ISAH 2005 - Warsaw, Poland
Vol 1

INFECTION OF ALIMENTARY TRACT NEMATODES OF GOATS AND MILK QUALITY

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Key words: goats, blood samples, milk quality

Introduction

The goat is a frugal and economically profitable animal therefore more and more attention has been paid to the goat keeping in the world.

The goat's milk is also rich in casein, moreover, the protein casein and albumin are not as dense as they are in the cow's milk, for that reason they fall out in light flakes under the influence of the stomach juice, and they are easy to consume (Smith, Sherma, 1994). The fat globules of the goat's milk are tiny and event distributed therefore they are quickly digested and absorbed in the digestive tract. It has been proved that the goat's milk contains all the amino acids; moreover, they are in optimum proportions (Sprūžs, 1996). It has been reported in the world that the infection with nematodes in the digestive tract of the goat is one of the main reasons of the animal emaciation and a decrease of its productivity. Nematodes of several families can parasitize frequently in the animal digestive organs at the same time, for example, *Trichostrongylidae, Trichyridae, Oxyuiridae, Trichonematidae, Strongyloidae* and other families (Smith, Sherman, 1994). Infections are severe if nematodes of the *Ostertagia spp*. parasitize in the abomasum or *Bunostomum spp*. are in small intestines; whereas, the widespread in the world *Skrjabinema ovis*, which parasitize in the large intestines of the goat, is little pathogenic. If nematodes of several species parasitize in the animal at the same time, then the course of infection is more severe (Smith, Sherman, 1994).

It has been stated that changes of the blood morphological and biochemical indices show evidence of disorders of the animal health prior to the clinical signs appear. A common manifestation of an infection is the blood which appears from the seventh to the ninth day after infection (Balic et al., 2000).

The aim of this work was to investigate some physiological indices in goats with different degrees of nematode infection, and to determine if the infection influences the obtainable milk quality, and how the process takes place.

Materials and methods

The experiment was carried out on a goat farm "Līcīši" in Jelgava region. Ten 3 – 6 years old milking goats were elected from the herd.

All goats were examined coprologically to determine the degree of infection with strongilates. The parasite eggs were counted in MacMaster chamber (Hansen, Perry, 1994). Before the experiment was started the animals were estimated clinically. All goats included in the experiment were clinically healthy. Every goat got 1 kg hay, 0,5 kg oats and 0,2 kg carrots per day. In order to compare dynamics of the blood physiological indices in association with the infection degree, blood and milk were sampled five times with a three-day interval. The blood morphological and biochemical indices were estimated by conventional standard methods. The goat's milk quality was assessed at the Research Institute "SIGRA" of the Faculty of Veterinary Medicine of the Latvian University of Agriculture. The fat content, cholesterol and urea were determined in the milk as well as 17 amino acids were analyzed. For statistical data processing t – test was correlated samples (Arhipova, Bāliņa, 1999).

Results and discussions

The coprological examinations showed that the animals selected for investigations were differently susceptible to the strongilate infection. In 3 animals out of 10 goats evolved in the experiment the strongilate infection was not observed, in 4 goats the amount of strongilates per 1 g faeces was within the range from 310 to 317 eggs, and in 3 goats there were strongilates from 703 to 714 eggs per 1 g of faeces. Strongilate species were not determined, but the presence of eggs of other helminthes was not found. The blood morphological and biochemical indices in goats are shown in Tables 1 and 2.

Table 1.
The change of blood morphological and biochemical parameters of goat's with invasion 310-317 eggs of strongilate per 1g of faeces

Parameters	Goats without invasion	Goats with invasion	Difference - p
WBC, 10^9/L	6,7 ± 2,2	8,6 ± 2,6	$p < 0,05$
MON, %	1,3 ± 0,5	3,2 ± 1,5	$p < 0,05$
EOS, %	2,0 ± 0,9	14,1 ± 4,0	$p < 0,01$
CREATININE, µmol/L	76,0 ± 14,3	72,7 ± 6,2	$p < 0,01$

Table 2.

The change of blood morphological and biochemical parameters of goat's with invasion 703-714 eggs of strongilate per 1g of faeces

Parameters	**Goats without invasion**	**Goats with invasion**	Difference - p
WBC, 10^9/L	6,7 ± 2,2	7,4 ± 2,2	p < 0,05
MON, %	1,3 ± 0,5	4,3 ± 1,9	p < 0,05
SEGM. NEUTR., %	34,1 ± 5,5	39,3 ± 12,9	p < 0,01
BAND. NEUTR., %	1,6 ± 1,0	2,9 ± 2,1	p < 0,01
EOS, %	2,0 ± 0,9	3,3 ± 3,2	p < 0,01
GLUCOSE, mmol/L	3,2 ± 0,4	3,7 ± 1,7	p < 0,01
CREATININE, µmol/L	76,0 ± 14,3	82,1 ± 23,4	p < 0,01
BILIRUBIN, µmol/L	3,7 ± 2,1	4,6 ± 1,3	p < 0,01

In the group of animals within the strongilate range from 310 to 317 the number of eosinophils was increased (from 2,0% to 14,1%) significantly (p< 0,01), and the creatinine level in the blood was increased as well (from 3,7 to 4,6 mmol/L).

