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Suleiman Sh. Abdulmagomedov ✉
Rabiyat M. Bakrieva

Caspian Zonal Research Veterinary Institute, Makhachkala, Russia

✉ *gunib9876@gmail.com*

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The use of vitamin complex in combination with chemotherapy in theileriosis of cattle

ABSTRACT

Relevance. In the Caspian region of Russia, blood parasitic diseases are one of the most common diseases of cattle, which cause significant economic damage to livestock farms due to reduced productivity and death of animals. According to natural and climatic conditions and zonal features, the Republic of Dagestan is a favorable habitat for ixodic mites, the main carriers of pyroplasmidosis pathogens, in particular Theileria annulata. In spring, cattle with impaired resistance, weakened after wintering, are seriously ill with pyroplasmidosis, especially teileriosis, after getting over the gum, rumination, intestinal work, milk yield, and general reaction to the environment recover to physiological norm for a long time. In this regard, further improvement of existing and the search for new methods that ensure maximum conservation of animals from these invasions, with minimal effort and money, remains an urgent task.
The aim of the study was to determine the effectiveness of "Delagil" in the combined use of "Ursoferan-forte" in spontaneous bovine taileriosis.

Methods. Methods for determining therapeutic efficacy were formed by experimental and control groups of 30 heads of different ages with spontaneous tayleriosis in varying degrees of severity of the disease with a temperature reaction within 40.4 ± 0.03 — 41.5 ± 0.09 °C, parasitemia — 5.47 ± 0.3 — 25.18 ± 0.31% in 100 fields of view of the microscope. In the control group, "Delagil" was used in its pure form at a dose of 2 g / 100 kg (20 mg / kg by DV) (orally) with water in the form of a suspension. In the experimental group, treatment was carried out comprehensively — "Delagil" in the indicated doses in combination with the drug "Ursoferan-forte" in a dose of 10–25 ml (once, intramuscularly).

Results. The use of antimalarial "Delagil" in combination with the drug "Ursoferan-forte" (in combination) increases the effectiveness to 93.3% and avoids significant economic losses. Currently, the safety of susceptible animals from teileriosis is becoming possible with the combined use of chemotherapeutic drugs.

Key words: cattle, theileriosis, therapy, "Delagil", oxytetracycline hydrochloride, "Ursoferran-forte", efficacy

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Научная статья

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С.Ш. Абдулмагомедов ✉
Р.М. Бакриева

Прикаспийский зональный научно-исследовательский ветеринарный институт, Махачкала, Россия

✉ *gunib9876@gmail.com*

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Применение витаминного комплекса в сочетании с химиотерапией при тейлериозе крупного рогатого скота

РЕЗЮМЕ

Актуальность. В Прикаспийском регионе России кровепаразитарные болезни являются одним из наиболее распространенных заболеваний крупного рогатого скота, которые причиняют значительный экономический ущерб животноводческим хозяйствам за счет снижения продуктивности и гибели животных. По природно-климатическим условиям и зональным особенностям Республика Дагестан является благоприятной средой для обитания в ней иксодовых клещей — основных переносчиков возбудителей пироплазмидозов, в частности Theileria annulata. Весной крупный рогатый скот с нарушенной резистентностью, ослабленный после зимовки, тяжело переболевает пироплазмидозами, особенно тейлериозом, после чего жвачка, руминация, работа кишечника, удои, общая реакция на окружающее долго восстанавливаются до показателей физиологической нормы. В связи с этим дальнейшее усовершенствование существующих и изыскание новых методов, обеспечивающих максимальное сохранение животных от этих инвазий, при минимальных затратах сил и средств остаются актуальной задачей.
Цель исследования — определить эффективность «Делагила» при сочетанном применении препарата «Урсоферан-форте» при спонтанном тейлериозе крупного рогатого скота.

