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Comparative evaluation of the efficacy of different anthelmintic drugs against ovine dictyocaulosis

Qo'ylar diktiokaulyoziga qarshi qo'llanilgan turli antгельmint preparatlarining qiyosiy samaradorligi

Сравнительная оценка эффективности различных антигельминтных препаратов при диктиокаулёзе овец

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ENGLISH

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Abstract. This article presents the results of a comparative evaluation of the therapeutic efficacy of different anthelmintic drugs used for the control of ovine dictyocaulosis. A review of the available literature indicates that dictyocaulosis is widely distributed worldwide, with the prevalence of infection ranging from 18.7 to 75.5 per cent. Previous studies conducted in the Republic of Uzbekistan reported that the extent of invasion reached up to 65.5 per cent in certain regions. However, the current epizootic status of ovine dictyocaulosis, its distribution across different regions of the country, as well as the efficacy of commonly used anthelmintic drugs and the level of parasite resistance to them, remain insufficiently investigated. The present study comparatively evaluated the therapeutic efficacy of LEVAMISOLE 75 and RICAZOL®, manufactured by Nita-Farm LLC (Russian Federation), and IVERMEC 1 %, manufactured in the People's Republic of China. All of these drugs are officially registered in the Republic of Uzbekistan and are widely used in veterinary practice.

Keywords: sheep; helminth; helminthiasis; dictyocaulosis; larva; geohelminth; Dictyocaulus filaria; prevalence of infection; intensity of infection; deworming; LEVAMISOLE 75; RICAZOL®; IVERMEC 1 %

O'ZBEKCHA

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Annotatsiya. Mazkur maqolada qo'ylar diktiokaulyoziga qarshi kurashishda qo'llanilayotgan turli antгельmint preparatlarining qiyosiy terapevtik samaradorligini baholash natijalari keltirilgan. Adabiyotlar tahliliga ko'ra, diktiokaulyoz dunyoning ko'plab mamlakatlarida keng tarqalgan bo'lib, kasallikning uchrash darajasi 18,7–75,5 % ni tashkil etadi. O'zbekiston Respublikasida o'tkazilgan avvalgi tadqiqotlarda kasallikning ekstensivligi ayrim hududlarda 65,5 % gacha yetishi qayd etilgan. Shunga qaramay, hozirgi davrda respublikaning turli hududlarida diktiokaulyozning zamonaviy epizootik holati, tarqalish xususiyatlari, shuningdek amaliyotda qo'llanilayotgan antгельmint preparatlarining samaradorligi va ularga nisbatan parazitlarning rezistentlik darajasi yetarli darajada o'rganilmagan. Tadqiqot davomida O'zbekiston Respublikasida davlat ro'yxatidan o'tgan hamda chorva hayvonlari gelmintozlariga qarshi veterinariya amaliyotida keng qo'llanilayotgan Rossiya Federatsiyasining «Nita-Farm» MChJ tomonidan ishlab chiqarilgan LEVAMIZOL 75 va RIKAZOL®, shuningdek Xitoyda ishlab chiqarilgan IVERMEC 1 % antгельmint preparatlarining qiyosiy terapevtik samaradorligi o'rganildi va olingan natijalar tahlil qilindi.

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Kalit soʻzlar: qoʻylar; gelmint; gelmintoz; diktiokaulyoz; lichinka; geogelmint; Dictyocaulus filaria; invaziya ekstensivligi; invaziya intensivligi; degelmintizatsiya; LEVAMIZOL 75; RIKAZOL®; IVERMEC 1 %

РУССКИЙ

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Аннотация. В данной статье представлены результаты сравнительной оценки терапевтической эффективности различных антигельминтных препаратов, применяемых для борьбы с диктиокаулезом овец. Анализ литературных данных свидетельствует о том, что диктиокаулез широко распространен во многих странах мира, а уровень зараженности животных варьирует от 18,7 до 75,5 %. Согласно ранее проведенным исследованиям в Республике Узбекистан, экстенсивность инвазии в отдельных регионах достигала 65,5 %. Вместе с тем современное эпизоотическое состояние диктиокаулеза, особенности его распространения в различных регионах республики, а также эффективность применяемых антигельминтных препаратов и уровень резистентности паразитов к ним изучены недостаточно. В ходе исследований была проведена сравнительная оценка терапевтической эффективности препаратов ЛЕВАМИЗОЛ 75 и РИКАЗОЛ®, производимых ООО «Нита-Фарм» (Российская Федерация), а также препарата IVERMEC 1 %, произведенного в Китайской Народной Республике.

