 ml, dogs 4 ml 3 - 4 times a day for 5 - 7 days every month, or added to water for drinking. Contraindication for the use of the drug is an individual hypersensitivity to the components of the drug.

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## **MORPHOMETRIC PARAMETERS OF MEDIUM AND LARGE MARKETABLE CARP OF A HYBRID BREED**

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Commercial fish farming in the Republic of Belarus at the present stage occupies one of the leading positions in the provision of food to the population. This is due, first of all, to the fact that the fishing industry is a rather promising direction for the development of agriculture. Further development of fish farming will be closely associated with an active increase in the production of marketable fish and a decrease in the cost of raising it.

The object of carp pond fish farming is the main Republic of Belarus. It is universally bred in artificial ponds in natural reservoirs, it has a good growth rate, high taste [1, 2]. A large list of morphometric data characterizing the shape and size of the fish's body is used to characterize nutrients and trade, create industry and fish species of various fish processing equipment, conduct energy calculations, mass transfer processes [3].

The aim of the research was to study morphometric parameters of medium and large commercial carp of a hybrid breed of Lakhvinsky scaly and Amur carp. Work is based on the study of Public corporation "Fish farm "Novinki".

Materials and morphometric parameters were carried out at the Department of Pathological Anatomy and Histology of the Ural State Autonomous High-Aviation Medicine Department. Medium and large commercial carp hybrid was used as the starting material for breed Lakhvinsky scaly and Amur common carp in the amount of 3 individuals of two years old, which were purchased at Public corporation "Fish farm "Novinki". Before starting morphometric studies, all the studied fish were weighed. To assess the exterior indicators characterizing the physique of the fish, the following indicators were determined: absolute length body length—L, ichthyological length—l, head length —C and maximum body height —H. Measurement was conducted using a standard student ruler.

All received digital data were processed statistically. The mass of individuals studied varied from 422 to 475 g. ( $453,00 \pm 19,54$  g.), which corresponds to the parameters declared by the fish producer that are typical for the average commercial carp. When studying morphometric parameters, it turned out that for the average of commercial carp, the absolute body length (L) is on average  $32,60 \pm 1,14$  cm, ichthyological length (I) is  $27,74 \pm 1,49$  cm, head length (C)  $8,00 \pm 0,70$  cm, and the highest body height (H)  $6,90 \pm 0,54$  cm. The mass of the studied individuals of large commercial carp ranged from 875 to 1205 g. ( $1061,66 \pm 169,21$  g).

Morphometric studies showed that for a large commercial carp, the absolute body length (L) on average is  $42,33 \pm 1,15$  cm, the ichthyological length (I) is  $36,00 \pm 1,00$  cm, and the head length (C) is  $12,33 \pm 0,57$  cm, and the highest body height (H)  $8,23 \pm 0,75$  cm.

The obtained morphometric indicators give a clear idea of the obtained morphometric characteristics of the medium and large hybrid breed, crossing commercial salmon of Lakhvino squamous carp and Amur carp, grown at Public corporation "Fish farm "Novinki" selection and genetic.

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## **COMPOSITION, PROPERTIES AND APPLICATION OF THE MEDICINAL SAGE IN VETERINARY AND HUMAN MEDICINE**

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Sage is one of the most commonly used medicinal plants in medicine and veterinary medicine. *Salvia officinalis* (pharmacy) – *Salvia officinalis* L, a species of the genus *Salvia* Lamiaceae, is a herbaceous plant or shrub up to 70 cm high with a strong pleasant odor.

The birthplace of sage is the Mediterranean coast. Translated from Greek, sage means well-being and health. Growing now everywhere, its plantings are cultivated in Moldova, Crimea, southern regions of Russia.

Leaves are harvested at the beginning of flowering; upper leaves and inflorescences are especially valuable. They are carefully cut and dried in the shade. Dry grass is stored for 2 years.

*Salvia officinalis* has a rich chemical composition of a variety of biologically active substances. All parts of the plant contain essential oil (up to 2.5 %). Its main components are cineole (a natural antibiotic, up to 15 %) and bicyclic terpenes. The leaves contain sesquiterpene cebren, triterpenic acids, resin, gums, starch, protein, tannins, and volatile substances with a strong bactericidal effect [1]. Sage contains such acids as oleic, linoleic, linolenic (unsaturated acids, have an antioxidant effect), ursolic (has an anti-inflammatory, antitumor effect), chlorogenic (an antioxidant, exhibits antimicrobial properties), as well as the natural antibiotic salvin. The plant contains beta-carotene (provitamin A), lutein, vitamin E, vitamin K, vitamin PP, as well as macro- and microelements: potassium, calcium, magnesium, sodium, phosphorus, iron, manganese, copper, selenium, zinc.

Essential oil, which includes about 350 aromatic components, gives the plant and medicinal raw materials a peculiar aroma and determines their therapeutic effect. Essential oil and leaves have antiseptic properties.

Infusion of leaves and flowers of sage has a strong tonic, disinfectant, astringent, anti-inflammatory effect. It is used in various inflammatory processes, for irrigation of the oral mucosa, as a hemostatic agent, for gastritis, for spastic colitis. Sage is used in a complex of therapeutic measures for articular rheumatism, chronic inflammatory processes, for exchange-dystrophic diseases of the joints, for radiculitis, osteochondrosis in the form of general or local baths, for applications. Their appointment during pregnancy is contraindicated [2, 3].

The use of sage in folk medicine is diverse: decoctions, tinctures, infusions, inhalations, teas, compresses.

One can use sage infusion for mood swings, stresses, increased excitability. In a glass of boiling water add 1 tbsp. plant leaves, leave it to stand, wrapped for 40 minutes. Drink like tea (2-3 times a day), adding honey. You can prepare a decoction of sage herb: 1 tbsp. a spoonful of grass in 500 ml of boiling water is heated for 15 minutes over low heat. Broth is drunk 10 days before meals, 100 ml 3-4 times a day. To rinse the throat, sage, chamomile, calendula (1 part each) are infused in three glasses of boiling water for 30 minutes, gargle is carried out with warm broth 3-4 times a day.

Sage is also widely used in veterinary medicine as an astringent, anti-inflammatory, disinfectant in the form of infusions (1:10) per dry leaf inside: for horses – 25-60 g; cattle – 30-80 g; sheep - 10-15 g; pigs – 5-10 g; dogs – 2-6 g 3 times a day. For diarrhea, calves are recommended to use sage infusion (1:20) in an amount of 300-400 ml 3 times a day for 3-5 days [1].

The following sage preparations are available in pharmacies:

- "Sage leaves" (raw materials shredded), astringent, anti-inflammatory agent;
- "Salvin" (1 % alcohol solution of a thick acetone extract), astringent, anti-inflammatory agent;
- "Elekasol" - antimicrobial, anti-inflammatory collection;
- tablets and lozenges for resorption (contain extract and essential oil), antimicrobial, anti-inflammatory, astringent, expectorant;
- "Altaleks", "Broncholitin Sage", "Fitolizin" and others. - combined medicines containing sage essential oil.

Thus, *salvia officinalis* has a rich and diverse chemical composition that beneficially affects the body of animals and humans in various pathological conditions, is an affordable and cheap medicinal raw material, which allows it to be used to obtain drugs with a wide spectrum of action for the treatment of diseases of various etiologies.

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## **COMMON TANSY: COMPOSITION, PROPERTIES AND APPLICATION IN VETERINARY MEDICINE**

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Common tansy - *Tanacetum vulgare* L. has long been used in medicine and veterinary medicine. The scientific name of the genus comes from the Greek words "tanaos" - long and "aceomai" - to live, which emphasizes the property of the plant to remain fresh in the bouquet.

Common tansy — a herbaceous perennial of the complex-colored family - Asteraceae. Thickets of the plant are formed by long underground rhizomes with lobes of thin roots. The stems are numerous, up to 150 cm high, with a mass of hemispherical inflorescence baskets collected on the top of the stem in the form of a shield. The leaves are oblong, twice pinnate, up to 20 cm long and up to 5 -10 cm wide.



Fractions of the leaf are lanceolate, pinnately incised. Hemispherical flower baskets have small yellow tubular flowers. The fruit is an oblong achene. It blooms in July-September; the fruits ripen in August - October.

Common tansy grows in the European part of Russia, in Western and Eastern Siberia, the Far East, the Caucasus and Central Asia, Western Europe, Turkey, China, Mongolia, Korea and Japan. It is brought to North America. It is found in meadows, steppes, among shrubs, in sparse forests, along river banks, on roadsides, and wastelands. In the mountains comes to the middle zone. It's toxic for livestock [1].

Inflorescences of tansy have healing properties. They are harvested manually without pedicels during flowering. They are raised dry in the shade at the temperature of no higher than 250 C in attics, in well-ventilated rooms. You can't often rake and overdry the raw materials, since the baskets are scattered. The activity of raw materials after storage during the year is reduced by 25 %.

The leaves and flower baskets contain essential oil, which includes camphor, flavonoids, alkaloids, the bitter substance tanacetin, organic acids, tannins, resins, sugar, gum, poppy seeds and microelements, etc. Also essential oil contains thujone ketone, which is poisonous in certain doses [2].

Flavonoids have an antispasmodic effect on the smooth muscles of the bile ducts, blood vessels and ureters, increase the outflow of bile, prevent the formation of stones in the gall bladder, and facilitate bile secretion into the duodenum. Camphor has an effect on the heart muscle, also has a vasoconstrictor effect. The bitter substance contained in common tansy stimulates the secretion of the stomach. Tannins cleanse infected wounds from purulent contents, relieve inflammation, and promote tissue regeneration [4, 5].