Методы. Методы определения лечебной эффективности формировали опытные и контрольные группы из 30 голов разного возраста при спонтанном тейлериозе в различной степени тяжести течения болезни с температурной реакцией в пределах 40,4 ± 0,03 — 41,5 ± 0,09 °С, паразитемия — 5,47 ± 0,3 — 25,18 ± 0,31% в 100 полях зрения микроскопа. В контрольной группе «Делагил» применяли в чистом виде в дозе 2 г / 100 кг (20 мг/кг по ДВ) (внутрь) с водой в виде суспензии. В опытной группе лечение проводили комплексно — «Делагил» в указанных дозах в сочетании с препаратом «Урсоферан-форте» в дозе 10–25 мл (однократно, внутримышечно).

Результаты. Применение противомалярийного «Делагила» в сочетании с препаратом «Урсоферан-форте» (в комплексе) увеличивает эффективность до 93,3% и позволяет избежать значительных экономических потерь. В настоящее время сохранность восприимчивых животных от тейлериоза становится возможной с помощью комбинированного применения химиотерапевтических препаратов.

Ключевые слова: крупный рогатый скот, тейлериоз, терапия, «Делагил», «Урсоферран-форте», эффективность

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Introduction/Введение

Theileriosis is an invasive disease, caused by endoglobular parasites of the species *Theileria annulata,* characterized by a number of characteristic clinical and pathomorphological changes in the body. The condition of the vascular walls is especially disturbed, the trophic and other functions of the nervous system, the functions of the hematopoietic organs suffer, anemia develops, metabolism, thermoregulation and the functions and structure of many parenchymal organs are disrupted. The disease usually occurs acutely, over several days, and produces a high mortality rate among sick animals [1–3].

Fundamental studies of the causative agents of theileriosis of animals, pathologies, caused by them, clinical manifestations, diagnosis, treatment, prevention and control measures, tick-vectors, features of their biology, ecology and other aspects of the problem in our country were carried out by N.A. Kolabsky (1966, 1968, 1977). A.M. Ataev (2009), S.A. Bursakov (2021), B.A. Timofeev (2005), V.T. Zablotsky (2009), S. V. Engashev (2011).

In Dagestan Republic piroplasmosis causes significant economic damage to livestock production, due to a decrease of productivity and an increase of the mortality rate, especially among young animals and imported livestock. The disease has a focal distribution in the vertical zone and is recorded in the form of enzootics, depending on the state of activity and population size of ticks from the genus *Hyalomma* [4–6].

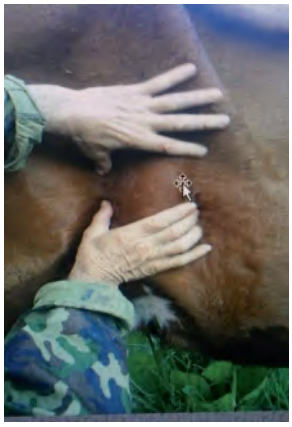
The lack of specific means of therapy and prevention prompts to the search of other ways to protect animals from theileriosis. Chemotherapy and chemoprophylaxis are of great importance in the fight against piroplasmosis, the success of which depends on the complex use of highly effective drugs, low toxicity and having high antiparasitic activity. In this regard, the task was set to study the effectiveness of the antimalarial drug “Delagil”, in combination with “Ursoferran-forte”, complex of vitamins in the conditions of the Caspian region of Russia [7–13].

Fig. 1. “Agrofirm Chokh” MTF No. 1. Photo by the author

Fig. 2. “Agrofirm Chokh” MTF No. 2. Photo by the author

Fig. 3. Enlarged prescapular lymph node. Photo by the author

Fig. 4. Enlarged superficial inguinal lymph node. Photo by the author



The purpose of the work is to determine the therapeutic effect and feasibility of combining of chemotherapeutic agents with vitamin complex in theileriosis of cattle.