Ключевые слова: овцы; гельминт; гельминтоз; диктиокаулез; личинка; геогельминт; Dictyocaulus filaria; экстенсивность инвазии; интенсивность инвазии; дегельминтизация; ЛЕВАМИЗОЛ 75; РИКАЗОЛ®; IVERMEC 1 %

1. MAVZUNING DOLZARBLIGI

Relevance of the topic

Dunyo miqyosida qishloq xoʻjaligi hayvonlarining parazitlar kasalliklarini tarqalishini oʻrganish, davolash va qarshi kurashishning optimal muddatlarini ishlab chiqish hamda ularni profilaktika qilish boʻyicha bir qancha chora-tadbirlar amalga oshirilmoqda. Shundan kelib chiqqan holda, kasallik qoʻzgʻatuvchilarining arealini, tur tarkibini va bioekologik xususiyatlarini oʻz vaqtida aniqlash, ularga qarshi ilmiy asoslangan kurashish, davolash va oldini olish choralarini hududlarning biogeografik va ekologik holatini baholash bilan birga olib borish yuqori samara beradi.

Respublikamizda mustaqillik yillarida agrosanoat majmuining asosiy tarmoqlaridan biri boʻlgan chorvachilikni rivojlantirish borasida keng qamrovli chora-tadbirlar amalga oshirildi. Mazkur yoʻnalishda olib borilgan rejali chora-tadbirlar natijasida chorva mollarning yuqumli, yuqumsiz va invazion kasalliklarga chalinishi sezilarli darajada kamayib, chorva mollari soni oshdi.

Shu bilan birga, mamlakatimizga keyingi 20 yilda chetdan turli zotga mansub qoramollar, qoʻy-echkilar va boshqa chorva hayvonlarining olib kelinayotgani, chorvachilikda xoʻjalik yuritish shakllarining (aholi, fermer, dehqon, klaster) rivojlanib borayotgani chorva mollarning turli parazitlar kasalliklari tarqalish darajasini oʻrganish hamda ularga qarshi davolash va profilaktika chora-tadbirlarini takomillashtirishga qaratilgan izlanishlarga alohida eʼtibor qaratish zarurligini bildiradi.

2. ADABIYOTLAR TAHLILI

Literature review

Mualliflarning tahlillariga koʻra, bugungi kunda respublikamiz sharoitida chorva hayvonlarining turli gelmintoz kasalliklariga qarshi 240 dan ortiq antgelmint vosita qoʻllanilib kelinmoqda. Ushbu antgelmint vositalarning 200 dan ortigʻi chetdan valyuta hisobiga kirib kelsa, 40 tasi respublikamizda ishlab chiqariladi. Shuningdek, qoʻllanilayotgan antgelmint preparatlarning 110 tasi suspenziya shaklida, 48 tasi tabletki, 41 tasi bolyus, 15 tasi granula, 11 tasi eritma va qolganlari gel, pasta hamda tomchi shakllarida qoʻllaniladi [3].

Bugungi kunda gelmintozlarga qarshi qoʻllanilayotgan antgelmint vositalar — albendazol (alben, albenol, albet, valbazen, orivermin), fenbendazol (panakur, fenkur, vermitan), mebendazol (mebenvet), kambendazol (kamban, MK-905), parbendazol (gelmatak, verminum), asetamizol (2-ASB), shuningdek nilverm (tetramizol, nemitsid, nilzan, oovermol, sitarin, askaridil, apperkal, konkurat, dikaris, veterin-vermizol, vetanizol) kimyoviy jihatdan benzimidazollar guruhiga mansub boʻlib, ular turli gelmintozlarni davolash va oldini olishda qoʻllanilib kelinmoqda [2].

Baʼzi mualliflar mayda shoxli mollarning diktiokaulyoziga qarshi kurashish uchun levamizol va oksfendazol asosidagi kombinatsiyalangan preparat — levoksni qoʻllaganlar; invaziya intensivligi 97,88 % boʻlganda 4,25 mg/kg dozada 90 %, 5,31 mg/kg dozada esa 100 % samaradorlikka erishilgan [1]. Boshqa tadqiqotchilar taʼkidlashicha, levamizol jinsiy voyaga yetgan diktiokaualarga jinsiy voyaga yetmaganlariga nisbatan samaraliroqdir [7].

