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IDENTIFICATION OF THE THERAPEUTIC DOSE OF ABAMECUR IN HYPODERMATOSIS

Annotation

Hypodermatosis of cattle caused by the larvae of subcutaneous gadflies *Hypoderma bovis* (spinal cord or string) and *H. lineatum* (esophagus) is widespread in the Republic of Kazakhstan and Russia and causes great economic damage to cattle breeding. The disease is characterized by inflammatory phenomena at the points of localization of larvae, general intoxication of the host organism and a decrease in animal productivity. The economic damage consists of a shortage of milk, meat, a decrease in the quality of raw leather, obtaining weak offspring. [2], a cow with hypodermatosis loses up to 200 kg of milk, and young cattle lose up to 9.8 kg in weight [1,2].

Timely implementation of antiparasitic measures allows to eliminate these shortcomings. Currently, there is a large assortment of antiparasitic drugs on the veterinary market. It is important to make the right choice based on the epizootic situation and knowledge of the parasitocenosis of animals undergoing treatment, while taking into account the cost of the drug.

For the treatment of hypodermatosis of cattle in recent years, foreign drugs of a wide spectrum of antiparasitic action for subcutaneous and intramuscular administration have been widely used. Drugs for intramuscular administration are of interest: these are Russian preparations of ivermectin, containing 1% of ivermectin as an active substance [3] and abivertin, the active substance of which is 1% of abamectin [4]. In the Republic of Kazakhstan, for the first time, we developed and tested in production conditions a broad-spectrum antiparasitic drug based on abamectin, which received the trade name abamecur. All drugs exhibit a high therapeutic effect at a dose of 1 ml / 50 kg (0.2 mg/ kg by DV) against [5] arachno-entomoses and nematodes of different types of ruminants with intramuscular administration.

To show the effectiveness of abamecur in cattle hypodermatosis, we compared it with Russian medicines of the same purpose.

Key words: *hypodermatosis, cattle, parasites, subcutaneous gadfly*

Introduction. Protection of animals from endo- and ectoparasites requires the development of not only more advanced [6,7,8,9,10] therapeutic and preventive measures, but also the creation of new highly effective, non-toxic, environmentally safe and easy-to-use medicines. In our case, it is a drug of a wide spectrum of antiparasitic action. It is important to know not only how it acts on ecto- and endoparasites, but also on the body of the animal itself.

Hypodermatosis, caused by hypodermic gadfly (*Hypoderma bovis*), which causes great economic damage to livestock, occupies a special place among cattle diseases. Gadfly larvae parasitize in the subcutaneous tissue of the back of cattle, forming muscles on the sides of the spine, and mature larvae form fistulas in the skin [11,12,13,14]. Violation of the function of superficial vessels, inflammation, swelling of all layers of the skin, the possibility of developing local and general toxic reactions determines the severity of the disease. The same clinic of the disease is caused by *H. lineatum* localized after migration in the esophagus. The economic damage [14,15,16,17] consists of a shortage of milk, meat, a decrease in the quality of raw leather, and the production of weak offspring.

A cow with hypodermatosis loses up to 200 kg of milk[118,19,20], and young cattle lose up to 9.8 kg in weight per year[21]. In this regard, it is important to study the condition of animals that have not been treated and on the background of treatment.

Materials and methods of research. Initially, the therapeutic dose of abamecur was detected on 160 heads of young animals grazing in summer on a pasture unfavorable for the summer of gadflies. Abamecur was compared to abivertin. 8 groups of 20 animals were formed from the animals: 7 experimental and a control. Onabamecur was administered once intramuscularly to experimental animals at a dose of 0.3; 0.5; 0.7; 0.9; 1.0 ml / 50 kg, which was 0.06; 0.1; 0.14; 0.18; 0.2 mg /kg of body weight, and abivertin was administered at a dose of 0.5 and 1.0 ml / 50 kg (0.1 and 0.2 mg / kg of DV, respectively).

Results of the study and their discussion. The results of the experiment took into account the years of the presence of gadfly nodules on the back of animals after autumn deworming (Table 1).

As a result, it was found that abamecur in doses of 0.5-1.0 ml per 50 kg of animal weight, as well as abivertin, showed a 100% effect against hypodermic larvae, and abamecur at a dose of 0.3 ml /50 kg showed an efficiency of 77.7%. The animals of the control group had 18 infected heads of young animals with an average number of gadfly nodules of 11.2. The remaining 18 infected animals were treated with abamecur in the spring at a dose of 1 ml / 50 kg and received a 100% effect.