Materials and methods /
Материалы и методы исследования

Production experiments were carried out in 2022, in the farm “Agrofirm Chokh” MTF No. 1, 2, (Fig. 1, 2.) Kumtorkalinsky district of Dagestan Republic, on 30 heads of cattle of the Red Steppe breed of different age groups, that spontaneously fell ill with theileriosis. In the initial period of the disease, with a parasitic reaction, there are 15–19 parasites in the field of view of the microscope and body temperature 40.0–41.0 °C.

The diagnosis was made comprehensively: the epizootological situation, the results of laboratory tests, microscopic studies of smears from the peripheral blood of sick and suspected animals, using the Romanovsky-Giemsa method and clinical studies of enlarged regional lymph nodes (Fig. 3, 4) and the presence of pomegranate bodies in punctates were taken into account.

The experiments studied the therapeutic effectiveness of “Delagil” — an antiprotozoal agent (Hungary Meda Farma) — (7-Chloro-4-quinolinyl)-N,N-diethyl-1,4-pentanediamine (in the form of phosphate, hydrochloride or sulfate). Dosage form — tablets, containing chloroquine — 250 mg, which are crushed and suspended with water, orally, in combination with “Ursoferran-forte” (organization-developer: LLC “VIK-animal health”, Russia) injection solution contains in 1 ml as active ingredients: (iron in the form of iron (III)-dextran-heptonic acid (gleptoferron), vitamins *E, B_3, B_9, B_{12}*), as excipients: macrogol 15-hydroxystearate, benzyl alcohol and water for to 1 ml, applied intramuscularly, in dose 10–25 ml per animal.

In the first control group (n = 15) “Delagil” was used in its pure form, in dose 20 mg/kg, orally, with water, once a day, during 6–11 days. In the second group (n = 15) in the 1st day of treatment, “Delagil” was used in dose 20 mg/kg, orally, with water, once a day, during 5–6 days, simultaneously with “Ursoferran-forte”, in dose 10–25 ml, once, intramuscularly (which are presented in Table 1) (Fig. 5).

Table 1. **Treatment regimen**

Indicators	Group	
	1-control (n = 15)	2-experimental (n = 15)
Animal weight, kg	125–356	120–350
Application period, days	6–11	5–6
“Delagil”	20 mg/kg	20 mg/kg
“Ursoferran-forte”		10–25 ml

Fig. 5. Chemotherapy. Photo by the author

Taking into account the condition of the animal, symptomatic — pathogenetic treatment was carried out in parallel, aimed on removing of intoxication of the body, using calcium borogluconate and glucose — 5%, intravenously, in rate 0.5 ml/kg of body weight, coffeine, sodium — benzoate, in dose 10–15 ml in 20%-solution, subcutaneously.

To prevent of the development of atony of the proventriculus, animals were given tincture of white hellebore in dose 5–12 ml per animal (0.01–0.024 ml/kg of live weight), with water from 50 to 500 ml, in morning and evening, and skim milk, 3–5 l, orally, with rubber bottle.

An important condition for organizing therapeutic measures that contributed to a favorable outcome of the disease was the timely separation of sick animals from healthy livestock, their early thermometry, the use of specific agents, and ensuring complete rest. During the treatment, the animals were kept under a canopy in a ventilated room, protected from sunlight, and given easily digestible food (good hay, dried grass, chopped root vegetables, fresh skim and whole sour milk) and salted water without restriction.

When setting up the experiment, the requirements of the European Convention for the Protection of Vertebrate Animals Used for Experiments or Other Scientific Purposes (ETS No. 123, Strasbourg, 1986)[1] were observed.

Results and discussion / Результаты и обсуждение

The following clinical signs were observed in sick animals: depression, lack of appetite, wetness and ruffled hair, profuse lacrimation and a sharp decrease of milk yield. Body temperature — 40.4–41.5 °C, pulse increased to 84–88 beats per minute, breathing to 31–37 movements per minute, anemia of the mucous membranes, enlarged superficial — unilaterally prescapular, suprauterine and inguinal lymph nodes, atony forestomach, diarrhea, followed by constipation. In peripheral blood smears, round and comma-shaped forms of *Theileria predominated*. Sick animals were promptly separated and kept in a cool room and treated.