Tadqiqotchilar kavsh qaytaruvchi hayvonlarning diktiokaulyoziga qarshi ivermektin preparatlarining yuqori samaradorlikka egaligini qayd etishgan [9, 10]. Shuningdek, diktiokaulyoz va boshqa gelmintozlarning oldini olish uchun ivermektin kapsulalarini 1,7 mg/kg dozada 100 kun davomida qoʻllash orqali samarali natija olingani koʻrsatilgan [8].

Koʻpgina tadqiqotchilarning maʼlumotlariga koʻra, qoʻzilarning diktiokaulyozdan oʻlim darajasi kasal hayvonlar sonining 12 foizini tashkil qiladi. Turli yillarda qoʻylar oʻlimining 25–82 % diktiokaulyoz tufayli sodir boʻlgani, diktiokaulyoz bilan zararlangan yosh hayvonlarning tirik vazni ortishi 38 foizdan koʻproq kamayishi qayd etilgan [5].

Qoʻylar diktiokaulyozining epizootik xususiyatlarini kengroq oʻrganish, kasallikning tarqalish qonuniyatlarini aniqlash hamda samarali profilaktika va davolash choralarini ishlab chiqish chorvachilikda iqtisodiy zararlarni kamaytirish va sohaning barqaror rivojlanishini taʼminlashda muhim ilmiy-amaliy ahamiyat kasb etadi.

3. MATERIALLAR VA METODLAR

Materials and methods

Toshkent viloyati Ohangaron tumanidagi «HOLTORAEV OYBEK-HM» fermer xo'jaligidan 96 bosh qo'ydan tezak namunalari olindi va gelmintlarvoskopik usullardan Berman-Orlovning O'zVITI da modifikatsiyalangan usulida tekshirildi. Tekshirish natijalariga ko'ra, 96 bosh qo'ydan 54 boshi (56,2 %) diktiokauloz bilan ekstens zararlangani aniqlandi.

Har bir qo'yning yoshi, rangi va birka raqami qayd etilib, olingan tezak namunasi laboratoriya sharoitida tekshirildi. Diktiokaulalar bilan zararlangan 54 bosh qo'y to'rt guruhga — uchta tajriba guruhiga 13 boshdan hamda bitta nazorat guruhiga 8 bosh qilib ajratildi. Birinchi tajriba guruhidagi qo'ylarga IVERMEC 1 % preparatidan 10 kg tirik vazniga 0,2 ml teri ostiga, ikkinchi tajriba guruhidagi qo'ylarga LEVAMIZOL 75 preparatidan 10 kg tirik vazn hisobidan 1 ml mushak orasiga, uchinchi tajriba guruhidagi qo'ylarga esa 10 kg vazniga nisbatan 0,4 ml miqdorda RIKAZOL® preparati mushak orasiga qo'llanildi. To'rtinchi — nazorat guruhidagi 8 bosh zararlangan qo'ylarga antelmint preparatlar qo'llanilmadi. Barcha guruhlarda preparat berilganidan 7 kun o'tgach takroriy gelmintarvoskopik tekshiruv o'tkazildi.

4. NATIJALAR VA MUHOKAMA

Results and discussion

Tajriba natijalari 1-jadvalda keltirilgan. Jadval ma'lumotlarini tahlil qilsak, birinchi tajriba guruhidagi 13 bosh qo'y gelmintarvoskopik tekshirilganda ular 100 % diktiokaulalar bilan ekstens zararlangani, invazyani intensivligi esa minimal 17, maksimal 68, o'rtacha 42 nusxani tashkil etgani aniqlandi. Ushbu guruhdagi qo'ylarga IVERMEC 1 % antelmint preparatidan 10 kg tirik vazniga nisbatan 0,2 ml teri ostiga yuborildi va 7 kundan keyin qayta gelmintarvoskopik tekshiruvdan o'tkazildi. Takroriy tekshiruv xulosasiga ko'ra, IVERMEC 1 % antelmint vositasining ushbu miqdori 100 foiz ekstens samara berdi.