Tansy is used in the treatment of hepatitis, cholecystitis, gall bladder and other diseases. As an antispasmodic, its inflorescences are used for colitis, gastric ulcer of the duodenum, malignant tumors, as a diuretic and hemostatic agent, as well as for the treatment of helminthic invasions [3].

Essential oil used in perfumery is extracted from tansy. Tansy leaves replace cinnamon and nutmeg; they are used to preserve meat and flavor liquors. Tansy roots can be used to produce green paint [1].

In folk medicine, decoctions, alcohol and water infusions are prepared from tansy. In veterinary medicine, tansy is used in the form of water infusions (1:10; 1:20). Infusions (20 g of tansy flowers per 1 liter of boiling water) are fed to calves with diarrhea of 50 ml 3 times a day 30 minutes before feeding [3]. With gastritis with low acidity, diseases of the liver and gall bladder, animals are given infusions (10 g of flowers per 1 cup of boiling water, insist 6-8 hours) 0.25 ml per 1 kg of weight 3 times a day 30 minutes before feeding. A similar treatment regimen is used for ascariasis, a more concentrated infusion is used (20 g of flowers per 1 cup of boiling water, infuse for 6-8 hours) [6].

The most famous preparations of tansy are:

- herbal collection "Alfit-24", which has a pronounced antiparasitic effect and can be used as an additional tool in the treatment of intestinal helminthiasis, diseases of the gall bladder and liver, which are caused by parasites, or intoxications resulting from the vital activity of parasites;

- "Alfit Active-24" - an antiparasitic drug, promotes the removal of dead and weakened helminths from the body, has a weak anti-helminth property;

- Capsules "Fitol-17" have an antiparasitic, antimicrobial effect, contribute to the release of the body from parasites and their metabolic products;

- "Altayfit-7" is an antiparasitic drug used for various types of helminthic infestations [7].

Thus, tansy preparations are still widely used in veterinary medicine as anthelmintics in the form of various dosage forms.

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## **THE EFFECT OF ACORUS CALAMUS PREPARATIVE FORMS ON THE BLOOD MORPHOLOGY AND BIOCHEMISTRY**

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Influence of preparative forms of *Acorus calamus* on morphological and biochemical parameters of sheep blood at strongylatosis of gastrointestinal tract is determined. Tincture, decoction and extracts contribute to the normalization of morphological and biochemical blood parameters, high therapeutic efficacy in strongylatosis of the gastrointestinal tract.

Anthelmintic intervention is necessary in most parasitic disease cases, however, only beneficial to the extent its effects do not outweigh the benefits. Plant based solutions offer an alternative. Herbal medicine works like that. That is the reason why people try to find new medicinal herbs, they make a research and use these herbs in a vet medicine practice.

Our objective is: to determine the effect of preparative forms (decoction, tincture, liquid and thick extract) of sweet flag on morphological and biochemical sheep blood counts.

The research was conducted among sheep aged 1-2 years, invaded by strongylata of the gastrointestinal tract. We formed 6 groups. Each of them included 10 sheep.

We made an enteral drug administration to all sheep: Group 1 – decoction of calamus ( dose: 5 ml/kg 2 times a day for 3 consecutive days); Group 2 – tincture of calamus (dose: 0,5 ml/kg body weight twice with an interval of 24 hours); Group 3 – liquid extract of calamus (dose: 0,2 ml/kg body weight twice with an interval of 24 hours); Group 4 – a dense extract of calamus (dose: of 0,1 mg/kg body weight twice with an interval of 24 hours); 5th Group – 20% tetramizole granulate (dose: 3,75 mg/kg body weight, once). Sheep of the 6th group served as a control and did not receive the drug. Blood was taken for blood counts before the administration of the drugs and on 1, 3, 5, 10 and 14 days after their use.

We measured the number of RBC and hemoglobin in all the invasive animals before the drug administration. The number of red blood cells was from  $5,1 \pm 0,57 \cdot 10^{12} / l$  to  $5,9 \pm 1,1 \cdot 10^{12} / l$  and hemoglobin from  $80,1 \pm 1,19$  g/l to  $85,0 \pm 1,33$  g/l. The new results were less than the acceptable level for healthy animals.

After the drug administration of preparative forms of calamus we determined an increasing number of red blood cells and hemoglobin among animals of the experimental groups by 5 days: group 1 – 29,3% and 31,1%, group 2-22% and 16%, group 3-30% and 37,9%, group 4-28% and 25,1%. Group 6 did not get preparative forms of calamus that's why their blood counts were on the same level.

On the 3<sup>rd</sup> day of the experiment the level of leucocytes (groups 1, 2, 3, 4) increased – 10%, 11,9%, 19,1%, 14,9%. By the end of the experiment, number of leukocytes in all experimental groups decreased to a normal level: 1st – by 65,3%, 2nd – by 56,9%, 3rd – by 41,7%, 4th – by 46,4% if we compare with the numbers in the beginning of the experiment.

The level of eosinophils before the experiment was high. However, by the 3rd day of the experiment, the level of eosinophils in all the experimental groups started to decrease as compared with the control by 29,3%, 19,9%, 20%, 32,2, and 48,4%, respectively. By the 14th day - the number of eosinophils in animals of the experimental groups decreased by 40,3%, 50%, 52,8%, 54,9% and 70,8%, respectively.

Studies have shown that the use of 20% tetramizole granulate decreased the level of leukocytes and eosinophils by the end of the experiment. The level of hemoglobin and red blood cells increased.

Sick sheep had decreased level of total protein content (by 9,79%) and albumin level (by 26,64%) and a lower amount of urea in the blood serum (by 30,28%).

By the 10<sup>th</sup> day of the experiment we have determined changes of the protein metabolism of experimental animals. All the animals who got preparative forms of sweet flag had increased level of albumin and urea. At the same time sheep which got 20% tetramizole had decreased level of albumin and urea.

By the 14th day of the experiment we have determined changes of the level of the total protein. All the animals who got preparative forms of medicinal plants had increased level of the total protein by 6,3% if you compare with the level before treatment. Moreover, the concentration of albumin was within the reference values.

Sick animals: the glucose level and the concentration of triglycerides were decreased (by 37,8% and 52,0%) and the total cholesterol level was higher by 23,07% (as compared with) as compared with healthy sheep.

By the 10th day after anthelmintic treatment, sheep who received herbal preparations had increased level of the glucose concentration ( $4,05 \pm 0,74$  mmol/l) by 56,2%, triglycerides ( $0,71 \pm 0,24$  mmol/l) – by 28,5%.

By the 14th day after anthelmintic treatment, using preparations based on medicinal herbs, sheep from groups 1-4 had the glucose level in the blood serum from 3,06-4,62 mmol/l, triglycerides – 0,58-0,74 mmol/l. These counts are normal for clinically healthy sheep.

At the same time, sheep treated with tetramizole (group 5), even by day 14, did not restore the integral indicators of energy exchange, glucose continued to decrease (31,8% lower if you compare with the period before treatment), the level of triglycerides decreased by 14,6%, the total cholesterol content also was decreased.

We have analyzed the activity of enzymes of invasive animals before the drug administration. The activity of alkaline phosphatase and alanine aminotransferase was higher than healthy animals had.

During the first 10 days of the drug administration, when invasive sheep were treated with herbal preparations and tetramizole, we did not find

significant changes of the activity of the enzyme system. From the 10th day of experiment we have noticed a decreased activity of alkaline phosphatase, ALT and GGT. Some increasing level of AST activity was found too. By the 14th day of the experiment all sheep, who received herbal preparations, had the normal level of alkaline phosphatase. ALT activity also decreased and AST activity increased, which led to the alignment of the AST/ALT ratio of healthy animals. The activity of GGT in animals treated with herbal preparations for 14 days was (30,68±4,56 U/L), which is close to the enzyme activity in healthy animals (31,13±1,45 U/L).

It should be noticed that sheep who were treated with tetramizole as a drug, by the 14th day, had the enzymatic activity of blood serum which is close to sick animals levels. Thus, even being treated a strong invasion, metabolic processes of animals who got tetramizole did not recover after 14 days of experiment.

Conclusion. 1. The use of preparative forms of rhizome of calamus contributes to the normalization of the number of red blood cells and hemoglobin in the sheep blood, which indicates the activation of hematopoiesis.

2. Infection of sheep with strongylates of the gastrointestinal tract leads to decreased level of total protein by 9, 79%, albumin – by 26, 64%, urea – by 30, 28%, glucose – by 37, 8%, triglycerides – by 52, 0% as compared with healthy animals.

3. The drug administration of decoction, tincture, liquid and thick extract of rhizome of calamus led to the normalization of all the main metabolic parameters by the 14th day of experiment.

4. Sheep who got tincture, liquid extract and thick extract based on rhizome of calamus had more pronounced normalization of metabolic processes, than ones who got decoction.

5. Preparative forms of rhizomes of calamus are effective for strong invasion treatment.

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**STUDY OF THE INFLUENCE OF SILVER NANOPARTICLES  
ON THE MORPHOLOGY OF BACTERIAL CELLS  
OF *ESCHERICHIA COLI* BY ATOMICALLY  
POWER MICROSCOPY**

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Over the past decades, methods of scanning probe microscopy, including atomic force microscopy (AFM), have become rapidly developed, which have become an effective tool for solving a variety of research problems. The use of AFM in microbiological studies made it possible to obtain important and even unique information about the properties of the studied objects, to measure the morphological characteristics of biological objects, to determine the features of small-sized systems, to visualize the surface profile of the sample with nanometer resolution and obtain high-quality images of bacterial cells [2–4].