Eosinophilia in case of helminthoses is well-known. It is mentioned by several researchers (Balic et al., 2000, Žubčič, 2001). It is one of the signs of sensibilization of the body, and apparently is one of the most typical helminthological indices of the infection. As it is known, the creatinine concentration in the blood serum reflects the renal glomerulus's filtration abilities, and the increase of its concentration may indicate to disorders of renal functions (Liepa, 2000). In this research the increase of this index was within a normal physiological limit. In the group of animals within the infection degree of 703 – 714 strongilate eggs per 1 g faeces alterations of the blood morphological and biochemical indices were more expressed (Table 2).

The leukocyte count changes were statistically confident (p<0,01): the number of segmented neutrophils (polymorph nuclear leukocytes) was increased from 34,1% to 39,3%, band neutrophils increased from 2,0% to 13,3%. Changes of the total number of leukocytes and monocytes were insignificant.

Significant changes were also observed in the blood biochemical indices. The amount of creatinine and bilirubin was changed statistically confident (p< 0,01) from 76,0 to 82,1 mmol/L and from 3,7 to 4,6 mmol/L, respectively. As it is known, bilirubin is formed of hemoglobin in the physiological process of decomposition of old erythrocytes, and this, to a certain extent, gives evidence of changes of the liver functions (Liepa, 2000). In this research the increase of this index in the infected goats only slightly exceeded the physiological limit.

An increase of segmented neutrophils in the blood of goats in this case is connected with the strongilate infection. While a significant increase of band neutrophils shows a certain evidence of the leucocytes shift to the left. Such alterations could be connected with the

strongilate infection in animals, which in this research is considered as a medium severe degree of infection when the number of strongilate eggs was from 703 to 714 per 1 g faeces.

As regards the milk quality indices of the infected goats, it was found that alongside with the increase of the infection degree at the beginning of the infection the milk fat content increased in average from 4,5% to 5,0% (Figure 1), the urea amount in the milk also increased from 4,0 to 5,6 mmol/L (Figure 2)

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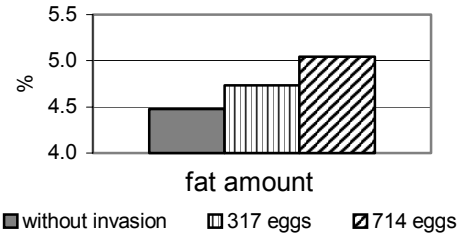

Figure 1. The fat amount change in goat's milk with invasion.

Figure 2. The urea amount change in goat's milk with invasion.

As to amount and ratio of amino acids in the milk, it should be pointed out that in general they were changed slightly in the infected goats (3A and 3B). Obviously, such a slight and medium degree of infection in goats does not cause significant changes in the milk. However, a conclusion should be made that the amount of all amino acids in milk, except that of cystine, increased alongside with the increase of the infection degree in animals.

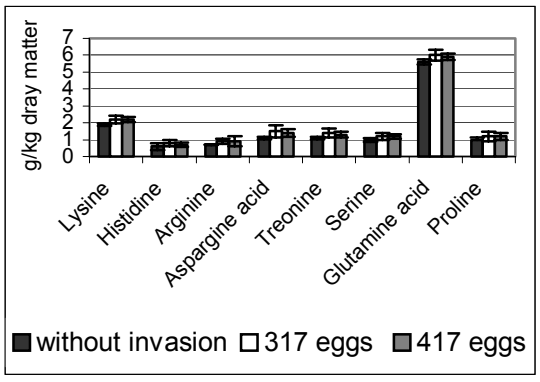

Figure 3A. The change of amino acids in goat's milk with invasion of strongilate

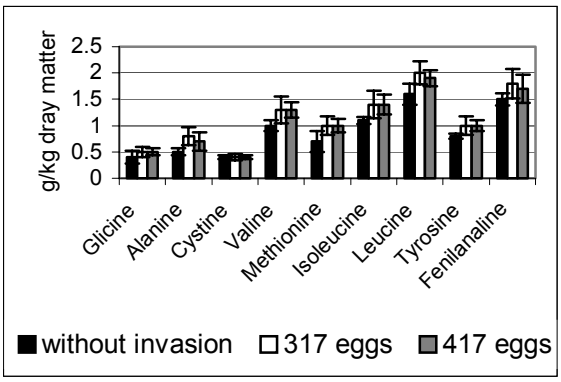

Figure 3B. The change of amino acids in goat's milk with invasion of strongilate

To conclude it should be stressed that these are the first results obtained and the first functional investigations as well as the milk quality research in goats. This research is being continued.

Conclusions

The strongilate infection in goats alters significantly ($p < 0,01$) the blood morphological indices: mainly the number of eosinophils, segmented neutrophils and monocytes was increased.

The amount of creatinine and bilirubin in the blood of the infected goats (infection degree 703 – 714 strongilate eggs per 1 g faeces) increased significantly ($p < 0,01$).

At the beginning of the infection period in goats alongside with the infection degree increase a tendency to an increase of fat content and urea amount in the milk was observed.

The amount of amino acids and their ratio in the milk of goats with a slight and medium infection degree in general is changed little.

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