Ushbu preparat qo'llanmasida chorva mollarining oshqozon-ichak strongilyatozlariga — bunostomum, Cooperia, chabertiya, gemonxus, nematodirus, ezofagostomum, strongilyus va trixostrogilyuslarga, shuningdek lichinkali telaziya hamda gipodermalarga va bit-kanalarga qarshi qo'llanilishi qayd etilgan. Ammo qo'llanmada o'pka nematodalariga, xususan

1-jadval

Qo'ylar diktiokauloziga qarshi IVERMEC 1 %, LEVAMIZOL 75 va RIKAZOL® antelmint vositalari samaradorligini qiyosiy o'rganish natijalari / **Table 1.** Comparative efficacy of IVERMEC 1 %, LEVAMISOLE 75 and RICAZOL® against ovine dictyocaulosis

Guruh raqami	Antelmint vositalar nomi, miqdori va qoʻllanish shakli	Qoʻylar soni	Antelmintlar berilguncha					Antelmintlar berilgach 7 kundan keyin					Samaradorlik, % ES
			IE		II			IE		II			
			soni	%	min	mak	oʻrtacha	soni	%	min	mak	oʻrtacha	
1-tajriba guruhi	IVERMEC 1 % — 10 kg / 0,2 ml, teri ostiga	13	13	100	17	68	42	—	—	—	—	—	100
2-tajriba guruhi	LEVAMIZOL 75 — 10 kg / 1,0 ml, mushak orasiga	13	13	100	22	57	39	3	23	5	9	7	77
3-tajriba guruhi	RIKAZOL® — 10 kg / 0,4 ml, mushak orasiga	13	13	100	15	75	45	1	7,7	6	6	6	92,3
Nazorat guruhi	—	8	8	100	18	56	35	15	100	18	62	40	—

IE — invaziya ekstensivligi; II — invaziya intensivligi (bir namunadagi lichinkalar soni).

5. XULOSALAR

Conclusions

1. Qo'ylar diktiokauloziga qarshi qiyosiy sinovdan o'tkazilgan uch turdagi antelmint preparat orasida Xitoyda ishlab chiqarilgan IVERMEC 1 % preparati (10 kg tirik vazniga 0,2 ml, teri ostiga

diktiokaulalarga qarshi qo'llanilishi ko'rsatilmaganligi sababli ushbu preparat ham sinovdan o'tkazildi va uning yuqori samaradorligi haqida ma'lumotga ega bo'lindi.

Ikkinchi tajriba guruhida 13 bosh qo'y diktiokaulalar bilan ekstens zararlangan bo'lib, invazyani intensivligi minimal 22, maksimal 57 va o'rtacha 39 nusxani tashkil etdi. Ushbu qo'ylarga LEVAMIZOL 75 preparatidan 10 kg vazniga 1 ml miqdorda mushak orasiga yuborildi. 7 kundan keyin takroriy gelmintarvoskopik tekshirganda 13 bosh qo'yning 10 tasi diktiokaulalardan to'liq ozod bo'lgani, 3 boshida esa diktiokaulalar aniqlanib, invazyani intensivligi pasaygani qayd etildi: o'rtacha 39 nusxadan 7 nusxagacha kamaydi. LEVAMIZOL 75 antelmint preparatining qo'ylar diktiokauloziga qarshi ekstens samaradorligi 77 % ni tashkil etdi. Shuni alohida ta'kidlash kerakki, ushbu preparatning qo'llanmasida diktiokaulalarga qarshi samaradorligi qayd etilgan bo'lsa-da, u bizning tajribalarimizda qo'ylarni diktiokaulalardan to'liq ozod qilmadi.

Uchinchi tajriba guruhidagi 13 bosh qo'ydagi 100 foiz ekstens zararlaniş hamda minimal 15, maksimal 75 va o'rtacha 45 nusxada diktiokaula lichinkalari bilan intens zararlaniş aniqlandi. So'ngra qo'ylarning 10 kg tirik vazniga nisbatan 0,4 ml miqdorda RIKAZOL® preparati mushak orasiga qo'llanildi. 7 kundan keyingi gelmintarvoskopik tekshirishda 13 bosh qo'ydan 1 boshida (7,7 %) diktiokaulalar aniqlandi, ya'ni preparatning ekstens samaradorligi 92,3 % ni tashkil etdi.

