MEDICINAL DRUG “DUNLEY” INTENDED FOR THE TREATMENT OF PNEUMONIA AND INFECTIOUS DISEASES OF DOMESTIC ANIMALS

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Abstract:

The newly invented drug “DUNLEY” is used in agriculture and veterinary medicine for the treatment of pneumonia and infectious diseases such as foot-and-mouth disease virus. Additionally, it serves as a biostimulator for the domestic animals.

Government is taking measures to solve issues related to the supply of agricultural industry products. As a result, efforts are being made to cure agricultural animals from viral and epizootic diseases. Infected animals suffer from gastrointestinal and airborne diseases at a rate of 80%-100%. Large and small livestock often die during the most severe stages of the disease, while healthy animals, due to unawareness, become infected. Their weight decreases by 2-3 times, which negatively impacts the agricultural industry. Ultimately, the treatment of sick animals, their prevention from viral diseases, and the decline in animal fertility lead to significant economic losses.

Keywords: animal husbandry, veterinary drug, domestic animals, respiratory and infectious diseases

Introduction

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Foot-and-mouth disease (Latin: *Aphtae epizooticae*; English: *FMD*) is serious, highly contagious viral disease affecting domestic and wild cloven-hoofed animals. It is characterized by fever and aphthous lesions on the mucous membranes of the oral cavity, hairless areas of the skin on the head, udder, coronet, and interdigital cleft. It is also accompanied by lameness. In young animals, the disease affects the myocardium and skeletal muscles [1].

Disease leads to significant losses in milk, meat, and other livestock products, complicates commercial operations, and disrupts agricultural activities. Long-term

experience has shown that in regions where FMD is endemic, revenues from dairy and meat production decrease by 30-40% [3].
The probable causes include the high concentration of animals in confined areas, stall housing, frequent regrouping, microclimate disturbances, inadequate and unbalanced nutrition, infectious and parasitic diseases—all of which contribute to stress conditions in the body and, as a result, immune deficiencies [4].

New technologies for animal husbandry are emerging in agriculture, and medicinal drugs are widely used to combat viral diseases. The reasons for this include the diversity of antigenic and pathogenic disease formations, as well as their resilience in external environments. Disease prevention is also one of the key approaches to solving the issue. Under such conditions, bacterial diseases are considered “mass diseases.” Therefore, significant efforts are being devoted to the development of medications that can protect animals from infectious diseases.
In this regard, utilizing modern technologies, the medicinal drug “DUNLEY” was developed. It effectively combats infectious diseases and pneumonia in animals.

The objective of this work is to produce a highly effective and affordable medicinal drug (using local raw materials) for the treatment of pneumonia, lung diseases, and infectious diseases in domestic animals.
For the prosperity of livestock farming, an increase the number of sheep, and the stable development of livestock production, reliable protection of animals from various infectious diseases, pneumonia, and foot-and-mouth disease is essential. To achieve this, a new technology and formulation of the “DUNLEY” drug have been developed.

Materials and methods

In veterinary medicine, various methods are used to treat large and small livestock from infectious diseases and pneumonia, including injections, aerosols, ointments, and feed additives.

We have used similar types of inventions. In some works, complex technology was applied, and the chemical substances included in their composition are rare, inaccessible, and expensive.

The disadvantages require the fact that the preparation technology for this drug is highly complex and is not always dependent on weather conditions. Additionally, some of the substances in its composition are difficult to obtain and have intricate chemical structures.

The composition of the drug used for disease treatment, animal prevention also acts as a biostimulator and hormonal tissue-based medicinal preparation, includes preserved organs from cattle up to 4 years old. These organs include the thyroid and parathyroid glands, thymus, pancreas, and liver. They are separately minced three times using a meat grinder, then subjected to a multi-stage extraction process, and finally transformed into a tissue emulsion. The obtained substances include: ovarian tissue emulsion – 10.3, thyroid and parathyroid gland emulsion – 10.3, thymus emulsion – 10.3, pancreatic emulsion – 10.3, liver emulsion – 20.6,

ASD fraction-2 – 10.3, formalin – 0.4, and natural honey – 20.6. The drug is prepared by strictly following these proportions [5].