Using atomic force microscopy, it is possible to study the components, cellular organizations and bacterial biofilms of microorganisms, to determine and evaluate the degree of exposure to microorganisms of various factors of biotic and abiotic nature [1, 2, 5]. Thus, according to a number of authors who used atomic force microscopy in their studies, data were obtained on the effect of antibacterial drugs on the bacterial cell wall [1, 3].

The aim of our work was to study the effect of silver nanoparticles on the morphology of bacterial cells of *Escherichia coli* by atomic force microscopy using an atomic force microscope NT-206.

The procedure for preparing samples for atomic force microscopy was to immobilize them on a flat substrate. The material was atomically smooth mica substrates. The test samples were placed on the surface of the substrate:

1 sample – pure bacterial culture of *Escherichia coli* (control).

2 sample – bacterial culture of *Escherichia coli* + silver nanoparticles in a ratio of 1: 5.

3 sample – bacterial culture of *Escherichia coli* + silver nanoparticles in a ratio of 1:10.

For the fixation, the sample was incubated for 24 hours.

The visualization of the surface of bacterial cells of *Escherichia coli* was carried out in various modes of atomic force microscopy. During the study, images of *Escherichia coli* bacterial cells were obtained before and after incubation with silver nanoparticles.

The obtained AFM images showed the change in the morphology of the bacterial cell *Escherichia coli* under the action of silver nanoparticles in various dilutions. In this case, not only the transformation of the form of the microorganism is traced, but also the change in the number of microbial cells in the experimental and control samples. So, in the control, after 24 hours of incubation, microorganisms form numerous colonies, while in the test media after treatment with the drug single cells are found, the form of *Escherichia coli* changed from rod-shaped to more rounded. Moreover, these processes are most pronounced during incubation with compounds at a dilution of 1:10, in which complete destruction of bacterial cells was noted.



Conclusions: According to the results of the study, it was found that silver nanoparticles exhibit a pronounced antibacterial effect on *Escherichia coli* bacterial cells, which is confirmed by atomic force microscopy. Silver nanoparticles can be recommended as the basis for the creation of veterinary drugs, as an active antibacterial environmentally friendly substance.

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## **MORPHOLOGY OF THE OVARIES IN RACCOON DOGS**

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Raccoon dogs (*Nyctereutes procyonoides*) are omnivores that feed on insects, rodents, amphibians, birds, fish, reptiles, molluscs, carrion, and insectivores, as well as fruits, nuts, and berries.

The ovary is divided anatomically into the cortex and medulla. The cortical aspect of the ovary is covered by cuboidal epithelium during

development that converts to squamous epithelium with age. The cortical parenchyma is composed of follicles (oocytes and follicular cells), interstitial cells and collagenous connective tissue stroma. The ovarian medulla contains large arteries and veins, lymphatics, nerves embedded in a loose collagenous matrix. The rete ovarii are also present in the medulla.

In raccoon dogs the cortex contains the developing follicles. The ovaries are small almond shaped structures, covered by a thick connective tissue capsule - the tunica albuginea. It is covered by a simple squamous mesothelium called the germinal epithelium. The ovary has a cortex, where the ovarian follicles can be found, and a highly vascular medulla, with coiled arteries called helicine arteries.

The sequence of follicular development is: 1) primordial follicle; 2) primary follicle; 3) secondary follicle; 4) tertiary follicles.

Primordial follicles contain a primary oocyte and are surrounded by a single layer of flattened follicular cells.

Primary follicles still contain a primary oocyte but the follicular cells become more cuboidal and are now known as granulosa cells. Follicular (granulosa) cells proliferate (membrane granulosa) but are separated from the oocyte by a thick periodic acid Schiff (PAS) positive basement membrane called the zona pellucida. The organized stromal cells around the follicles are called theca cells.

Secondary follicles start to develop spaces between granulosa cells that coalesce to eventually form a large space called the follicular antrum. The granulosa cells secrete PAS positive material into these spaces. The stromal cells surrounding the follicle form two layers, the theca interna and the theca externa.

Graafian (tertiary, mature) follicles are large preovulatory follicles which bulge from the surface of the ovary. Once the follicular antrum is formed, the oocyte is surrounded by a remnant of granulosa cells called the cumulus oophorus. The cells of the cumulus oophorus immediately adjacent to the oocyte are known as the corona radiata.

The oocytes are surrounded by epithelial cells and form follicles. The ovary contains many primordial follicles, which are mostly found around the edges of the cortex. There are fewer follicles in different stages of development.

After ovulation, the ruptured follicle collapses and fills with a blood clot (corpus haemorrhagicum) which then forms the corpus luteum. The granulosa cells enlarge and become vesicular, and now are called the granulosa lutein cells. They become folded, as you can see here.

The spaces between the folds are filled with theca interna cells, which also enlarge and become glandular, and are now known as the theca lutein cells.

**THE INFLUENCE OF ENDOTOXEMIA ON THE CHANGE  
OF HOMEOSTATIC PARAMETERS AFTER  
A SURGICAL TREATMENT OF GASTROINTESTINAL  
PATHOLOGIES IN HORSE**

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Currently, gastrointestinal tract disease in horses is the most talked about in the world. On the average, 80% experience colic during life, and endotoxemia is accompanied in 40% of cases and is the main cause of euthanasia in this disease [2]. This study of the pathogenesis of endotoxic shock and the evaluation of some criteria for the parameters of homeostasis after surgical treatment of colic may serve as a future direction for improving and creating a treatment strategy for endotoxemia.

In this regard, the aim of our research was to study the pathogenesis of endotoxic shock and evaluate the change in the dynamics of homeostasis parameters after surgical treatment of colic horses.

The experimental part of the studies was carried out in the period from 2018. to 2019 in the Moscow region, on the basis of the veterinary clinic and equestrian center "New Century". The 1 control group consisted of 9 clinically healthy horses of equestrian center "New Century". The 2 experimental group included 9 horses with pathologies of the gastrointestinal tract, which underwent surgical treatment. All

clinical and laboratory abnormalities were symptoms of progressive endotoxic shock, which arose as a result of the death of a large number of gram-negative bacteria, and consequently massive resorption of toxic lipopolysaccharide into the systemic circulation [1, 2]. Laboratory results were obtained on the 10th day after the abdominal surgery.

As a result of a hematological study, we can note changes in the leukocyte formula, namely an increase in the concentration of neutrophils, which is directly related to an increase in the synthesis of cytokines. They also found a decrease in the concentration of lymphocytes and eosinophils of the experimental group, which most likely can be the result of both absolute neutrophilia and an increased concentration of cortisol in this period [5]. In addition, a change in the concentration of red blood cells, hemoglobin and hematocrit was established, which is due to the pathological action of cytokines, which contribute to the inhibition of hematopoiesis, and postoperative infusion therapy [3].

In the analysis of biochemical parameters in the experimental group, we revealed a significant increase in the concentration of bilirubin, which is directly related to the initial inflammation of the liver parenchyma with endotoxemia and is a cytokine-mediated activation of sinusoidal cells, their expression of adhesive molecules, further release of pro-inflammatory cytokines and mobilization of circulating leukocytes [1]. An increase in creatinine concentration also reflects the effects of a systemic inflammatory reaction and a decrease in the functional capacity of the kidneys. A significant increase in the concentration of cortisol in horses in the experimental group, as a rule, indicates a systemic suppression of inflammation [6].

According to the dynamics of immunological parameters in the experimental group, a decrease in the phagocytic activity of neutrophils was found [4]. This dynamics of the indicator correlates with an increase in the concentration of cortisol, and also undergoes a change under the influence of antibacterial drugs. A significant decrease in the overall level of IgG and IgM can also correlate with an increased concentration of cortisol, which has an inhibitory effect on the immune system [2, 6].

According to the results of gas and electrolyte blood composition, we note a decrease in pH and pO<sub>2</sub>, of the experimental group of horses.

Such dynamics can be explained by a strong vasoconstriction of arterial vessels in case of endotoxic shock, which causes dilatation at the capillary level and, consequently, leads to hypoxia and, ultimately, to cell acidosis [1].

According to the results of a bacteriological study of feces, we found reliable dynamics of a decrease in lactobacilli, which was most likely previously caused by cell acidosis, the use of antibacterial and anti-inflammatory drugs [2]. In addition, we found an increase in the concentration of opportunistic microflora, such as Clostridia, Klebsiella and Hemolytic Escherichia coli, this dynamics is associated with a decrease in the concentration of resident intestinal microflora, as well as the use of the above drugs in the postoperative period [1, 3].

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## **PERSPECTIVES FOR THE USE OF MEADOWSWEET IN VETERINARY MEDICINE**

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Meadowsweet (*Filipendula*) or Meadowsweet is a genus of perennial grasses, that has at least 16 species that grow in the temperate zone of the Northern hemisphere.

