Characteristics of Autochthonous Pirot Sheep and its Reaction to the Presence of Parasites

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Abstract
The research was conducted in the population of the Pirot's autochthonous sheep in the area of Stara Planina Mountain, East Serbia. The production characteristics of sheep, milk yield and body weight, were observed. Oestrus is most pronounced in July (58%), then in August (33%), while lambs reach a weight of 22 kg at three months. Before experiment flock from which separated animals from examination we were examined to presence of parasitic infection, with coprological examination. A total of 21 animals were examined after slaughter. We revealed same gastrointestinal helminths*: Dicrocoelium dendriticum*, *Dictyocaulus filaria*, *Ostertagia circumcincta*, *Os.ostertagi*, *Trchostrongylus axe, Tr colubriformis, Nematodirus filicollis*, *N,spathige, Haemonchus contortu, Marshallagia marshalli*, *Chabertia ovina*, *Oesophagostomum venulosum*and *Bunostomum trigonocephalum*. After that, from herd were separated 100 one year old sheep and individually coprological examined to confirm the presence of parasite infections. The sheep were divided into two groups of 50 animals each - experimental and control group. First group has treated with the albendazole-based anthelmintic in dose 7.5 mg/kg through food. The second group has treated after the examination with same anthelmintic. A comparison of the obtained results indicates that in the group of treated animals body weight was average higher by 4.4 kg and milk yield was average higher by 231.08 g. The parasites significantly affected the weight and daily milk yield of sheep. The conclusion is that serious prevention in terms of sheep parasites is necessary.

Keywords: body weight, milk, parasites, pirot sheep.

1. Introduction

Autochthonous Pirot sheep is a Serbian local population, one of the domestic strains of Pramenka. It is an old sheep adapted to the conditions of the Stara Planina Mountain but also in the entire Pirot region, throughout time, and especially after the Second World War, and like other strains in Serbia, due to improved nutrition and care conditions has made visible progress in terms of production properties [1]. It is a sheep with triple production abilities (meat, milk, wool), overgrown with white fleece all over the body, except the face and lower parts of the legs. Hull moderately developed with insufficiently pronounced widths and depths. The head is of medium width and length. The hair that covers the face is white or darkly sprayed, sometimes with brown patterns around the eyes and lips. The nose and ears are white or mixed with brown or black spots [1]. Sheep are polled and rams can be horned or polled. Legs of medium height and firm covered with dark spots. It is suitable for growing in all areas and farm systems. It is known for its famous products from milk (Pirot cheese), meat (Pirot lamb), and wool (Pirot carpet). Diseases of parasitic ethology are the most common and significant diseases in sheep production

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worldwide [2,3,4]. The grazing diet allows the constant contact of animals with transient hosts, eggs, and larval forms of the parasite so, that there is no sheep of which is not infected, with at least one parasitic species.

Research in the world and in our country has shown that diseases of parasitic ethology dominate in sheep in terms of both prevalence and incidence of which they have accompanied by significant morbidity and moderate mortality [5,6,7].

The harmful effects of parasites on sheep are reflected in the reduction of milk production and reduction of body weight, and according to many opinions, these diseases are the primary cause of losses in sheep production [8,9,10,11]. The particular problem is the fact that certain types of parasites (ectoparasites above all) are at the same time biological and mechanical vectors of certain diseases of viral, bacterial, and parasitic ethology. Sheep have parasitized by large numbers of parasite species, and the most numerous groups consists of gastrointestinal and pulmonary strongyles, and flukes, which most often occur in terrains that have lush vegetation, regardless of altitude. Protozoa are mostly present in young animals, while ectoparasites do not choose the age of the animals. The aim of this paper is to check out the production potential of sheep of the autochthonous Pirot Pramenka and the influence of parasites on their production.

2. Materials and methods

The investigations have been conducted in the Stara Planina area, municipality of Pirot. Indigenous Pirot Pramenka sheep have used in the experiment. A total of 300 animals both lamb and sheep categories have observed for parasitic infection. At lambs were controlled bodyweights which determined per month, at birth and up to 90 days of age. Of the adult sheep in the experiment, we have control dynamics of oestrus occurrence, body weight and milk yield.

All sheep and lambs that were not included in the research were dewormed after a parasitological examination.

Here we presented obtained results on the influence of parasites in adult sheep on growth and milk yield.