The composition of our drug is characterized that it includes a numerous and complex combination of substances, as well as a group of hard-to-obtain hormonal preparations. Additionally, the manufacturing process takes several days, which makes it expensive.

Some medications used for the effective treatment and prevention of diseases in animals include hyperimmune serum, with the addition of formalin, against antigens of colibacillosis (*Escherichia coli* infection), salmonellosis, and klebsiellosis. There are several similar studies on this topic [6].

These medications must be used repeatedly until a clear improvement in the animals' condition is observed. In addition, various antibiotics must be used. However, these drugs are only effective for specific diseases in animals, their application periods are very short, and this creates certain challenges.

Medications applied through aerosol spraying contain a 25% alcohol tincture of propolis, diluted with a 20% glucose solution in a 1:100 ratio. This ensures a high concentration of the drug in the bloodstream [7]. However, this treatment method requires a closed space and special spraying equipment, which significantly increases the cost of the medication.

For the treatment of infectious diseases, pneumonia, and skin wounds in cattle, a drug containing 84-86% pumpkin pulp, 10-12% walnut concentrate, 2-3% metrosept, and 1-2% emulsifier T2 is used [8]. The preparation of this drug requires significant labor and time, making it expensive. Moreover, it is not a specific medication for treating animals.

The composition of a drug used to treat infectious diseases caused by bacteria includes doxycycline hyclate (5.0-15.0), bromhexine hydrochloride (0.25-0.75), lactose (0.5-1.5), 2-pyrrolidone, and other components [9].

The production technology of this drug is highly complex. It contains several rare and hard-to-obtain substances, making it expensive and economically unviable.

The aforementioned analogs of the proposed drugs require repeated management, which demands considerable human effort and time.

The drug we propose is distinct in that its technology is simple, the ingredients used in its composition are easily accessible, and its preparation does not require much time.

Foot-and-mouth disease (FMD) is classified by the World Organization for Animal Health as a List of a disease. This classification is due to its potential for rapid and widespread transmission within and between countries, leading to severe economic consequences. Although FMD does not cause high mortality in adult animals, it results in significant economic losses and poses a major obstacle to international trade [10].

According to expert estimates, production losses and vaccination costs for foot-and-mouth disease (FMD) range from $6.5 billion to $21 billion USD [11]. The primary replication of the FMD virus occurs in the upper respiratory tract, followed by viremia, leading to fever and associated symptoms such as lethargy, anorexia, and reduced milk production [12].

Animals can become infected through two main routes: airborne transmission and oral ingestion. For all susceptible animal species, higher viral doses are required for infection via ingestion compared to respiratory transmission. Infections can also occur through primary infection pathways such asabrasions, contaminated tools, or artificial insemination [13].

The incubation period can range from 1 to 14 days (very rarely less than one day). The most likely incubation period is between 2 and 6 days. Viral shedding can begin two days before clinical signs appear, peak within two days of symptom onset, and usually stop 4-5 days after symptoms appear [14].

In cattle and pigs, the infection is easily recognized due to its obvious clinical symptoms. FMD in cattle it causes severe depression, anorexia, and apathy. In dairy cows, milk production often decreases before other clinical signs appear. Mouth pain leads to excessive salivation and teeth grinding. Sudden death in calves due to myocarditis and abortions in pregnant cows are also observed. European cattle breeds, particularly Friesian and Jersey, tend to show more severe symptoms [15].

FMD presents with mild, often subtle, clinical signs in small ruminants like sheep and goats. [16].

Vesicles are often very small and difficult to detect. On the hooves, vesicles appear on the coronary band as well as in the interdigital space. These symptoms can be overlooked by livestock owners or veterinarians. Foot-and-mouth disease (FMD) lesions in sheep, especially on the limbs, may be transient, healing quickly or becoming secondarily infected with other pathogens, complicating diagnosis. Sudden death of lambs due to myocarditis and abortions in pregnant adult sheep are possible [17].

