

TESTING A PLANT EXTRACT FROM TRIBULUS TERRESTRIS IN CALVES IN SUCKLING PERIOD

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Abstract. An experiment was held in order to test the effects of Tribulus terrestris extract on weight development and health status in calves of Simmental breed in the dairy period. The experiment included calves leveled by gender, body weight, age and paternity. The calves were divided into two groups (control and experimental), the difference between the groups is in the presentation of the plant extract in the diet of calves from the experimental group. During the experiment (lasted 60 days) we controlled health and feed consumption (daily) and the weight development (monthly). The results show higher growth (not significant) with 7.7% and better feed conversion in calves receiving with milk plant extract from Tribulus terrestris to those in the control group. In animals of the experimental group was observed better health status.

Keywords: Weight development, Health status, Calves, Simmental breed, Tribulus terrestris

INTRODUCTION

In the recent years, there has been an augmenting interest for the usage of "botanical", "herbal" or "natural" chemicals in livestock breeding. These chemicals include organic ingredients, separate or in combination, as well as their extracts, obtained by dissolution or steam distillation. The active substances of these products are quite diverse - terpenes, phenols, alcohols, aldehydes, ketones, derivatives and ethereal oils. These substances can affect in very distinct ways, but the most important aspects are: stopping the pathogenic bacteria growth, aiding digestion and activation of endogenous enzymes, which results in improved resorption and appetite, an antioxidant effect and reduction of auto-oxidative stress, stimulation of the immune reactivity, increased tolerance to toxins and a better liver activity. Herbal substances in many cases improve growth and productivity, as well as utilization of nutrients. At the same time they are harmless to animals and the environment. There is no risk of overdosage (or at least, it is not possible to overdose in actual production conditions). Herbal substances are widely used by humans, but are much less distributed for animal usage due to high prices. Herbal substances are also associated with numerous trade names based on Tribulus terrestris. Studies of livestock breeding with this product however are few. More interest has been shown to studies related to the role of substance on the microbial activity in the digestion process and on the immune activity. Tribulus terrestris L. (Zygophyllaceae), also called "Puncture vine", is a prostrate annual herb native of Mediterranean region, but widely distributed in warm regions of Europe, Asia, America, Africa and Australia (Frohne, 1999). This plant has been used in the folk medicine in many countries including Bulgaria for different purposes, but is popularly claimed to improve the sexual function in humans. It contains biologically active substances as steroids, saponins, flavonoids, alkaloids, unsaturated fatty acids, vitamins, tannins, etc. (Adaikan et al., 2000). The main active components of this plant are saponins of the furostanol type, termed protodioscin (Tomova, 1987; Kostova and Dinchev, 2005). Several different samples of plant material were analyzed and depending on origin and plant part used for extraction significant differences in the composition of the saponins were observed; the analysis of

market products showed considerable variations of 0.17 to 6.49 % in the protodioscin content (Ganzera et al., 2001). Tribulus terrestris extract is commonly used in the folk medicine also for control of blood pressure and cholesterol. There are reports showing that this extract decreases blood cholesterol level in humans, rats and mice (Li et al., 2001; Chu et al., 2003). There exist no data concerning this effect of Tribulus terrestris extract in cattle. A major problem for calves during the suckling period are digestive disorders and colds. There are numerous studies on the positive effect on health and the weight development of calves using probiotic forage additives. Their successful usage provokes a more rigorous search for alternative natural supplements. The herbal extract of Tribulus terrestris is an example of such supplements.

Aim. In the present study, we aimed to test the biological effect of the vegetative additive Tribulus terrestris on calves during the suckling period.

MATERIAL AND METHODS

An experiment was carried out in the experimental base of the Experimental station in Vidin with calves of the Simmental breed during the suckling period. The animals were divided into two groups of ten (control and experimental), aligned by body weight, age and gender. The used supplement Tribulus terrestris is a light brown powder with a specific flavor, well soluble in water and in 50 % ethanol. The calves were kept in individual cages and fed cow's whole milk (four liters per day per calf). When the calves were ten days old, they were taught to eat a starter mixture and could freely consume lucerne hay. In addition to milk, the group also received 500 mg of the herbal supplement Tribulus terrestris daily.

The experiment's duration was 60 days. During this time the health status, consumption of milk, lucerne hay and starter mixture were controlled daily, while the body weight - monthly. The statistical analysis was performed using Student's t-test

RESULTS AND DISCUSSION

At the beginning of the experiment calves' body weight was (Average \pm Standard deviation) 40.0 ± 1.90 kg for the control group and 41.4 ± 1.31 kg for the experimental group. At the end of the experiment, however, the same indicators were, respectively, 84.47 ± 3.670 kg for the control group and 89.20 ± 3.380 kg for the experimental one. The inclusion of 500 mg Tribulus terrestris in the daily ration of calves during the dairy period increased their growth by 7.7 % compared to the control group at validity level $P > 0.05$. Feed consumption by the experimental calves was lower (approximately 10 %) compared to the controlled calves, which means that the supplement positively affected the utilization of the adopted energy and protein (Table 1). As opposed to calves from the control group, no manifestations of diseases in the motor or digestive systems were observed in the calves from the experimental group. **Discussion.** The fact that large nominal differences in a number of indicators surveyed between experimental groups were not statistically valid perhaps should be explained by overheterogeneity of the native population of the Simmental breed. Over the past two decades genetic material from this breed has been repeatedly imported into the country. It was derived, however, from various populations, including those in which the selection process pursued very different breeding purposes. For example, there are some Simmental breeding associations in Europe, which focus on milk productivity and others that emphasize meat productivity. On the other hand, the cattle population, which

existed under the socialist rule and received the title Bulgarian Simmental, also left a significant trace in today's Simmental cows. In such circumstances it would be strange to expect uniformity in the current native Simmental population and - what is more - it is unclear in the current dynamic economic and social situation what the future breeding objective among owners should be.

Additionally, the wide result variation can be explained by possible significant individual differences in the way organisms respond to herbal substances. The evolution of a species, both in the wild and during the domestication process, has been always developing in close correlation with specific herbal communities in the corresponding regions. In these close and diverse relationships, it is normal to assume that there are significant hereditary differences in the way individual organisms react to active ingredients in plants. In any case, pressuring the consumer towards farming with minimal use of chemically synthesized veterinary medicinal products compels us to find solutions by applying plant extracts in research.

Table 1

Feed consumption and feed conversion ratio (Average \pm Standard deviation)

Traits	Groups	
	Control	Experimental
Nutrient intake (by calf, daily)		
Milk, kg	4.00 \pm 0.0	4.00 \pm 0.0
Stater, kg	0.58 \pm 0.022	0.53 \pm 0.015
Alfalfa hay, kg	0.49 \pm 0.034	0.45 \pm 0.024
Intake of energy, Fodder growing unit, total	2.2 \pm 0.15	2.1 \pm 0.10
Including:		
- from milk	1.2 \pm 0.00	1.2 \pm 0.00
- from starter	0.71 \pm 0.082	0.66 \pm 0.052
- from alfalfa hay	0.29 \pm 0.121	0.26 \pm 0.091
Intake of crude protein, g, total	302 \pm 10.0	290 \pm 12.0
Including:		
- from milk	65 \pm 5	62 \pm 3
- from starter	101 \pm 11	92 \pm 8
- from alfalfa hay	65 \pm 4	61 \pm 2
Feed efficiency, per kg gain		
- Fodder growing unit	2.97	2.66
- Crude protein, g	408	363

CONCLUSION

The inclusion of the *Tribulus terrestris* herbal extract in the calves' diet during their dairy period leads to improved living and health status of the animals.

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