Before experiment flock from which separated animals from examination we were examined to presence of parasitic infection, with coprology examination. Coprological examinations are performed using the methods of Patakij, Stoll and McMaster, as well as the modified method of Whitlook [12]. All faecal samples are collected like group samples from the herd and a total of 80 faeces samples were examined. From that flock, 21 animals were commercial slough and with parasitological necropsy were examined complete gastrointestinal tract, trachea, lung, heart, liver, kidney and urinary bladder. Found parasites either fixing in 10% formalin, were mounted in lactophenol for identification. Determination of adult parasites and parasites eggs we have done by keys given by Soulsby and Euzeby [12,13].

After that, from herd were separated 100 one year old sheep looking to have approximately the same body build and weight. All sheep individually coprology examined to confirm the presence of parasite infections. After the confirmed presence of parasites, the sheep were divided into two groups of 50 animals each - experimental and control group. Both groups were examined for the effect of parasites on growth and milk yield.

To investigate the effect of parasitic infections on growth (body weight), before the examination, all sheep were weighed individually. After that the first group has treated with the albendazole-based anthelmintic in dose 7.5 mg/kg through food. The second group has treated after the examination with same anthelmintic. All animals have individually reweighed one month after treatment. Based on individual measurements, the average weight of the sheep in each group was calculated. The results are presented in the average value for the treated and untreated group of animals at the beginning and at the end of the examination.

The milk yield of both examined groups of sheep had control too. In both groups of sheep, a five-day control of the obtained milk was performed during the morning and evening milking. During the entire duration of the experiment, morning and evening milking have performed, and the obtained milk measured with a graduated beaker for each sheep in the groups. Based on individual measurements, the milk yield of the sheep in each group was calculated. The results are presented in the average value for the treated and untreated group of animals at the beginning and at the end of the examination.

The processing of data was performed using the SPSS software version 20, and the descriptive

statistic and comparison of means of average values have also done.

3. Results and discussion

A coprological examination of adult sheep revealed the presence of gastrointestinal and pulmonary Strongyloidiasis and dystomatosis. Necropsy revealed the following parasite species (Table 1).

We can see in Table 1 that the most common species in the sheep are *Trichostrongylus* and *Nematodirus*, with variations in the species distribution within the genera. It can also notice that the unitary of the genus *Ostertagia* are *Ostertagia circumcincta*. In the presented table, we see that among the species of the genus *Trichostrongylus*, the most common is *Trichostrongylus axei* and followed by *T. colubriformis*. In addition to the mentioned, *Dicrocoelium dendriticum* and *Haemonchus contortus* had slightly lower representation, but in a high level too. It is followed by moderately represented *Chabertia ovina*, while other species are found in a smaller extent.

The influence of the presence of parasites on the body weight of sheep can be seen in Table 2. The average weight of sheep before the experiment was 55.4 kg. All animals were re-measured one month after treatment. The first group was treated with the anthelmintic albendazole base through food, while the second group was treated after the examination. In the treated group of animals, after one month, the average weight was 59.92 kg. In the group of untreated animals, the average weight was almost identical to that at the beginning of the experiment with a variation of +/- 1 kg per animal ($P>0.05$). A comparison of the obtained results indicates that in the group of treated animals, the body weight was higher by 4.4 kg on average, which as in Table 3, showed as very significant ($P<0.01$).

During the entire duration of the experiment, morning and evening milking was performed and the obtained milk was measured with a graduated beaker for each sheep in the groups. The results were presented collectively for each experimental group.

In the treated group, the amount of milk after one month of treatment ranged from 267-1023.5 g per animal, or 645.25 g on average.

In the group of untreated animals, the average daily amount of milk individually ranged from 109-604 g, while for the group it averaged 414.17 g (Table 4).