In parallel with the first experiment, 120 heads of cattle grazed in a hypodermatous zone were used in another farm. Before being placed in a stable in October 2006, 50 animals were injected with abamecur, and 50 with abivertin at a dose of 1 ml / 50 kg; 20 heads served as a control.

Table 1 – The effectiveness of different doses of abamecur in cattle hypodermatosis in comparison with abivertin in autumn deworming (n=20)

Drugs	Dose by		Number of animals		Found gadfly nodules , average	Effectiveness, %	
	ml/50kg,	AS mg/50kg	total	incl. released		IE	EE
Abamekur	0,3	0,06	20	13	2,5	65	77,7
	0,5	0,1	20	20	0	100	100
	0,7	0,14	20	20	0	100	100
	0,9	0,18	20	20	0	100	100
	1,0	0,2	20	20	0	100	100
Abivertin	0,5	0,1	20	20	0	100	100
	1,0	0,2	20	20	0	100	100
Control			20	2	11,2	-	-

The results of treatment were taken into account in the spring, . None of the animals treated with abamecur and abivertin in the fall showed gadfly nodules. At the same time, out of 19 untreated animals (one was culled in winter), 14 were found to have from 1 to 6 (on average, 2.8) gadfly nodules.

The conducted studies confirmed the high therapeutic effect of abivertin and for the first time showed the high therapeutic effect of abamecur, as well as the harmlessness of their use. Since abamecur in all experiments showed a 100% effect against hypodermic larvae, it was of interest to once again test the effectiveness of the drug in different doses on a large livestock.

Out of 700 heads of young animals, 7 equal groups were formed, each of which was injected with abamecur and abivertin once intramuscularly under the shoulder blade in the doses indicated in Table 2.

Table 2 – The effectiveness of different doses of abamecur in cattle hypodermatosis in comparison with abivertin in autumn deworming (n=100)

Drugs	Dose by		Number of animals		Found gadfly nodules , average	Effectiveness, %	
	ml/50kg,	AS mg/50kg	total	incl. released		IE	EE
Abamekur	0,5	0,1	100	99	0,1	98,95	99,0
	0,7	0,14	100	100	0	100	100
	0,9	0,18	100	100	0	100	100
	1,0	0,2	100	100	0	100	100
Abivertin	0,5	0,1	100	95	0,3	96,85	98,0
	1,0	0,2	100	100	0	100	100
Control			100	0	9,5	0	0

The results of treatment were taken into account in the spring 180 days after the administration of drugs by the number of gadfly nodules on the back and rump of cattle, received a 100% therapeutic effect from doses of abamecur 0.7-1.0 ml / 50 kg of body weight against gadfly larvae of the first and second degree. From a dose of 0.5 ml / 50 kg, abamecur and abivertin showed a high, but not 100% effect, which, respectively, amounted to 98.95 and 96.85 (IE), 99.08% and 98.0% (EE). In untreated animals, 9.5 gadfly nodules were found.

In the following experiment, 100 young animals of the control group were used, which remained untreated, which were once intramuscularly injected with abamecur at a dose of 1 ml/50 kg on March 15, 2008. Before treatment, the animals had from 3 to 17 gadfly nodules, which averaged 9.5 specimens per head.

Taking into account the results, 30 days after treatment, we obtained a 100% effect against stage 11 hypodermic larvae, which only began to appear in some animals.

Thus, in the presence of 3-17 larvae in the body of cattle, hypodermic abamecur exhibits a 100% effect in doses of 0.7-1.0 ml / 50 kg of body weight. Since the infection rate of animals was not very high, the therapeutic dose is considered to be a dose of 1.0 ml / 50 kg of body weight, as well as abivertin.

To once again show the effectiveness of abamecur in cattle hypodermatosis, we compared it with Russian medicines of the same purpose.

The comparative effectiveness of abamecur, abivertin and ivermectin against hypodermic larvae was studied during autumn and spring processing of cattle in the economy of Western Kazakhstan, unfavorable for gadfly diseases. Experimental and control groups of animals were formed according to the principle of analogues. The drugs were administered to cattle once intramuscularly in the forearm area at a dose of 1.0ml per 50 kg of animal weight, which corresponded to 0.2 mg/kg in DV.

To identify and count gadfly nodules, livestock subjected to autumn deworming against hypodermic larvae were examined in spring at the end of March, and during spring deworming - a month after treatment.

The infestation of animals was determined by a quantitative method of studying the lifetime diagnosis of hypodermatosis.