Meadowsweet (*Filipendulaulmaria* (L.) Maxim.). Medicinal properties of meadowsweet (meadowsweet) are used by people for more than 400 years. This plant was described by the European herbalist and botanist D. Gerard in 1597 and Nicholas Culpepper in 1652. The use of labaznikis recognized not only by folk, but also by traditional medicine. It is included in some formulations of the drugs of conventional medicine. In Russia, tavolga was engaged in V. I. Dubin. He recommended the use of meadowsweet for shingles, herpes, flu, ARI, in the complex treatment of viral hepatitis and pancreatitis [1].

About meadowsweet you can hear these words: "meadowsweet 40 diseases cures". There is a belief that the meadowsweet was called a labaznik by hunters because it served them as a shelter-a labaz - to track down ducks.

Medicinal use of meadowsweet due to high (up to 300 mg%) content of ascorbic acid, tannins, salicylic acid and its derivatives. Also, traces of coumarins, phenolic compounds, fenolglikozidy, flavonoids, chalcones. Labaznik flowers contain essential oil (0,2-1,25%) with a strong characteristic smell of honey shade, the main component of which is salicylic aldehyde [2].

Ascorbic acid contained in meadowsweet is involved in the biosynthesis of corticosteroid hormones, which are responsible for adaptive reactions of the body. It stimulates immune responses: participates in the production of lymphocytes and interferon, promotes the synthesis of antibodies, and increases reactivity. Due to the vitamin C, the body activates the production of phagocytes, which destroy viruses and bacteria, because it is a stabilizer of the lysosomal

membranes of phagocytes. In addition, the vitamin increases the sensitivity of bacteria to lysozyme.

Tannins of meadowsweet cause a weak astringent effect, and together with gaulterin act antimicrobially. Haultain acts upon the thermoregulation; it causes a diuretic and diaphoretic effect. It accelerates granulation and epithelization of ulcers and wounds. Diterpene alkaloids (sporamin and spiration) are allocated from seeds and roots of Filipendula. Their effect is similar to camphor and caffeine, but the use does not cause an increase in blood pressure. Spermineis assumed to protect brain cells from oxygen starvation.

Flavonoids are the substances of polyphenolic nature that protect plants from adverse environmental factors, and perform similar functions in animals. Flavonoids are powerful antioxidants that prevent the development of oxidative stress in cells where metabolism is disrupted by the action of toxic Pro-oxidants. Once in the body, they are involved in numerous processes of cell signaling, gene expression, various metabolic processes, and protect the body from the introduction of parasites and infection.

In general, meadowsweet is used as a hemostatic, astringent, anti-rheumatic, antipyretic, diuretic and diaphoretic. In veterinary medicine, it is also used as a vitamin, antiseptic and anti-inflammatory agent for diseases of the hooves of horses. The beekeepers also love the meadowsweet. They believe that if you rub it with grass and flowers hives, the bees will be less sick and bring more honey. In veterinary medicine, the roots of labaznikare used as an antihelminthic agent. It is also used for gastrointestinal diseases in animals. The literature also describes the antiviral effect of labaznik, in particular against the flu virus. A 20 % tincture of roots has a pronounced antibacterial effect.

Our goal is to study the effect of the infusion of meadowsweet in broiler chickens on the indicators of natural resistance. To conduct experiments on the principle of analogues, 2 groups of broiler chickens were formed at the age of 21 days, 12 heads in each group: the 1st group– the control one that did not receive the drug, the 2nd group – the experimental one, who received an infusion of meadowsweet at a dose of 1,0 ml per head 1 time a day for 21 days individually orally in the form of an infusion of 1:10.

Analyzing the state of natural resistance of broiler chickens by humoral protection factors, we noted a stimulating effect on the indicators of bactericidal and lysozyme activity of blood serum. There was an increase in bactericidal activity of blood serum and lysozyme activity of blood serum by 5-8 % ( $P < 0,05$ ) compared to the control group.

Examining the phagocytic activity of white blood cells we noted a significant increase by 5% ( $P < 0,05$ ). The phagocytic number and phagocytic index were also slightly higher compared to the control group.

Meadowsweet has had a stimulating effect on the factors of natural resistance, which makes possible to recommend it to increase the overall resistance of the body in viral and bacterial infections.

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## **THE EVALUATION OF ANTIBIOTIC RESISTANCE DEVELOPMENT TO AZITROMYCIN IN SALMONELLA ENTERICA**

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Currently, antibiotics – the substances that inhibit the growth and vital activity of animal and human pathogens – have become widespread. Almost a century has passed since the beginning of an era of antibiotics, and over this period, they have saved millions of lives. However, the long-term use of various groups of antibiotics has led to the resistance development in microorganisms [1, 2, 4]. In modern science, the antibiotic resistance is a big topic for discussion as penicillin-resistant strains and, moreover, penicillin-dependent microorganisms were discovered [2, 3]. There is a need to study the rate of formation of microbial resistance to



new antimicrobial agents. In this regard, controlled antibiotic therapy is an urgent issue for the prevention and treatment of infectious diseases in humans and animals [3, 4].

In this study, we assessed the resistance development in the initial cultures of *Salmonella enterica* and determined the minimum inhibitory concentration of azithromycin dihydrate for these microorganisms by using nutrient broth with a sub-inhibiting dose.

The minimum inhibitory concentration was established by the micro-method, producing two-fold dilutions of azithromycin dihydrate in nutrient broth with a ten-fold therapeutic concentration (50 mg/L). The measurement results showed that for *Salmonella enterica*, the minimum inhibitory concentration was 1,95 µg/ml. Subsequent dilution with a concentration of 0,98 µg/ml showed sub-inhibitory properties – microorganisms retained the ability to reproduce (optical density 0,265 o.u.), but much slower compared to the initial culture (optical density 0,725 o.u.). Thus, to study the effect of a sub-inhibitory concentration of azithromycin dihydrate on *Salmonella enterica*, a concentration of 0,98 µg/ml was determined.

Nutrient broth with a concentration of azithromycin dihydrate of 0,98 µg/ml was prepared and the effect of this concentration on *Salmonella enterica* was studied. At the end of the exposure, the growth inhibition zones in the initial culture and the cultivated with a sub-inhibitory antibiotic dose were determined. The minimum inhibitory concentration of the antibiotic was established.

**Table 1 – Diameters of inhibition zones in *Salmonella enterica* cultures**

Salmonella enterica culture	Growth inhibition zones, mm
Initial culture	34
Cultivated with a sub-inhibitory dose of azithromycin dihydrate	23

Cultivating the bacteria on nutrient broth with a sub-inhibitory dose of azithromycin dihydrate for 5 days leads to a decrease in sensitivity in *Salmonella enterica*: the growth inhibition zone in the culture is reduced by 11 mm, and the minimum inhibitory concentration increases by 4 times to 7,81 µg/ml.

Thereby, the study has shown that the use of the antibiotic in doses below the minimum inhibitory dose stimulates the increase in Salmonella resistance in a short time. In this regard, it is extremely important to maintain the therapeutic concentration of the antibiotic throughout the treatment period, as its decrease leads to the resistant strains formation, especially when bacteriostatic antibiotics are used.

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## **EXPERIENCE IN THE TREATMENT OF MASTITIS IN COWS IN THE TYUMEN REGION**

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One of the main factors inhibiting the growth of milk productivity and worsening the sanitary quality of milk obtained at farms is pathological processes in the field of the mammary gland.

The most common pathology of the mammary gland is mastitis [2, 5]. Therefore, its treatment is an urgent problem at the level of many countries with developed cattle breeding [4.7].

Treatment is based mainly on the use of systemic and intracisternal antibiotics, increasing the overall resistance of the body.

The use of intra-tank antibiotics can prevent the development of a wide range of pathogens, but some have a narrow spectrum of action. In this regard, in the treatment of mastitis, several alternating treatment regimens are used [10].

In the conditions of the Tyumen region, the features of the application of the used treatment regimens for mastitis with the use of Cobactan 2.5% and Cobactan LC in dairy complexes will be considered.

For complex effects, most often veterinary specialists use different groups of active substances and different modes of administration, providing a larger-scale effect on the bacterial microflora.

The development of antibiotic resistance in bacterial forms of pathogens is also taken into account, which complicates the treatment and necessitates the use of “shock” doses or a combination of various drugs. Therefore, before treatment, the sensitivity of bacterial cultures to the active substance of the drug is determined.

A common drug in the treatment of mastitis is Cobactan 2.5% in various dosage forms [3, 6, 9]. The active substance - cefkinoma sulfate - has an antibacterial effect mainly against most gram-positive and gram-negative bacteria.

A feature of the structure of cefkinom, which determines its high efficiency, is the presence in the molecule of both negative and positive charges - zwitterion. The bipolar structure ensures rapid penetration of the drug through the outer membrane, which is especially important for gram-negative bacteria [8, 11]. Reaching high concentrations in the periplasmic space, due to its high affinity, cefkin quickly binds to penicillin-binding proteins on the surface of the inner membrane, which leads to a quick therapeutic effect. With a low affinity for b-lactamases, cefkin is highly resistant to their effects.

When administered by cefkin, it is slightly absorbed into the blood, providing high antibacterial concentrations in the tissues of the udder. It is worth noting that Cobactan LC is classified as a moderately hazardous

substance by its degree of exposure to the body. It's not recommended for use with other antibacterial agents, with bacteriostatic effect. Therefore, it is used exclusively in combination with the injection of Cobactan 2.5%.

The milk from the animal during the treatment period is not used for food purposes and in the next 4 days after the end of treatment. The slaughter of the animal is made not earlier than 48 hours after the last use of the drug.

To increase the effectiveness of antibiotics, the introduction of non-steroidal anti-inflammatory drugs is necessary.