Table 1. Presence of parasites in examined sheep

Parasites species	%	Parasites species	%
Dicrocoelium dendriticum	80.95%	*Nematodirus spathiger*	100%
Dictyocaulus filaria	57.14%	*Haemonchus contortus*	80.95%
Ostertagia circumcinta	95.23%	*Marshallagia marshalli*	28.57%
Ostertagia ostertagi	33.33%	*Chabertia ovina*	57.14%
Trichostrongylus axei	100%	*Oesophagostomum venulosum*	38.09%
Trichostrongylus colubriformis	90.47%	*Bunostomum trigonocephalum*	14.28%
Nematodirus filicollis	47.61%		

Table 2. Body weight of sheep before and after treatment

Item		Min	Max	Mean	Std. Error
Before treatment	Average weight of groups	52.00	59.00	55.4000	0.25873
After treatment	Treated	56.00	64.00	59.9200	0.27381
	Untreated	52.00	59.00	55.4800	0.26839

Table 3. Paired Samples Test of sheep body weight

Item	Paired Differences				T	Significance (2-tailed)
	Mean	Std. Error Mean	95% Confidence Interval of the Difference			
			Lower	Upper		
Treated Control	4.44000	0.40118	3.63379	5.24621	11.067	0.000
Treated Before	4.52000	0.39408	3.72807	5.31193	11.470	0.000
Control Before	0.08000	0.06905	-0.05875	0.21875	1.159	0.252

Table 4. Amount of milk after one month of treatment

Group	Minimum	Maximum	Mean	Std. Error
Treated	267.00	1023.00	645.5000	32.22033
Untreated	109.00	604.00	414.1700	15.75803

Table 5. Paired samples test of sheep milk amount

Group	Paired Differences				T	Signifi-cance (2-tailed)
	Mean	Std. Error Mean	95% Confidence Interval of the Difference			
			Lower	Upper		
Treated – Untreated	231.33000	35.82042	159.34617	303.31383	6.458	0.000

Comparison of the obtained results indicates the fact that in the group of treated animals the average daily amount of milk was higher by 231.33 g. Paired samples test of sheep milk amount (Table 5) shows very significant differences between groups ($P<0.01$).

Body weights of the lambs as shown at the beginning of our results presented, it is about 22 kg. These results are similar to the research of Caro Petrovic [14].

From the aspect of our research, we must also take into account the consequences left by parasites in pregnant sheep. It is known that the body weight of lambs at birth also affects the weight at 90 days. Less heavy sheep give birth to lighter lambs [14]. Less lamb has less growth in the first three months of life [1,15,16]. This indicates the great importance of prevention of sheep from parasite infestation [17,18].

Tests for the presence of parasites in sheep have been performed in various part of Serbia. That research has been conducted both in the mountainous area and in the plains, and parasites have been detected in Sar Planina Mountain, Stara Planina Mountain [19,20] south-east and south-west part of Serbia [21,22,23] north area and Vojvodina [24,25] south in Kosovo [26]. The presence of parasites in sheep has also been determined in neighbouring countries like Macedonia and Bulgaria [27,28].

Many researchers have found that the presence of parasites in the body affects the productivity of animals through reduced growth and various infections [5,8,10,11,18,29]. A negative influence of parasitic infection reflected through decrement quantum of lactation [30,31,32,33,34].

Research all over the world shows the negative effect of parasites on productivity in sheep breeding [7,29,30,32,34]. The presence of parasites in sheep, among other things, reduces the efficiency of food utilization [9,35] increases the loss of endogenous protein in the intestinal lumen which, among other negative influences, reduces production and causes sheep diseases. In the prevention of parasitic diseases in sheep that cause great damage to farmers, special attention should be paid to pasture management [32].

The problem of parasites in sheep has been considered for a long time from the genetic aspect. There is an evident influence of sheep breed but also of individual genotype within the same breed on resistance to parasites [36,37,38,39]. Since resistance to parasites is a hereditary trait, good management of line breeding of sheep is recommended, because it leads to success in fixing the desired genes faster, and thus for resistance to parasites [1,32].

4. Conclusions

Pirot's autochthonous sheep population in the conditions of Stara Planina has a satisfactory genetic potential, which can be seen from the results of our research. However, regardless of the fact that parasitic infections are mostly subclinical, much more attention must be paid to this problem. We have seen from the obtained research results that the presence of parasites leads to a decrease in production. In the area we examined, prophylactic treatment is not implemented or is partially implemented. As parasites have an impact on the quality of meat, which is highly valued as Pirot lamb, more attention must be paid to this problem in the period ahead. The parasites significantly affected the weight and daily milk yield of sheep. A comparison of the obtained results indicates that

in the group of treated animals body weight was average higher by 4.4 kg and milk yield was average higher by 231.08 g. The conclusion is that serious prevention and control of sheep parasites is necessary if we want to have healthy sheep and good production results.

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