Autumn deworming was performed on 150 cattle (50 in each group) with 50 in the control (Table 3). The results were taken into account in the spring by palpation.

Table 3 – Comparative therapeutic efficacy of abamecur, abivertin, ivermek during autumn preventive deworming of cattle against hypodermatosis

№п	Drugs	Dose by	Number of animals		Gadfly larvae were found after treatment in March	Effectiveness, %
			total	incl. released		
1	Abamekur	1,0	50	50	0	100
2	Abivertin	1,0	50	50	0	100
3	Ivermek	1,0	50	50	0	100
4	Control	-	50	6*	31,3 ± 0,33 (4 - 58)	-

* - Infection of animals with hypodermatosis was 88%.

Table 3 shows that 50 heads of cattle were taken into the control group, of which in the spring of 2008 44 heads had gadfly nodules under the skin in the amount of 4 to 58 per animal. On average, the number of gadfly nodules was 31.34 ± 0.333 copies. Considering that 6 animals out of 50 untreated were free of hypodermic larvae, we believe that infection with hypodermatosis in the farm was 88%.

Animals treated with abamecur, abivertin and ivermectin in autumn were completely free of gadfly larvae, which amounted to 100%.

In the spring, 40 animals that remained untreated after autumn treatment were dewormed, with 4 animals in the control group. Table 4 shows that both Russian and Kazakh preparations showed a high effect against sexually mature gadfly larvae.

Each drug from 10 animals freed 9 heads from hypoderms, which was 90% effective. When calculating the gadfly nodules, a statistically unreliable difference was found from the action of abamecur, abivertin and ivermek. Intensity efficiency, respectively, was: 99.30; 99.34; 99.59%. In four untreated animals, the number of gadfly nodules did not change - 28.5 ± 0.304 .

The conducted studies have shown that abamecur is as effective in hypodermatosis as Russian abivertin and ivermek and it can be used for the treatment of animals. At the same time, like Russian scientists, we believed that cattle that graze on pasture in an unfavorable hypodermatosis zone should be treated better in autumn, since hypoderm larvae are at an early stage of development, which allows us to prevent their migration and further development in the host body.

Table 4 – Comparative therapeutic efficacy of abamecur, abivertin, ivermek in spring deworming of cattle against hypodermatosis

№	Drugs	Dose 1 ml/50 kg (0,2mk/kg by AS)	Number of animals		Number of gadfly larvae		Effectiveness, %	
			total	incl. released	Before treatment	After treatment	IE	EE
1	Abamekur	1,0	10	9	31,7± 0,4	0,22	99,30	90
2	Abivertin	1,0	10	9	33,4± 0,4	0,22	99,34	90
3	Ivermek	1,0	10	9	27,3± 0,3	0,11	99,59	90
4	Control	-	4	0	28,5± 0,3	28,5 ± 0,3	0	0

Of interest are the data of observation of animals for three years; when they were treated in a timely manner with an abamecure. Initially, 385 heads were taken into the experiment.

In autumn, 385 heads of young animals aged 7-9 months grazing on a pasture unfavorable for hypodermatosis were dewormed with abamecure at a dose of 1 ml/ 50 kg (0.2 mg/kg by DV) of body weight. In spring and summer, there was an intensive growth of gadflies, which created a threat of mass infection of livestock with hypodermatosis. As a control, 10 heads of untreated young animals were left.

At the end of March, from two to 28 gadfly nodules were found in 7 control animals, which averaged 19.8 ± 2.07 specimens. These animals were dewormed with abamecur in a therapeutic dose and as a result, 6 bulls were freed from the gadfly's jaws.

Of the 385 animals treated with abamekur, 379 remained until spring (6 animals were killed) and none of them showed gadfly nodules on palpation, which indicates a 100% effect with timely autumn deworming. The effect of spring deworming was 87.5%.

During the spring and summer, the animals continued to graze on the same pasture, but their number already amounted to 340 heads. At the end of October 2008, they were dewormed with abamecur at a dose of 1 ml / 50 kg of body weight. When taking into account the results in the spring after the treatment of g, not a single animal had gadfly nodules.

Observation of animals continued from autumn to spring a year later. and showed the advantage of timely autumn treatment of animals with abamekur.

At the end of April, 8 calves were identified in one farm grazing on a pasture unfavorable for hypodermatosis, which had from 4 to 17 large gadfly nodules on their backs and withers, which averaged (4, 05, 05, 07, 09, 11, 16, 17) ~ 9,3 ex . Abamecur was administered to calves at a dose of 1 ml / 50 kg of body weight and, taking into account the results, after 12 days it was revealed that only one calf had hypodermic larvae, and 7 had gadfly nodules preserved with live larvae. This suggests that the larvae of the 3rd stage are no longer feeding and are ready to exit the gadfly's jaws, so abamecur does not act on them.