In the first group (control) of patients with clearly expressed clinical signs of theileriosis, animals were treated 6–11 days, severely ill patients — 6, moderately — 5 and mildly ill — 4. The duration of the temperature reaction ranged from 6 to 8 days, the parasitic reaction in individual animals decreased after 6–7 times of administration of the drugs. Recovered — only 13, were forced to die — 2. Efficiency— 86.6%.

In the experimental group, the disease progressed in animals: in the mild — 4, with average — 5, 6 — in severe forms. Body temperature within 41.3 ± 0.11 °C

lasted from 4–5 days, in blood smears to 17.37 ± 1.19% of erythrocytes affected by theileria were detected. As a result of complex chemotherapy with “Delagil” and “Ursoferran-forte” in combination with symptomatic and pathogenetic agents according to indications, in most cases on the 5th–6th days temperature decreased to 38.5–39.3 °C, parasitemia — to 1.00 ± 0.03 theileria in 100 fields microscope vision on. At the same time, the general condition of the animal improved, and in the following days the parasitic reaction decreased significantly. Of the 15 treated animals, 14 recovered, 1 were forced to be killed, efficiency — 93.3% (Table 2).

Table 2. **Therapeutic effectiveness of complex therapy in theileriosis of cattle**

Indicators	Groups	
	1-control	2-experimental
Forcedly killed	2	1
Dead animals	–	–
Recovered animals, heads.	13	14
Therapeutic effectiveness,%	86.6%	93.3%

When treating animals, no side effects were identified, and no adverse reactions were detected on the body of the cows of the experimental group at the above dose.

The rooms where the sick animals were located were treated with the insecticidal drug “Delcid 4%” at a rate of consumption of 300–400 ml per 1 m^2 using spraying equipment.

Regular anti-tick treatments were carried out on animals of public and private use with aqueous solutions of acaricides against ixodid ticks carrying blood parasites, by spraying, with an interval 14 days (Fig. 6).

Fig. 6. Parsitization by mites of the genus Hyalloma. Photo by the author

[1] https://rm.coe.int/168007a6a8. Текст изменен в соответствии с положениями Протокола (СЕД № 170) как его вступления в силу 2 декабря 2005 года.

Conclusion/Выводы

A new treatment regimen of theileriosis of cattle, with the simultaneous use of "Delagil" and the vitamin complex "Ursoferran-forte", according to the instructions on their use, on the 5th–6th days leads to complete recovery from theileriosis and promotes the restoration of the animals' body after illness, compared with the treatment regimen, adopted in the control group. Therapeutic effectiveness — 93.3%.

All authors bear responsibility for the work and presented data.
All authors made an equal contribution to the work.
The authors were equally involved in writing of the manuscript and bear the equal responsibility for plagiarism.

Авторы несут ответственность за работу и представленные данные.

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ОБ АВТОРАХ

Сулейман Шарапович Абдулмагомедов
кандидат биологических наук
gunib9876@gmail.com
https://orcid.org/0000-0001-9162-5062

Рабият Магомедовна Бакриева
научный сотрудник
nauka800@gmail.com
https://orcid.org/0000-0001-9638-8182

Прикаспийский зональный научно-исследовательский ветеринарный институт,
ул. Дахадаева, 88, Махачкала, 367000, Россия

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ABOUT THE AUTHORS

Suleiman Sharapovich Abdulmagomedov
Candidate of Biological Sciences
gunib9876@gmail.com
https://orcid.org/0000-0001-9162-5062

Rabiyat Magomedovna Bakrieva
Researcher
nauka800@gmail.com
https://orcid.org/0000-0001-9638-8182

Caspian Zonal Scientific Research Veterinary Institute,
88 Dakhadaev Str., Makhachkala, 367000, Russia