The treatment regimen is based on the type of mastitis. With a clinically sluggish leaking mastitis, one quarter usually uses 1 syringe in the affected lobe with an interval of 12 hours at least 3 times [1]. In the chronic form - in addition to the introduction of Cobactan LC, an external treatment of the udder lobe with warming ointments is performed. In the acute form, treatment should be accompanied by injections of Cobactan 2.5% calculated on the weight of the animal.

Thus, it can be noted that such a drug as Cobactan 2.5% and Cobactan LC are universal antibiotic agents for the effective fight against mastitis in the economy of the Tyumen region.

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**YOUNG SCIENTISTS OF THE VITEBSK STATE ACADEMY  
OF VETERINARY MEDICINE – TO SCIENCE AND NATIONAL  
DEVELOPMENT OF BELARUS**

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Young scientists of today are a social group that is characterized by non-standard thinking, high educational level, initiative, ability to quickly and effectively adapt to a market economy and wide spread of innovative technologies. An effective innovative activity of young scientists is a guarantee of sustainable development of nation. The Republic of Belarus pays special attention to the innovative findings of young researchers using new mechanisms for them to be involved into the development of scientific advances. However, requirements for the products of young researchers and innovators are rather high. Youth's innovative projects should be linked with the economical and industrial accomplishments of the country where they could find their implementation.

In the "Program for improving the scientific sphere of the Republic of Belarus" the University science is encouraged to develop fundamental and applied scientific research in advanced areas of science and technology; to improve scientific-methodological support of research work; to develop scientific- innovation activities [1].

Young scientists of the Vitebsk State Academy of Veterinary Medicine actively participate in research programs at both national and

international level. The major areas of young scientists' investigation encompass innovative technologies in veterinary medicine, biotechnology, agricultural production, ecology and energy efficiency, social and economic development of the Republic of Belarus.

In accordance with the order of the President of the Republic of Belarus of 22.12.2018 No 253rp, talented young scientists from the Academy were granted scholarships of the President of the Republic of Belarus. Among them can be mentioned Natalia Lazovskaya, the associate professor of the Department of Pathological Anatomy and Histology, PhD in Veterinary Sciences, for obtaining new data on the diagnosis of reovirus tenosinovitis in chickens and substantiating the degree of tension for the post-vaccination immunity in chickens when immunized with a new domestic vaccine obtained from the strain "CMIEV-V118"; Sergey Sysa, the assistant of the Department of Clinical Diagnostics, for obtaining new scientific results on the development of means and methods of treatment, diagnosis, immunocorrection and prevention of infectious diseases in cattle using complex preparations of anthelmintic, prebiotics and probiotics [2].

By the decision of the Higher Attestation Commission of the Republic of Belarus of July 9, 2009 No. 9 "On the annual contest for the best doctoral dissertations" Minich Anastasia, PhD in Veterinary Medicine, assistant of the Department of Animal Anatomy, was announced the winner of the contest in 2019 (topic: "Esophagostomosis in Cattle of Belarus (dissemination, parasite-host relationships, measures of control)") and was awarded the Diploma of the Laureate of the Contest in the category "Animal and Agricultural Sciences".

In 2019 young scientists submitted an application for an invention, as well 6 applications for patents. A positive decision on granting a patent was received, and a patent search was conducted with the use of the databases from the National Intellectual Property Center of the Republic of Belarus, the Russian Federation, the World Intellectual Property Organization and the Eurasian Patent Office for further patenting of research objects.

In 2019 the Academy of Veterinary Medicine held 8 intramural conferences, 7 international scientific and practical conferences, published 595 student articles, including 16 articles from the list of

editions recommended by the Higher Attestation Commission. 140 articles were published in collections of scientific conferences, 436 articles in electronic collections of conference materials, 3 articles in other scientific journals. In 2019 a thesis for PhD degree (A. Minich, PhD in Veterinary Medicine, assistant of the Department of Animal Anatomy) and a thesis for the degree of Doctor of Veterinary Sciences (I. N. Gromov, associate professor of the Department of Pathological Anatomy and Histology) were defended and approved. 4 students were granted the scholarships of the President of the Republic of Belarus, 3 students received nominal scholarships, and 26 students received personalized scholarships.

Last year 129 acts were issued for young researchers of the academy for the introduction of scientific developments in the educational process, and 146 in the production practice.

The development of programs in support of the youth entrepreneurship in the field of high technologies, particularly in the regions with a high scientific and technical potential, is the most important task of stimulating innovative activity in the country [4]. The organization of cooperation with scientific, educational, engineering, technological, industrial, agricultural and other organizations in would integrate the scientific potential [3].

The priority task of the state innovation policy is to increase the effectiveness of the National innovation system as a mechanism for interaction between science and real sectors of Belarusian economy.

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## **THE PROBLEM OF PASTEURELLOSIS AS AN INFECTION COMMON FOR ANIMALS AND HUMANS**

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Today, pasteurellosis in the world is very common and even the availability of a vaccine and the use of measures to prevent the disease do not constrain its spread. The disease is found in all countries. Economic damage consists of the death and forced slaughter of animals, the decrease in their productivity during the period of illness, and the significant costs of conducting treatment and preventive measures. The incidence is up to 90%, mortality - from 10 to 75%. The source of the causative agent of the infection are sick and ill animals, as well as clinically healthy bacteria carriers. All types of domestic and wild mammals and birds are susceptible to pasteurellosis. The most sensitive are buffaloes, cattle, rabbits and chickens. Horses and carnivores are relatively resistant to disease. Animals of all ages can be ill, but young animals are more susceptible. In addition, a person can get sick with pasteurellosis. The factors contributing to the epizootic spread of pasteurellosis include the mass movement of animals without due regard to the degree of well-being of farms for pasteurellosis, the lack of proper organization of economic, all kinds of violations of production technology and veterinary and sanitary measures in livestock and poultry farms. The diagnosis of pasteurellosis is established on the basis of a complex of epizootological, clinical, pathological and laboratory studies.

Laboratory diagnosis of pasteurellosis involves: microscopy of blood smears and smear prints from affected organs, isolation of a pure



culture on nutrient media with identification by biochemical properties, isolation of pasteurella by infection of laboratory animals (white mice or rabbits) with a suspension from pathological material and culture from a nutrient medium, determination of virulence of isolated cultures for white mice and rabbits. To determine the virulence of hemolytic pasteurella, 7-day-old chicken embryos are used, and the determination of the serovariant affiliation of pasteurella is used. Blood samples from superficial vessels and nasal mucus are taken as a test material from diseased animals, and after a case or forced slaughter, blood is taken from the heart, lymph nodes (mesenteric, pharyngeal, mediastinal, supramural, etc.), pieces of the affected lobes of the lungs, liver, spleen, heart, kidney, tubular bone. In summer, during prolonged transportation, pathological material is preserved with a 30% sterile glycerol solution. Pasteurellosis must be differentiated primarily from febrile septic diseases, which are also accompanied by the appearance of inflammatory edema under the skin: anthrax, emphysematous carbuncle and malignant edema, as well as from a number of other pathologies with a similar clinical picture. Treatment of animals with pasteurellosis should be carried out in two directions: improving the conditions of feeding and feeding and the use of specific and symptomatic agents. One of the specific treatments for pasteurellosis is hyperimmune polyvalent antipasterelotic serum. However, this serum has a weak therapeutic effect. The combined use of antibiotics and serum gives a good therapeutic effect. With pasteurellosis, tetracycline antibiotics are effective. Most Pasteurella isolates are sensitive to oral antimicrobials such as amoxicillin, amoxicillin / clavulanic acid, minocycline, fluoroquinolones (ciprofloxacin, ofloxacin, levofloxacin, moxifloxacin) and trimethoprim-sulfamethoxazole. Aminoglycosides have low activity against *P. multocida*. More severe infections may require parenteral antibiotics. Recently, a number of completely new or improved antimicrobials with a wide spectrum of activity have appeared in the arsenal of practical veterinary specialists. Along with the use of antibiotics, it is necessary to use vitamin preparations and minerals that increase the body resistance of a sick animal, as well as symptomatic therapy, including the use of cardiac and tonic drugs.

Pasteurellosis-infected animals acquire immunity for 6 to 12 months. Since pasteurellosis is a respiratory infection, and pasteurellas themselves are ubiquitous with a wide pasteurization, it is necessary to protect animals from general and local hypothermia: a cold often provokes acute pasteurellosis. For specific prophylaxis of acute pasteurellosis, inactivated vaccines are recommended: precipitated formol vaccine against pasteurellosis of hemorrhagic septicemia of cattle, sheep and pigs, semi-liquid aluminum hydroxide AzNIVI against pasteurellosis of hemorrhagic septicemia of cattle and buffalo, concentrated paratylocetomyelitis against pasteurellosis of cattle, buffalo and sheep, emulsions, the vaccine against pasteurellosis. Vaccines are used for prophylactic purposes and compulsory in case of stationary dysfunction of the area, in farms with an acute outbreak of pasteurellosis and in threatened points. For the prevention of pasteurellosis in poultry farms, it is recommended to use dry live vaccines made from the French (Pasteur) avirulent and Russian weakly virulent strains (K and AB of the Krasnodar NIVS), as well as inactivated emulsion vaccines. For passive immunization there is a hyperimmune serum against pasteurellosis of cattle, buffalo, sheep and pigs.