Another experiment was conducted in May 2009 on three heifers, in which 8, 15 and 20 large-sized gadfly nodules were found on the back and withers, respectively. The animals were injected with abamecur at a dose of 1 ml / 50 kg of body weight. When taking into account the results of treatment after 10 days, it was revealed that the larvae of gadflies of the 3rd stage were alive and ready to go out into the external environment. This once again convinced us that it is impractical to treat hypodermatosis in late spring.

The conducted studies indicate that the new drug abamecur during the autumn strategic antiparasitic deworming not only has a 100% therapeutic effect against hypodermatosis, but also provides disease prevention throughout the stall period, which has a significant impact on increasing meat products, improving leather raw materials.

In order to provide effective assistance to peasant farms, there is a need for mandatory deworming of animals in the fall, and, if possible, repeat deworming in the spring, which heals cattle from hypodermatosis and protects pasture from infection. The absence of an invasive beginning on the pasture for the next year ensures the health of the cattle.

Conclusions. Thus, it is advisable to carry out annual mandatory preventive, and if necessary therapeutic antiparasitic measures that contribute to the improvement of livestock from hypodermatosis. As an antiparasitic agent, any broad-spectrum drug based on avermectins can be used.

We recommend abamecur, developed in the Republic of Kazakhstan, which is not inferior in therapeutic efficacy to foreign drugs at a dose of 1 ml / 50 kg (0.2 mg / kg by DV) for hypodermatosis of cattle and shows a high therapeutic effect. It is advisable to carry out deworming of livestock in autumn or early spring.

In the event that for some good reason it is not possible to carry out autumn deworming, then it must be done in early spring to prevent infected cattle from entering the pasture. According to a

number of scientists, it has been established that if you do not fight hypodermatosis for 2-3 years, the number of infected cattle increases dramatically. So for the continuation of the gadfly population, only three males and five females or 10 larvae released for pupation are needed

Late spring treatment of cattle against already formed stage III hypodermic larvae is impractical, because the larvae are already formed and ready to exit the capsule. At the same time, intoxication of the host organism is possible and a 100% effect is not achieved during treatment.

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ТҮЙІН

Тері астындағы гадфля личинкаларынан туындаған ірі қара малдың гиподерматозы Қазақстан Республикасы мен Ресейде кең таралған және мал шаруашылығына үлкен экономикалық зиян келтіреді. Паразитке қарсы шараларды уақтылы жүргізу бұл кемшіліктерді жоюға мүмкіндік береді. Қазіргі уақытта ветеринарлық нарықта антипаразиттік препараттардың үлкен ассортименті бар. Эпизоотиялық жағдайға және емделетін жануарлардың паразитоценозын білуге, сонымен қатар препараттың құнын ескере отырып, дұрыс таңдау жасау маңызды. Қазақстан Республикасында біз ірі қара малдың гиподерматозы кезінде шетелдік препараттардың терапевтік тиімділігі бойынша 1 мл/50 кг (ДВ-ға 0,2 мг/кг) дозасында кем түспейтін және жоғары терапиялық әсерін көрсететін абамектин негізінде антипаразиттік әсердің кең спектрін алғаш рет жасап, өндірістік жағдайларда сынақтан өткіздік. Малды дегельминтизациялауды күзде немесе ерте көктемде жүргізген жөн.

РЕЗЮМЕ

Гиподерматоз крупного рогатого скота, вызываемый личинками подкожных оводов широко распространен в Республике Казахстан и России и причиняет большой экономический ущерб скотоводству. Своевременное проведение противопаразитарных мероприятий позволяет устранить эти недостатки. В настоящее время на ветеринарном рынке имеется большой ассортимент антипаразитарных препаратов. Важно сделать правильный выбор на основании эпизоотической ситуации и знания паразитоценоза животных, подвергающихся лечению, при этом, учитывая стоимость препарата. В Республике Казахстан мы впервые разработали и испытали в производственных условиях препарат широкого спектра антипаразитарного действия на основе абамектина, получивший товарное название абамекур, который не уступает по терапевтической эффективности зарубежным препаратам в дозе 1 мл/50 кг (0,2 мг/кг по ДВ) при гиподерматозе крупного рогатого скота и проявляет высокий терапевтический эффект. Дегельминтизацию скота целесообразно проводить осенью или ранней весной.