In spring and autumn, cattle and small ruminants often suffer from pneumonia, particularly young animals (calves, lambs), with mortality rates reaching up to 40%. Our research has taken into account many years of scientific studies in livestock farming and veterinary medicine. This led to the conclusion that the new drug should contain substances with antibacterial and antiviral properties, improve blood circulation in animals, and act as a biostimulant to enhance immune.

Recognizing this importance, after several years of experiments and research, we developed the drug “ “GUNLEY”," which contains substances that aid in the treatment of pneumonia, infectious diseases—including FMD—and function as a biostimulant for cattle and small ruminants.

The composition of the “GUNLEY” drug (1 liter) is shown in Table 1.

№	Component Name	Quantity
1.	Antibiotic	40 g (400 ml of 10% solution)
2.	Physiological solution	200 g
3.	Sodium citrate	50 g
4.	Hydrochloric acid	5 ml

№	Component Name	Quantity
5.	Cow blood (vaccinated against infectious diseases or 30-40 days after recovery from an infectious disease)	400 g

The following components were used to prepare this drug: antibiotic (oxytetracycline, gentamicin, penicillin, etc.), physiological solution, sodium citrate, hydrochloric acid, and cow blood from animals that were vaccinated against infectious diseases (foot-and-mouth disease, leptospirosis, EMCAR, etc.) or 30-40 days after recovering from infectious diseases.

Antibiotics (oxytetracycline, gentamicin, penicillin, etc.) effectively treat animals from bacterial infections and prevent bacterial growth in the blood. These antibiotics suppress and slow down bacterial enzymes. The use of different antibiotics is necessary, frequent use of the same antibiotic leads to bacterial resistance. Therefore, using new antibiotics, the effectiveness of the drug increases. Some types of antibiotics currently produced have the property of easily penetrating the blood, being quickly absorbed by the cells of the body, and being easily excreted.

The physiological solution evenly distributes the drug, restores the overall blood volume, and cleanses the body from toxins. The physiological solution is drug used in medicine. By definition, it is an aqueous solution of electrolytes and other hydrophilic molecules. The solution contains electrolytes (sodium and chloride ions), which dissociate in the solution [18].

Sodium citrate prevents the clotting of animals' blood. (It is also possible to use other substances in different concentrations to prevent coagulation.)

Hydrochloric acid leads to the expansion of the capillaries in the alveoli of the lungs in animals, which contributes to the acceleration and improvement of blood circulation.

In the article, an analytical method was used. The main features of the biochemical composition of the blood of cattle, one of the most important agricultural animals, are considered. Special attention was given to immunoglobulin proteins (antibodies). The majority of these are synthesized by the thymus, Peyer's patches, bone marrow, and spleen. These proteins bind to antigens, neutralize them, and remove them from the body, meaning their primary function is specific immunity. Immunoglobulins are divided into classes G, M, A, E, and D [19].

In addition, the blood of cattle contains small amounts of proteins such as transferrin, haptoglobin, lactoferrin, ceruloplasmin, properdin, interferon, lysozyme, complement system proteins, and beta-lysin [20].

The drug “GUNLEY”, which contains blood from cattle vaccinated against infectious diseases (foot-and-mouth disease, leptospirosis, EMCAR, etc.) or 30-40 days after recovery from an infectious disease, acts as a specific serum that increases antibodies in the animals' bodies, as well as intracellular antibodies like interferon in tissue cells. All of this increases the effectiveness of the drug in combating viral diseases in animals.

All chemical and biological components included in the composition of the “GUNLEY" drug are approved and used in animal husbandry, and their prices are affordable, economically viable, and beneficial for use.

The preclinical trials of the "Günleý" drug were conducted on laboratory animals in the Vivarium section of the Biotechnology Research Laboratory of the Academy of Sciences of Turkmenistan. The preclinical trials were based on the methodologies outlined in the Biopharmaceutical research by Academicians N.N. Karkishenko and S.W. Grachiev, specifically their guidelines for laboratory animals and alternative models [21].