The epidemiological situation of pasteurellosis in a number of countries is unfavorable. As it can be seen from the latest data from the country's veterinary services, there is currently a downward trend in the number of dysfunctional pasteurellosis farms caused by *Pasteurella multocida*, but at the same time the likelihood of isolating *Mannheimia haemolytica* is increasing due to the nature of the pathogen, which is a latent threat and the spread of the disease on a larger scale. To prevent the spread of the disease, the development of a modern laboratory diagnostic technique for *Mannheimia haemolytica* is a necessary element of preventive and antiepidemiological measures. Due to the fact that the use for specific prophylaxis of the pasteurellosis vaccine caused by *Pasteurella* spp. unable to provoke a specific immune response to *M. haemolytica*, there is a need to develop a biological product that can cope with this problem.

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## **COMPOSITION, PROPERTIES AND APPLICATION OF CALENDULAS IN MEDICINE**

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Calendula is an annual herbaceous plant from the Asteraceae family with small yellow or orange flowers and crescent-shaped or hook-shaped seed fruits (for this form, reminiscent of bird claws, the calendula was called marigold) [1].

The pharmacological activity of calendula preparations is due to the presence in the raw material of a complex of biologically active substances (BAS), namely: carotenoids, flavonoids, triterpene saponins and a number of related substances. In different parts of the plant, chemical composition is different. The largest number of biologically active substances is found in calendula flowers. They contain up to 3% carotenoids and up to 0.8% flavonoids. Monoterpene lactone - loliolid with antitumor activity was isolated from the flowers of calendula officinalis. The tart aroma of the plant is due to the presence of essential

oil. The seeds contain fatty oils and alkaloids. Carotene (provitamin A), which is found in marigolds, affects the color of the plant: in orange flowers it is twice as much as in white. Due to all these substances, calendula preparations have high pharmacological activity [2].

Calendula flowers are used to create various medicines. Everyone knows tincture of calendula for gargling, treating wounds and bruises, diseases of internal organs. These medicinal and beneficial properties of plants provide the chemical composition of the flowers.

The study of the chemical composition led to the creation of not only tinctures of calendula, but also other drugs from it, for example, carotenoids formed the basis of carophilene ointment, which successfully heals inflammatory processes. Also there is a drug released for the treatment of gastritis and gastric ulcer that is called "Kaleflon". This drug not only destroys bacteria that cause ulcerative lesions of the tissues of the stomach, but also accelerates the recovery of mucous membranes.

Clinical observations showed that abundant irrigation of the oral cavity with an aqueous solution of tincture of marigolds before and after the removal of tartar, insertion of turundum, abundantly moistened with undiluted tincture of the plant into the pathological gum pockets, relieved inflammation, reduced or stopped discharging from the gum pockets, bleeding of the gums, and contributed to compaction gum tissue. Shredded fresh leaves are applied to wounds, abscesses, boils [3]. In animals, when administered intravenously, blood pressure decreases, the amplitude of heart contractions increases and its rhythm slows down, calendula preparations have a calming effect on the nervous system. Calendula reduces dyspeptic symptoms and intoxication.

The ointment is prepared by mixing fresh juice of marigolds and lanolin (petroleum jelly, lard) in a ratio of 1:10. You can prepare it from the smallest powder of reed flowers on lanolin (1:10). Calendula tincture (*Tinctura Calendulae*) is prepared from regional flowers or from flower baskets with 70% alcohol (1:10). In summer, for tinctures for alcohol, you need to take fresh, just picked flowers, fill them with a 0.5 liter jar and pour vodka to the top. After seven days of insisting in a dark place, strain and apply as directed.

Water infusion of calendula (sometimes called tea) is prepared from dry flower calendula baskets (1:10).

NK tablets (marigold with nicotinic acid) contain 0.25 g of calendula flower basket powder and 0.1 g of nicotinic acid. "Rotokan" is a combined preparation, which includes calendula. It is prescribed for heart disease, hypertension, neurosis. Calendula ointment is made from 20 g of calendula tincture and 90 g of an emulsion, which is a petroleum jelly diluted in water. The ointment is available in glass jars of 40 g and has a yellowish color. It is recommended for burns, cuts, cracking lips, nipples, bruises, eczema. The drug "Kaleflon", based on calendula flowers, is prescribed for ulcers and chronic gastritis of the stomach and duodenum, as a choleric agent for diseases of the liver and bile ducts, as a symptomatic agent for malignant diseases of various localization [4].

Thus, the pharmacological effect of calendula is due to the presence in its flowers of a rich spectrum of biologically active substances, and the availability of raw materials allows this medicinal plant to be widely used to treat various diseases, both in humans and animals.

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## **THE INFLUENCE OF MEDICINAL PLANTS ON SOME PHYSIOLOGICAL FUNCTIONS OF ANIMALS**

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The world of plants is our healing wealth. With the help of medicinal plants, many physiological functions of the body can be regulated. The analysis of the literature indicates the multilateral use of various plants for medicinal purposes in folk and scientific veterinary medicine. Close attention is paid to the study of the effect on hematological parameters and the level of natural resistance, since the most important condition for the normal functioning of all cells in the body is the relative constancy of the blood composition and concentration of substances soluble in it. It is also important to study the effect of herbal preparations on digestive processes, in particular on the abdominal and parietal digestion, because digestive processes are closely related to metabolic processes, which affects the performance of productivity and dynamics of body weight. In general, the study of preparative forms of medicinal plants is an urgent task of science and practice [1, 2].

We have analyzed the literature data and selected medicinal plants that increase the viability and productive qualities of poultry [1, 2]. We have collected the following medicinal plants: wormwood grass (2 parts), dandelion leaves (1 part), nettle leaves dioecious (2 parts), yarrow grass (1 part), hypericum perforatum herb (1 part), dill seeds (1 part), meadowsweet grass (1 part).

Our goal is to study the effect of infusion of medicinal plants in broiler chickens on the morphological composition of the blood, humoral indicators of natural resistance and activity of proteolytic digestive.

Laboratory tests were performed in the laboratory of the Department of normal and pathological physiology and clinic of the Department of clinical diagnostics of the Vitebsk state Academy of veterinary medicine.

For the experiment, 2 groups of broiler chickens were formed at the age of 21 days, 12 heads in each group: the 1st group – the control one that did not receive the drug, the 2nd group – the experimental one, which received an infusion of medicinal plants at a dose of 1 ml per head for 21 days (starting from 21 days of age) individually orally in the form of an infusion of 1: 10.

Analyzing the results of the blood test, we have noted that the level of hemoglobin in chickens of the 2nd experimental group after 7 days of giving the infusion of fitosbora was higher by 9,4 % ( $P < 0,05$ ) compared with the control group and amounted to  $89,5 \pm 0,45$  g/l. Prescribing the drug within 21 days did not cause a significant difference between the groups in the hemoglobin content in the blood of broiler chickens. The level of ESR in the blood of chickens of the experimental and control groups throughout the experiment remained within the normal range for this age group and did not differ significantly from each other.

The level of red blood cells in the blood of the 2nd experimental group during the experiment was higher compared to the control after both 7 days and 21 days, although not reliably. At the same time, their content did not exceed the norm for this age of the bird.

The number of leukocytes in the blood of chickens of the 2nd experimental group after 7 days of receiving the drug was significantly higher compared to the control by 22,7% ( $P < 0,05$ ). It is important to note that the leukocyte level in the blood of the bird remained within the normal range for this age group.

Analyzing the state of natural resistance, we noted a stimulating effect on the indicators of bactericidal activity of blood serum. Infusion of medicinal plants after 7 days led to an increase in bactericidal activity of blood serum by 5,5 %, but without significant differences, and within 21 days-by 14 % ( $P < 0,05$ ). Indicators of lysozyme activity of blood serum during the whole period of watering infusion fitopreparations the bird was observed higher compared to control at 8-16 %, although without significant differences.

In the mucous membrane of the glandular stomach, there is an increase in the activity of protease in the appointment of herbal infusion for 21 days – by 8,3 % ( $P < 0,05$ ). And in the content of glandular stomach enzyme activity was significantly higher by 6,6 % ( $P < 0,05$ ). In the

mucous membrane and the contents of the 12-duodenum, a significant increase in protease activity was observed only after 21 days of prescription of the infusion of medicinal plants by 26,5% ( $P < 0,01$ ) and 20,8% ( $P < 0,001$ ), respectively. By analyzing the enzymatic activity in the jejunum, it was found to increase the activity of proteolytic enzymes, both in the mucous membrane of the jejunum, and in its contents. So after 21 days in the content of the jejunum in chickens of the experimental group it was significantly higher by 10,2% ( $P < 0,05$ ), and in the mucous membrane-by 9,3 % ( $P < 0,05$ ). This indicates stimulation of both the cavity and parietal digestion.

Thus, the infusion of phyto-collectioning broiler chickens stimulates the activity of proteolytic enzymes and humoral factors of natural resistance.

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## **THE USE OF IRON-CONTAINING DRUGS FOR THE IRON DEFICIENCY ANEMIA IN ANIMALS**

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Iron deficiency anemia (IDA) is a disease caused by a decrease in the number of red blood cells and hemoglobin per unit volume of blood. It causes hypoxia of animal tissues, which is manifested by drowsiness, loss of appetite, decreased activity and weight of the animal, pallor of all mucous membranes; increased heart rate and respiration, etc. [1]. With iron deficiency anemia, iron metabolism is first disturbed and iron deficiency states (IDF) occur. To diagnose these disorders, it is necessary to determine the content of iron in blood serum, the total iron binding capacity of blood serum (OGSS), the degree of transferrin



saturation with iron (SNF) [2]. The causes of iron deficiency syndrome are varied and may be associated with impaired feeding or absorption of iron, with massive single or chronic blood loss, increased destruction of red blood cells by toxins or infection, as well as features of the physiological state of animals [3, 4]. For the treatment of iron deficiency conditions, various iron-containing preparations are used, mainly iron dextrans, which are administered intramuscularly in the thigh or neck of the animal. Let's consider some of them.