Nazoratdagi to'rtinchi guruhdagi zararlangan qo'ylarga antelmint preparatlar qo'llanilmadi. Dastlabki tekshirishda ushbu guruhda 8 bosh qo'y diktiokaulalar bilan zararlangan bo'lib, invazyani intensivligi minimal 18, maksimal 56 va o'rtacha 35 nusxani tashkil etdi. 7 kundan keyingi takroriy gelmintarvoskopik tekshirishda zararlangan qo'ylar soniga yana 7 bosh qo'shib, ularning umumiy soni 15 taga yetdi. Invazyani intensivligi ham ortdi: maksimal 56 nusxadan 62 nusxagacha va o'rtacha 35 nusxadan 40 nusxagacha ko'paydi. Bu esa davolanmagan oilalarda invaziya o'z-o'zidan kamaymasligini, aksincha kuchayib borishini ko'rsatadi.

Yuqorida qiyosiy o'rganilgan uchta antelmint preparat orasida Xitoyda ishlab chiqarilgan IVERMEC 1 % preparati diktiokaulozga qarshi eng samarador antelmint vosita ekanligi ma'lum bo'ldi.

yuborilganda) eng yuqori terapevtik samaradorlikni namoyon etib, 100 % ekstensiv samaradorlikka ega ekanligi aniqlandi.

2. Rossiya Federatsiyasining «Nita-Farm» MChJ tomonidan ishlab chiqarilgan RIKAZOL® preparati (10 kg tirik vazniga 0,4 ml, mushak orasiga yuborilganda) qo'ylar diktiokauloziga qarshi 92,3 % ekstensiv samaradorlik ko'rsatdi.

3. Rossiya Federatsiyasining «Nita-Farm» MChJ tomonidan ishlab chiqarilgan LEVAMIZOL 75 preparati (10 kg tirik vazniga 1,0 ml, mushak orasiga yuborilganda) qoʻylar diktiokaulyoziga qarshi 77,0 % ekstensiv samaradorlik koʻrsatgani aniqlandi.

DECLARATIONS

Declarations

Author contributions *CRedit*

Conceptualization; Methodology; Investigation; Data curation; Formal analysis; Writing – original draft; Writing – review & editing. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Ethics approval

The study was carried out on a commercial sheep farm as part of ordinary therapeutic deworming practice, in accordance with the veterinary and sanitary requirements in force in the Republic of Uzbekistan and with the agreement of the owner of the farm. All preparations were used at the doses and by the routes stated in their registered instructions. No human participants were involved.

Informed consent

All authors have read and approved the final version of the manuscript and have given their consent to its submission and publication. The owner of the farm agreed to the trial and to the publication of the results. The study involved no human participants and no personal data.

Data availability statement

All data supporting the findings of this study are presented in the table of the article and are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare no conflict of interest. The manufacturers of the preparations tested had no part in the design of the study, in the collection or analysis of the data or in the preparation of the manuscript.

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Generative AI disclosure

Generative AI was used only partially. The authors used Claude (Anthropic, Opus 5) for language editing, formatting of the reference list and preparation of the English and Russian metadata. No text, data, figures or conclusions were generated by AI. The authors reviewed and verified all output and take full responsibility for the content of the publication.

EXTENDED SUMMARY IN ENGLISH

Kengaytirilgan inglizcha xulosa / Расширенный реферат на английском языке

Purpose and research problem

A wide range of measures is being carried out worldwide to study the distribution of parasitic diseases of farm animals, to determine the optimal timing of treatment and control and to prevent these diseases. Timely determination of the range, species composition and bioecological characteristics of the pathogens, combined with an assessment of the biogeographical and ecological state of the territories concerned, gives the highest effect. In Uzbekistan extensive measures have been carried out to develop animal husbandry, and as a result the incidence of infectious, non-infectious and invasive diseases of livestock has fallen appreciably while animal numbers have grown. At the same time, the import of cattle, sheep and goats of various breeds over the past twenty years and the development of different forms of farming — household, farmer, dehqan and cluster — make it necessary to study the distribution of parasitic diseases and to improve treatment and preventive measures. According to the literature, dictyocaulosis is widespread in many countries, with prevalence between 18.7 and 75.5 per cent, and earlier studies in Uzbekistan recorded an extent of invasion of up to 65.5 per cent in certain regions; nevertheless the present epizootic status

of the disease, the features of its distribution and the efficacy of the anthelmintics used in practice, together with the level of parasite resistance to them, remain insufficiently studied. The aim of this work was to compare the therapeutic efficacy of three anthelmintic preparations registered in the Republic of Uzbekistan — LEVAMISOLE 75 and RICAZOL®, produced by Nita-Farm LLC of the Russian Federation, and IVERMEC 1 %, produced in China — against dictyocaulosis of sheep.

