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Original Contribution

INFLUENCE OF PROTOZIN-A ON THE ETHOLOGICAL PARAMETERS OF SHEEP

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ABSTRACT

These results were obtained following a large-scale study aimed at establishing the effect of synthetic multienzyme products on the digestion, intermediate metabolism, fattening ability, meat quality and behavior of ruminants (sheep). Six ewes, four-line hybrids of the breeds Tsigai, were used in a six-month study. The animals, weighing between 41 and 49 kg and aged 2.5 yrs, were reared in individual boxes sized 2/2 m in closed barns. The experiment was conducted according to the method of the periods. During the experimental period multienzyme Protozin-A (*Zelin–AD, Botevgrad*, Bulgaria), was added to the mixture concentrate at dose 1g/kg of mixture. During both periods (Control and Test) the basic behavioral patterns were observed by individual chronometric measurement method within 24 hours. Markers for satisfying biological requirements were feeding, moving activity and rest. There was no negative effect of Protozin-A on the animal behavior. Increased feeding activity and rest and decreased moving activity of the tested animals were found. The following index limits for the functional activities have been recorded: feeding activity - from 0.373 to 0.380, moving activity– from 0.333 to 0.367 and rest – from 0.260 to 0.287.

Key words: Behavior, Enzyme, Nutritive Stimulators and Sheep

INTRODUCTION

At the end of the 20th century the use of hormone products and ionforic antibiotics as productivity stimulators in domestic animals was forbidden in the EU countries. It has been proved that these products are accumulated in the muscles of the animals even when administered in sub-therapeutic doses. They are passed along the food chain to the end consumer, no matter the amount. The synthetic enzyme products, obtained chemically, are their alternative[*] The enzymes added in small doses (usually 1 kg/t) to the concentrate of animals are able to influence the digestive processes, the intermediate metabolism, the fattening ability and meat qualities. In addition the enzyme products influence the behavior of animals (1). In similar studies on rabbits it was found that the synthetic multienzyme *Sanizim* resulted in a change in the basic behavioral activities (2). An effect on the duration of feeding, moving activity and time for rest of the experimental animals has been recorded.

The enzyme products are recommended by the manufacturers of combined forages as an ecological product with no cumulative effect and residual action. The synthetic enzymes improve the catabolic processes in the digestive tract of animals, change the viscosity of the food masses and facilitate the action of the native enzymes. They influence the degradability of both polysaccharides and protein fractions in the diet.

The aim of study is to estimate effect of Protozin on behaviour of sheep.

MATERIAL AND METHODS

Six 3-year-old ewes were used in the experiment. The animals were reared in closed barns in individual boxes sized 2/2 m. The experiment was conducted in two periods – Control and Test Periods. During the Test period the multienzyme Protozin-A was added to the mixture concentrate of the animals at dose 1g/kg of forage. Protozin-A (*Zelin–AD, Botevgrad*, Bulgaria) is a multienzyme product with wide range of enzyme activity. According to the manufacturers Protozin-A improves the digestibility of feeds and increases the assimilation of the basic nutritive substances – starch, carbohydrates, proteins, fats– and accelerates the growth

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intensity. The product improves the caloric value of the diet and reduces the cost of the end product from the fattened animals. It is recommended for young animals with insufficiently functioning digestive enzyme activity. It is resistant to a wide range of concentrations of hydrogen ions in the medium of its activity. **Table 1** presents the content and the amount of the diet used in the course of the study. The diet was given twice a day – in the morning at 8 a.m. and at noon – at 1 p.m.

Table 1. Content and quantity of ration

Components	Kg – per animal daily
Wheat	0.400
Meadow hay	0.850

During both periods the animal behavior was recorded by the method of individual chronometric measurement for twenty-four hours. The resulting ethograms contained feeding and moving activities and rest as markers for the presence of factors that do not satisfy the biological requirements of the animals. The overall duration, rate frequency and daily dynamics were tested.

All data in the present study were processed by means of the variation statistics methods with a computer software package for statistical analysis. The methods for calculating the indices of the respective functional activities have been described in our previous paper (3).