All tests were conducted following the methods for keeping and testing laboratory animals. For the tests on acute and subacute toxicity, purebred Balb/C mice with an average weight of 18-20 grams were selected. The mice were divided into 4 groups, with 10 mice in each group, to determine acute and subacute toxicity (toxicity). The tests started on July 22, 2015. For the first group of mice, 1 ml of the drug was injected subcutaneously around the tail; for the second group, 1 ml of the drug was injected intramuscularly; for the third group, 1 ml of the drug was injected into the abdominal muscle; the fourth group of mice served as the control.

acute toxicity tests were conducted for 14 days. To determine the subacute toxicity, the test was extended to 28 days. Throughout the tests, no acute or subacute toxic effects of the drug were observed.

To check the purity of the drug, it was inoculated into a nutrient medium with peptone agar in a test tube and incubated in a thermostat at 36°C for 72 hours. After this period, no growth was observed in the test tube, confirming the purity of the drug.

According to the methodology, Wistar Albino line white rats weighing 250-260 grams were selected. The selected rats were divided into two groups of 6 animals each for conducting chronic toxicity tests of the drug.

The first group consisted of control rats, and the second group consisted of experimental rats. The control rats were administered a normal physiological solution, while the experimental rats were injected with 5 ml of the drug subcutaneously once a month for 6 months. Chronic toxicity effects were monitored. According to the observations, no clinical changes were found in either the control or the experimental group.

For skin allergic reactions in rabbits, two methods were used. New Zealand breed rabbits with an average weight of 1500-2000 grams were selected and divided into two groups. In the first group, 1-2 drops of physiological solution were applied to the eyes of the control rabbits. In the second group, 1-2 drops of the "Günleý" drug were applied to the eyes of the experimental rabbits. The rabbits were observed for 72 hours. According to the observations, no skin allergic reactions were detected in either the control or the experimental group of rabbits.

The second method of testing skin allergic reactions in New Zealand breed rabbits (weighing 1500-2000 grams) was also performed. The experimental group of rabbits was injected with the "Günleý" drug, while the control group received a physiological solution. The injections were used under the skin until a chickpea-

shaped nodule formed, and they were monitored for 72 hours. No significant changes were observed when comparing the control and experimental groups.

All components of the "Günleý" drug are excreted from the bodies of both large and small cattle within seven days. After this period, the products can be used without restriction.

The substances in the drug help the animals recover easily and quickly and act as a biostimulant for weak animals and calves that are unable to stand on their own. Furthermore, for a good result, only one dose of the vaccine is needed.

Additionally, during the research, the expiration dates and storage conditions for the drug were established. The conclusion was made that the shelf life of the drug is more than 6 months. The drug is stored for up to 6 months from the date of manufacture.

Based on the research results, the activity and effectiveness of the drug's medicinal properties were found to be 98%.

The prototypes presented contain similar shortcomings as noted in the descriptions of the analogs. The proposed analog drugs are complex in their preparation technology and contain a large number of ingredients.

On the basis of the technical solution to the task, we concluded that the composition of the proposed drug is ideal. It is highly effective and economically advantageous.

On the basis of the conducted experiments, we consider that our drug differs significantly from prototypes and analogs and it is eaasy to prepare, affordable, highly effective, and economically beneficial.

Immunity to foot-and-mouth disease is primarily mediated by antibodies. Antibodies begin to appear 3-5 days after the first clinical signs, and high levels of antibodies are registered 2-4 days later (5-9 days after the appearance of clinical signs) [22]. Foot-and-mouth lesions typically heal within 10 days. Secondary consequences of foot-and-mouth disease, such as bacterial infections of the hooves or mastitis, can cause full recovery to take much longer [23]. The antibody titer in ruminants remains high and can be detected for several years after infection. In pigs, however, antibodies may only be detected for several months, especially in rapidly growing young animals [24].