Materials and methods

Faecal samples were collected from 96 sheep on the HOLTORAEV OYBEK-HM farm in the Akhangaran district of the Tashkent region and examined by the helmintholaryoscopic method of Berman and Orlov as modified at the Scientific-Research Institute of Veterinary. The age, colour and ear-tag number of each sheep were recorded. Examination showed that 54 of the 96 sheep, or 56.2 per cent, were infected with Dictyocaulus. The 54 infected sheep were divided into four groups: three experimental groups of 13 head each and one control group of 8 head. Sheep of the first experimental group received IVERMEC 1 % subcutaneously at 0.2 ml per 10 kg of live weight; sheep of the second group received LEVAMISOLE 75 intramuscularly at 1.0 ml per 10 kg of live weight; sheep of the third group received RICAZOL® intramuscularly at 0.4 ml per 10 kg of live weight. The eight infected sheep of the fourth, control group received no anthelmintic. Seven days after treatment all groups were re-examined by the same helmintholaryoscopic method, and both the extent of invasion (the proportion of infected animals) and the intensity of invasion (the number of larvae per sample, recorded as minimum, maximum and mean) were determined before and after treatment.

Results and discussion

Before treatment all four groups were 100 per cent infected. In the first experimental group the intensity of invasion was 17 larvae at minimum, 68 at maximum and 42 on average; seven days after subcutaneous administration of IVERMEC 1 % at 0.2 ml per 10 kg no larvae were detected in any animal, giving an extensive efficacy of 100 per cent. It should be noted that the manufacturer's instruction for this preparation lists activity against gastrointestinal strongylatodes — Bunostomum, Cooperia, Chabertia, Haemonchus, Nematodirus, Oesophagostomum, Strongylus and Trichostrongylus — and against Thelazia larvae, Hypoderma and lice and mites, but does not mention lung nematodes and in particular Dictyocaulus; the preparation was therefore included in the trial, and its high efficacy against this parasite was established. In the second experimental group the intensity of invasion before treatment was 22 at minimum, 57 at maximum and 39 on average; seven days after intramuscular administration of LEVAMISOLE 75 at 1.0 ml per 10 kg, 10 of the 13 sheep were completely free of Dictyocaulus while larvae were still detected in three animals, the mean intensity falling from 39 to 7 larvae; the extensive efficacy was 77.0 per cent. Although the instruction for this preparation states activity against Dictyocaulus, in the present experiment it did not free the sheep of the parasite completely. In the third experimental group the intensity of invasion before treatment was 15 at minimum, 75 at maximum and 45 on average; seven days after intramuscular administration of RICAZOL® at 0.4 ml per 10 kg, larvae were found in only one of the 13 sheep, that is in 7.7 per cent, corresponding to an extensive efficacy of 92.3 per cent. In the untreated control group all eight sheep remained 100 per cent infected after seven days, and the intensity of invasion rose from a maximum of 56 to 62 larvae and from a mean of 35 to 40 larvae, confirming that the reduction observed in the experimental groups was due to the preparations and not to natural fluctuation. Of the three anthelmintics compared, IVERMEC 1 %, produced in China, proved to be the most effective against ovine dictyocaulosis.

Conclusion and contribution

Of the three anthelmintic preparations subjected to comparative testing against ovine dictyocaulosis, IVERMEC 1 %, produced in China and administered subcutaneously at 0.2 ml per 10 kg of live weight, showed the highest therapeutic efficacy, with an extensive efficacy of 100 per cent. RICAZOL®, produced by Nita-Farm LLC of the Russian Federation and administered intramuscularly at 0.4 ml per 10 kg of live weight, showed an extensive efficacy of 92.3 per cent against ovine dictyocaulosis. LEVAMISOLE 75, produced by the same company and administered intramuscularly at 1.0 ml per 10 kg of live weight, showed an extensive efficacy of 77.0 per cent. The practical contribution of this

work is twofold: it establishes a clear efficacy ranking for three preparations that are actually on the Uzbek market, and it documents that a preparation whose label makes no claim against lung nematodes nevertheless cleared *Dictyocaulus* completely, while a preparation that does carry such a claim did not.

ADABIYOTLAR RO‘YXATI

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