RESULTS AND DISCUSSION

The results showed that under conditions controlled by man animals spend most time in feeding activity, close to the values for moving activity and the lowest for rest (**Table 2.**). Maintaining that correlation throughout the experimental period is an indirect proof of the relatively constant surrounding conditions, as well as the lack of significant individual differences. Relying on our experience so far we think that the differences that we had found were due to effects of the diet made possible by Protozin-A supplement.

Table 2. Indices of the studied functional activities

Type of activity	Control period	Experimental period	Difference
Feeding activity	***0,373***	***0,380***	***+0,007***
Eating	*0,130*	*0,136*	*+0,006*
Rumination – total	*0,243*	*0,244*	*+0,001*
Rumination in standing position	*0,020*	*0,018*	*-0,002*
Rumination in lying position	*0,223*	*0,226*	*+0,003*
Moving activity	***0,367***	***0,333***	***-0,034***
Rest	***0,260***	***0,287***	***+0,027***

FEEDING ACTIVITY

Slight increase of the total feeding activity (0,007) was recorded, which was mostly due to the increased eating time. It correlates with the increased rumination time and hence, we can make a conclusion about the stimulating effect of the multienzyme on the feeding activity. From an ethological point of view extremely favourable were the recorded changes in the distribution of rumination – during the experimental period the share of rumination in lying position increased, which was an indirect proof of an improved ethological comfort.

From the data presented on **Figure 1** and **Figure 2** regarding the dynamics of the feeding activity in the studied animals the following tendencies were established:

- There were two well-defined peak-hours of eating, closely connected with the time of feeding (**Figure 1.**).
- The average duration of feeding in the morning – between 40 and 50 min per hour during the Control period and between 50 and 60 min during the Test period. After giving the rest of the ration, between 1.00 and 3.00 p.m. a second peak of shorter duration was recorded – up to 30 min during the Control period and 40-42 min during the Test period.
- When analyzing the data about the feeding activity one would notice its uneven distribution throughout the different parts of the day. Its peak was in the brighter part of the day, which confirmed the day type of feeding in sheep reported by us as well as by other authors (4, 5). During the night hours the duration of feeding considerably decreased – two to three times and in the early morning hours it was equal to zero.

By comparing the dynamics and duration of feeding during both periods we found that the

addition of Protozin-A in the diet resulted in sharpened appetite and probably quicker consumption per kilo of dry matter from the given ration.

Figure 2 shows that immediately following the first feeding for the day during both periods were two to three rumination cycles that continued from 15 to 20 minutes. It was also established that rumination as an activity prevailed at the night. No significant differences were observed in that behavioral marker during both studied periods.