Ferroglukin-75 is a complex compound of dextran with iron. 1 cm<sup>3</sup> of the preparation contains 75 mg of iron (III). The drug is a dark brown sterile colloidal liquid, mixes well with water. For therapeutic purposes, Ferroglukin-75 is administered to animals older than two weeks of age in mg based on ferric iron per 1 kg of body weight [5]. 1 ml of the Ferran preparation contains 100 mg of ferric iron, as well as cyanocobalamin, folic and nicotinic acids. For therapeutic purposes, Ferrand is used in animals over 2 weeks of age in the following single doses (ml per animal): piglets - 2.0-3.0 ml; calves and foals - 6.0-8.0 ml, lambs - 2.0 - 3.0 ml, puppies of dogs and fur animals - 2.0 ml [5]. The drug "Sedimin" is an aqueous mixture of iodine and selenium compounds on a stabilizing basis of an iron-dextran complex. 1 ml of the drug contains: 18 - 20 mg / ml of iron, 5.5 - 7.5 mg / ml of iodine, 0.07 - 0.09 mg / ml of stabilized selenium. It's applied to cows 20 to 40 days before calving at a dose of 10 ml per head once, calves for 1-2 days of life at a dose of 5 ml per head once, to sows 8 to 12 days before insemination at a dose of 8 to 10 ml per head once and 20 to 25 days before farrowing in the same dose; piglets at a dose of 2 ml per head for 3 to 4 days of life. The injection can be repeated after 7 to 10 days. It is also recommended to administer the drug 7-10 days before weaning at a dose of 3-5 ml per head [6]. The complex preparation "Algaferrin" contains vitamins A, B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub>, B<sub>C</sub>, B<sub>6</sub>, B<sub>12</sub>, C, D<sub>3</sub>, PP, H, macro- and microelements (Fe, Co, I, Br, Mg), wheat bran, seaweed. The drug is a loose powder from beige to light brown in color, with dark inclusions, with a pleasant specific smell. Used for anemia of dogs [7]. Ursoferran-100 is a sterile, slightly viscous injection solution, dark brown in color with a specific odor, containing a complex of iron (III) dextran-heptonic acid. The drug is administered to piglets on the third or fourth day of life once deeply intramuscularly in the

neck or in the upper third of the thigh at a dose of 1.5-2 ml per animal. Female mink during feeding of puppies in spring, the drug is administered once subcutaneously or intramuscularly at a dose of 0.3 ml per animal. To mink puppies at the age of 6-12 weeks, the drug is administered once subcutaneously or intramuscularly at a dose of 0.2 ml per animal [8]. Ferranimal-75 is a colloidal solution of a complex of iron (III) hydroxide, copper, cobalt and selenium ions with low molecular weight dextran in water. 1 ml of the drug contains 72 - 80 mg of iron, 0.08 - 0.10 mg of copper, 0.18 - 0.20 mg of cobalt, 0.05 - 0.07 mg of selenium. The drug is administered to dogs inside with food or water daily for 2 to 3 weeks in doses corresponding to the age and weight of the animal [9].

Thus, for the treatment of iron deficiency anemia in animals, iron dextran preparations, which are usually well tolerated by animals, have a prolonged effect and good therapeutic effects are most in demand.

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## **COMPARATIVE EVALUATION OF DIAGNOSTIC METHODS FOR HELMINTHOSES IN TURKEY**

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In most countries of the world, poultry farming occupies a leading position among agricultural industries. The bird is characterized by great productivity, high reproductive abilities and intensive growth. Currently, one of the rapidly developing areas of the poultry industry is turkey broiler farming, which is characterized by high production efficiency due to the use of modern technologies and the concentration of a large population in a limited area, which in turn leads to obtaining the maximum number of products at minimum cost. However, a large accumulation of birds in a small area contributes to the rapidly spreading of infectious and invasive diseases.

In the household plots of the Republic of Belarus, the parasitofauna of turkeys presents an unstudied problem. Such factors as the joint keeping of different species of birds, free-range, contact with wild birds, etc. aggravate the epizootic situation in turkey parasitoses.

The material for the study was turkeys aged one year and older.

Research was conducted in the laboratory of the Department of Parasitology and Invasive Animal Diseases, VSAVM. 10 turkeys of the private sector of the Vitebsk region were examined. Feces were taken from each bird's cloaca or freshly isolated from the floor. Feces were studied using the Darling (using a saturated solution of sodium chloride,

$\rho=1,18-1,2 \text{ g/cm}^3$ ) and G.A. Kotelnikova and V.M. Khrenova method (using a saturated solution of ammonium nitrate (ammonium nitrate)) with a solution density of  $1.32 \text{ g/cm}^3$ ). The invasion intensity was determined by counting the number of helminth eggs in 20 p.z.m. Based on the identification of helminth eggs, the generic composition of helminths was established.

In a laboratory study of litter, eggs of capillary, heterokisis, and ascaridia were found.

In this case, the capillary eggs are barrel-shaped, asymmetric, yellow-brown,  $0,024-0,028 \times 0,048-0,056 \text{ mm}$  in size. The shell is multi-layered. Corks at the poles are wide, flattened. The outer shell is fine-meshed. Inside, the entire volume is filled with a granular mass.

Ascaridia eggs of regular oval shape, yellowish-gray, size –  $0,047-0,051 \times 0,07-0,086 \text{ mm}$ . The sides are convex. The shell is thick, inside is a dark gray oval-shaped embryo. At the poles between the shell and the nucleus, the free space is distinguishable.

Heterokis eggs of regular shape, size  $0,03-0,039 \times 0,05-0,07 \text{ mm}$ . The shell is thick. The internal cavity is filled with germinal mass. The poles are rounded. The sides are almost parallel.

The results of the studies are presented in table 1.

In the study of 10 samples of litter by Darling's method in 5 samples (50%), it was possible to identify ascaridia eggs, with an invasion intensity (II) of 1-7 specimens. at 20 p.z.m. ; in 7 samples (70%) – heterakisis eggs, with AI – 8-17 copies. at 20 p.z.m. ; in 10 samples (100%) - capillary eggs, with AI – 1-56 copies. at 20 p.z.m.

By the method of G.A. Kotelnikova and V.M. Horseradish ascariasis eggs were identified in 8 cases (80%), while the intensity of invasion was from 1 to 11 specimens. in 20 p.z.m., heterokisis eggs – In 10 cases (100%), II – 3-32 specimens. in 20 p.z.m., capillary eggs – In 10 cases (100%), II – 3-76 specimens. at 20 p.z.m.

Conclusion. 1. Turkeys in the private sector of the Vitebsk region are invaded by capillaries, heterakisis and ascarids. 2. Diagnostics by two methods showed greater efficiency of the method of G.A. Kotelnikova and V.M. Khrenova, in comparison with the Darling method.

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## **THE EFFICACY OF THE DRUG "DORAMECTIN KM 1%" FOR STRONGYLATOSES OF THE GASTROINTESTINAL TRACT IN CATTLE**

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Cattle breeding is one of the main branches of animal husbandry in the Republic of Belarus. Under current conditions, the most important task of cattle breeding is to preserve and maintain the health of livestock as well as an increase in its number. To ensure a high level of animal performance, obtain products of a high sanitary quality, as well as to improve protection of population against diseases common to humans and animals is only possible in conditions of sustainable well-being of animals.

The most important problem of current animal husbandry is invasive diseases. Pharmacotherapeutic agents currently play an important role in controlling these diseases.

The objective of our work was to determine the therapeutic efficacy of the drug "Doramectin KM 1%" for strongylatous infestation of the gastrointestinal tract in cattle.

The testing of the drug "Doramectin KM 1%" was carried out on farms of the Vitebsk district on cattle affected by strongylatoses of the gastrointestinal tract.

Doramectin KM 1% is an antiparasitic drug in the form of a solution for injection. It is a transparent liquid ranging from discoloured to a light yellow. 1 ml of the drug contains 10 mg of doramectin. The drug "Doramectin KM 1%" is referred to antiparasitic drugs of systemic action of the class of macrocyclic lactones.

For the trial 43 heads of cattle under the age of 2 years infested with strongylatosis were selected. The animals were divided into two groups. The experimental group consisting of 29 animals was administered the drug "Doramectin KM 1%" at a dose of 1 ml per 50 kg of animal body weight subcutaneously, a single dosage. Animals of the control group in the amount of 14 heads were administered the drug "Pharmacin" at a dose of 1 ml per 50 kg of animal body weight subcutaneously, a single dosage.

A preliminary fecal examination was carried out by the Darling's method, as a result it was found that the rate of prevalence for the invasion made 100%.

The efficacy of the drugs was tested by coproscopic studies on the 3, 7 and 15 days after dehelminthization.

On the day 3 the fecal egg counts of the strongylate type decreased in both groups: from 110 to 240 eggs per 20 FOV in the experimental group, and from 120 to 178 eggs per 20 FOV in the control group. Scatocopy on the days 7 and 15 revealed no strongylate eggs.