This drug has successfully passed clinical trials in the agricultural industry. During the spring months, both large and small ruminants are most commonly affected by diseases such as pneumonia and foot-and-mouth disease. Upon examining the internal organs of a deceased lamb, it was noted that the blood near the heart had coagulated, the gallbladder was swollen, and the stomach had dreadful milk-colored spots. Unwary private entrepreneurs lost approximately 100 lambs and about 10 calves due to this disease. After using the "Günley" drug, animal mortality sharply decreased, and they recovered quickly. The "Günley" drug also acts as a biostimulant for calves, lambs, and others that are unable to stand on their feet.

This invented drug is used against viral diseases and as a biostimulant for animals. Its pharmacological actions have a positive effect on the bodies of both large and small ruminants and other animals, improving circulation, boosting immunity, preventing viral diseases, and helping rapid recovery during illness.

The composition of the drug we are proposing differs significantly from analogs and meets with the criteria of scientific and technical literature and patent requirements.

During the working process, the authors invented the composition of the "Günley" drug, which is highly effective for treating pneumonia, infectious diseases, and also acts as a biostimulant for domestic animals. Additionally, they developed instructions for the use of this drug and conducted experiments on laboratory animals (preclinical) as well as clinical trials on animals.

Clinical researches were conducted in collaboration with several people involved in agriculture. B. Sopyev, A. Kakabayev, O. Anzarov made some conclusions together with farmers and private entrepreneurs.

For the infected animals, several vaccines of different volumes were administered subcutaneously. All results are shown in the table. (Table 2)

Check Number	**Vaccine Volume**	**Results**
Check № 1	1-2 ml	40-45%
Check № 2	3-4 ml	80-85%
Check № 3	5 ml	98-100%
Check № 4	6-7 ml	98-100%
Check № 5	10 ml	98-100%

As a result of the test, it was established that for small ruminants, the recommended dose is 5 ml and above. The same test was carried out on large ruminants, for which the recommended vaccine dose is 10 ml. After administering one dose of the vaccine, it was observed that the animal quickly started to recover. If there is no improvement, the procedure should be repeated after 3 days.

The drug "Günley" has shown very good results in comparison with other applied medicines. Our drug is highly effective in treatment and it does not require much human labor, and is economically advantageous.

The "Günley" drug contains substances that contribute to the treatment of pneumonia, infectious diseases, including foot-and-mouth disease, and also acts as a biostimulant for both large and small ruminants (cows, calves, horses, sheep).

Results and Discussion

For small animals: Regardless of weight and age, for small animals, 5 ml dose should be applied once to the inner thigh skin, and if there is no improvement, a second time the same dose can be repeated after 3 days. Regardless of weight and age, for large animals, 10 ml dose should be applied once to the skin over the 3rd cervical vertebra and the skin of the scapula of horses, and if there is no improvement, a second time the same dose can be repeated after 3 days.

The medicinal product has no contraindications. It can be used together with other antibiotics and heart medications.

Storage conditions: Store at a temperature of +4 - +6°C, shelf life 6 months. Storage conditions are at a temperature of +4 - +6 ^{0} C, with the shelf life of 6 months.

To achieve the set task, prototypes and analogs were used [5-9]. The composition of the proposed drug significantly differs from the analogs and meets with the scientific and technical literature and patent criteria.

All substances included in the composition of the "Günley" drug are approved and used in animal husbandry. The price is affordable and economically advantageous.

The simplicity of the drug preparation technology allows it to be widely used in animal husbandry and introduced into industry. Additionally, the drug can be manufactured in any farm.

There are some difficulties with the above-mentioned analogs. A significant amount of effort is required to prepare this medicine, as it involves various rare chemicals and complex technologies.

Based on the technical solution, we have learned that the drug effectively helps animals with pneumonia, infectious diseases, foot-and-mouth disease, and also acts as a biostimulant. It also helps recovering animals as soon as poosible and provides preventive effects.

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