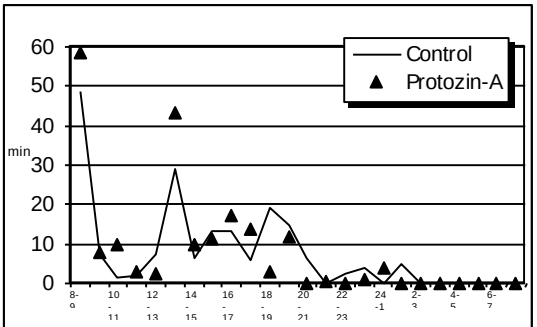

Figure 1. Feeding activity

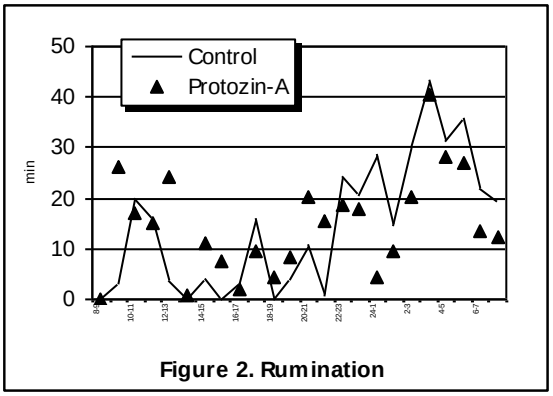

Figure 2. Rumination

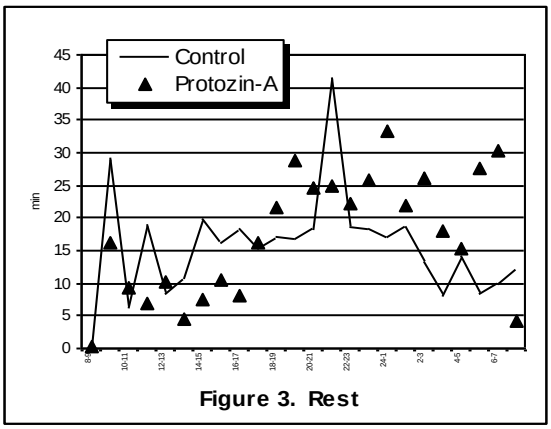

Figure 3. Rest

The dynamics of rumination in standing position revealed that its relative share was about 10%, and within one hour - 4 to 6 minutes on the average. We should point out that during the Test period three clear rumination peaks were recorded in the morning. During the dark part of the day its duration gradually decreased and after midnight rumination in standing position was practically not recorded.

Rumination in lying position was characterized by relatively even distribution during the day with seven main rumination periods of 50 min on the average for each of them.

The increased values of feeding activity after adding the enzyme product and the reduced relative share of rumination in standing position during the Test period presupposed an increased catabolic level in the fore-stomachs and quicker evacuation of the feeding matter towards the back parts of the digestive tract.

REST

As a rule the increased duration of lying of the animals was assumed to be a marker of comfortable status (except for the pathological cases). The recorded increase in the values of that activity during the Test period can be regarded as favorable impact (**Table 2**). The daily dynamics of that behavioral act marked the same tendency especially during the dark part of the day when the values reached 35 min per hour (**Figure. 3.**). The lack of clearly marked peaks during the day was yet another confirmation about the lack of unfavorable environmental factors and a proof that the experiment had been conducted under normal conditions which allowed us to record in the maximum degree the effect of the multienzyme supplementation in the diet.

MOVING ACTIVITY

Under industrial rearing of animals very small part of their time is for free movement. This is a result of the purposeful impact of man who supplies food to the animals and limits their movements in order to reduce the energy consumption and to transfer it for production purposes. For the present experiment moving activity shall mean the active idling of the experimental animals – i.e. the time when they stay and do not ruminate or perform limited movements to reach food or water. The reduced time for that type of activity, which we have recorded during the Test period was mostly a result of the increased time for rest (**Table 2**).

After the addition of the multienzyme Protozin–A no significant changes in the duration and the daily dynamics of standing of the Test animals had been recorded (**Figure 4.**). It is evident from the figure that this behavioral act was more or less evenly

distributed throughout the day and its average duration was 40 min per hour.

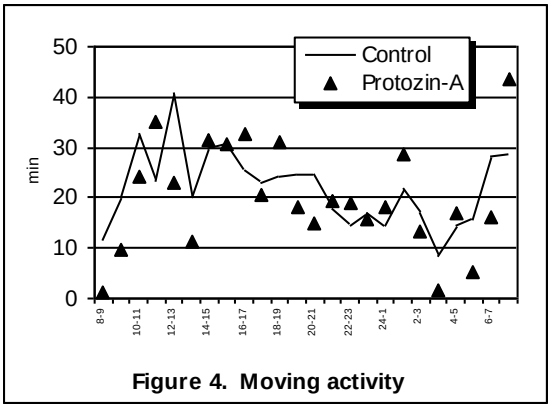

Figure 4. Moving activity

CONCLUSIONS

The results from this study point to the following conclusions:

1. There was no negative effect of multienzyme Protozin-A supplementation in the diet of sheep at dose 1g/kg.
2. Feeding activity and rest increased while moving activity in the studied animals decreased.

Under the described experimental conditions the limits for the indices of the basic functional activities are: feeding activity - from 0.373 to 0.380, moving activity – from 0.333 to 0.367 and rest – from 0.260 to 0.287.

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