Finally it has been found out that the extended efficacy of the drug "Doramectin KM 1%" and "Pharmacin" in strongylatoses of the gastrointestinal tract of sheep made 100%.

The drug "Doramectin KM 1%" is an effective medicine to control strongylatoses of the gastrointestinal tract in sheep.

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## **QUAIL IS LITTLE BUT HUGE PROFIT**

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Uzbekistan is an agriculture-based developing country with approximately 10 million poultry. The majority of these poultry are indigenous chickens and ducks. The productive performance of this chickens is low and losses due to diseases and predators are high. However, exotic pure breeds did not perform satisfactorily in scavenging system because of their higher nutritional demand and lower disease resistance. Therefore, in addition to indigenous poultry, rural and semi-

urban people need such a suitable species of bird which can be reared easily with little investment and provide more economic return within a very short time.

Its immense potentialities as a new dimension in poultry farming have already been recognized in this country. However, till now, the status and the major problems of quail farming in Uzbekistan are not properly explored. Therefore, the study was undertaken to obtain thorough and detailed information on the status, problems, and prospect of Japanese quail farming in selected areas of Uzbekistan.

**Materials and methods.** The study was conducted in 14 districts of Uzbekistan, during the period from July 2018 to June 2019. A quail farmers were interviewed for data collection using a structured questionnaire. Focus group discussions were also carried out with unsuccessful farmers and those want to start quail farming. Workers of quail farms, quail feeds and medicine suppliers, quail eggs and meat sellers were also interviewed regarding the issue.

There are specific aspects of maintaining quail and domesticated. These birds do not like noise. Because they occupy places where the grass is thick and high in freedom. Therefore, it is desirable to cover the nesting cages with noise-resistant cloth on three sides. The baby cage must not be exposed to strong light. In the cage it is necessary to adapt to the dung. They like to get them into it. From time to time, you need to change them to a new one. Large quails are fed 2-3 times a day for a night. It is desirable to have a mixture of cereals (barley, oats, crushed, oatmeal flour) -60%, protein compound (cottage cheese, crushed fish) - 35% and mineral compound (egg pinch). Usually, quails can be feed sunflower and soybeans. But there is no need to give seeds. The first polphones released from the egg go into feeding during the first week, 5 days in the daytime and 5 times in the day. In the summer months, each bird requires an average of 10g of grass per day. The container should always be clean.

Out of 31 farms, 86.5% were operated by male, 67.3% farmers did not receive any training and 92.3% farmers had no earlier experience of quail farming although 58.0% farmers primary occupation was quail farming. Most of the farms (63.4%) were mixed in type having  $\leq 5000$  birds of two or three varieties. About 80.7% farms were operated



separately round the year with no other poultry and 83.0% farmers wanted to expand their farming. The average pullet weight 145.0±0.12, 110.0±0.07, 120.0±0.22, and 128.0±0.17 g; age at the first lay 46.0±0.04, 42.0±0.31, 42.0±0.09, and 45.2±0.05 days; rearing period 15.0±0.01, 12.0±0.14, 15.0±0.32, and 15.2±0.18 months; culling period 15.5±0.14, 13.0±0.06, 15.0±0.03, and 15.4±0.26 months were for layer, parent stock, hatchery, and mixed farms, respectively. Most of the layer farms had an average egg production of ≤5000/day and net profit BDT 0.75/egg. However, an average number of birds,

hatchability and net profit per day-old-chick were ≤5000, 76.8% and BDT 2.75, respectively, in the hatchery. Broiler quails were sold at 30 days with mean weight of 110.8 g and net profit BDT 9.02/bird. The major constraints of quail farming were higher feed price, outbreak of endemic diseases, lack of proper knowledge, farmers training, proper market access, difficulties of parent stock collection, inadequate bio-security practices, and limited access to veterinary care. Thus, a proper training on quail farming, bio-security management, and government subsidy on feeds could make quail farming sustainable in Uzbekistan.

**Nutritional Supplements:** List of nutrition nutrients: Cereals, legumes, cereals and seeds: The legumes contain up to 25% protein, which is rich in carbohydrates and vitamins. It is well crushed before feeding. Pea contains 21.5% protein, rich in amino acids and magnesium. When the pea was fed, the ration enriched with methionine, vitamin B1, B2 and fat. Peas are chopped down. Corn increases the productivity of poultry and accelerates the growth of young wombs, but is not rich in amino acids. The juicy microelement is rich in many types. Carrot juice helps the poultry to grow well, reducing the symptoms of cancers. There is plenty of leaf in the. It is not necessary to crush before giving it and it can be added daily to the ration. When the wheat is crushed, it is sliced, it sticks into the mouth, so it is recommended to give it to the poultry. When the eggs become less egg, rice is used to increase productivity. The shade contains a large amount of protein, reaching 37-45%. It is processed at + 116-120 ° C before shading. The shade of this type of fruit has a positive effect on the growth of the young age. Nutritional ration should not exceed 5%.

- Milk is given in the form of gallstones so as not to put them in the bedrock. Often the poultry ration is added to cauliflower and yogurt. The gray contains about 16% of protein material.

- Rainworms are eaten by appetizers and eat quickly.

- Chicken and quail eggs are well cooked and minced, and the first dates are given to the young dumplings. The bedrock eggs are replaced with the crust.

The herbs include butter, dandelion, spinach, cabbage, carrots and beet leaves. The olives are fed to the quails in newly cut and crushed cuttings. It is useful to grind cabbage in the winter. Garlic may slightly reduce egg yolks, but the beneficial effect will reduce cholesterol content in the blood. It is given in small quantities in the amount not exceeding 3% of the total feed.

Increase the breeding: In tannery, the quails are selected from 3 months to 8 months, and are from 3 months to 6 months old. It is not recommended to pair different breeds and close relatives. In order to obtain incubation eggs by short-time co-pudding, put in the morning for 15-20 minutes every 2-3 days. Japanese nappies can be arranged for up to 20 days by color. If some of the quilts are not available in color, they will not be excluded. It is possible to know the bed of the breed: the pomegranate is surrounded by red, the tail area around the brown is brown.

Growing young berries: Quail chicks come out of the egg, the size of their chicks is larger than the egg size, as they are round and dense in the egg, weighs about 6-8 grams. After that, the chickens are slowly placed on the butter and heated with an electric heater. One of the basic conditions that must be addressed when feeding the body is the room temperature and the temperature inside the box that is available to the quails. In the first 10 days, the box containing the quail-chickens should be temperature + (35-38) °C, temperature in the room + (27-28) °C. From 10 to 17 days, the temperature is gradually reduced, in boxes or boxes, up to +30 °C, in the room + 28 °C. The beds are reduced from 17 up to 25 days in beds up to +25°C, and to +22 °C in the room.

After 2 months the length of the quails will stop growing. At this time, the pomegranate seeds can reach up to 400 grams. For those who want to get many eggs, it is recommended to feed up to 50 quails per 1

square meter. Bedrock eggs are cold, so it's best to move them to a faster, warmer place.

The demand for proteins in the home-grown bedrock is higher than in normal wild boar. A large amount of food (40%), especially frosts, is available at night, due to the fact that the poultry is slowly digesting the grain, while poultry feeds on the night, poultry keeps to itself.

Chicken feeds are the best nutrients for quails, but it is only necessary to raise the protein content of the germ to 21-23.5%. When feeding the food in humid conditions, quails do not feel thirst for water. One quail per day consumes 22-27 grams of food. To obtain 1 kg of egg mass, feed 5-7 kg of feed. Each year, a head worm is fed about 9 kg of fodder. In the case of prolonged exposure, reduced room temperature, poor nutritional rations and other nutriments, the nutritional consumption may increase.

For quail, drinking water should be continuous. Feeding leads to rapid water contamination of mouth and throat. Therefore, it is recommended to wash the teasers 1-2 times a day.

Embods are made of tunnels and similar materials. Depths are 5-7 cm in height and 15 cm in height. The feeders split the fodder during feeding, so the needles are deeper, the edges are rotated inward and far away from the pyramids. 3 to 2 parts of the ingredients are filled with them. The best nutritional ingredients from 8 to 29 days are feedstuffs such as: chopped maize and wheat, protein, vitamin and mineral supplements.

Quail's "Japanese" fertility is more productive than other breeds, and each shellfish gives an average of 300 eggs a year. Compared to other types of industrial poultry, the nectar is higher than the body weight of the egg.

The average weight of the quail "egg" egg is 9-12 g. Bean eggs are usually dark brown or covered with blue spots. Saving nests in Asian homes is a key to success and success. For people with chicken eggs allergies, quail eggs are not absolutely harmful, but help to cure allergies. It is recommended to use for every healthy person every 3 to 1.5 months every morning and night.

Conclusion. The study concludes that quail and Japanese quail farming has enormous potentiality and could be an alternative to chicken

farming particularly in providing gainful employment, supplementary income and as a valuable source of meat and egg, quail farming should be encouraged and promoted in Uzbekistan. There were many nutrient benefits of quail eggs which most of them as good sources of protein, fat, vitamin E, minerals (nitrogen, iron and zinc) and sex hormone P. Thus, we should educate or transfer knowledge to people for good nutrient benefits of quail eggs as good nutritional foods and may be the alternative resolving problem of people in some or all nutritional nutrients necessary for human health in developing countries and may be a good potential to resolve “World Food Problem”.

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