13. BOKU-SYMPOSIUM TIERERNÄHRUNG

TAGUNGSBAND

Wertvolle Pflanzenstoffe
für die Tierernährung:
Perspektiven und Entwicklungen

29. April 2014 in Wien

TIERERNÄHRUNG
TIERISCHE LEBENSMITTEL
ERNÄHRUNGSPHYSIOLOGIE

Tagungsband

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29. April 2014, Wien

Institut für Tierernährung, Tierische Lebensmittel und Ernährungsphysiologie

Interuniversitäres Department für Agrarbiotechnologie

BOKU – University of Natural Resources and Life Sciences, Vienna

Universität für Bodenkultur Wien

Effect of selenium supplementation in the diet of cows and heifers at the drought on the content of Ig G in serum

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Introduction

Due to the multi-layered placenta (placenta epitheliochorialis) in ruminants, transplacental exchange of immunoglobulins is not possible. Calves are born without innate immune protection, but they are immediately confronted by various micro-organisms situated in a stable. In order for them to be protected during this first period of calves, it is vital to deliver them maternal antibodies from colostrum as soon as possible after the birth, because the content of Ig G decreases with the number of breastfeeding (Heinzlová, 2013, Šlosárková et al., 2011). Soon after the birth of calves there is an incursion of *E. coli* bacteria from the colon into the small intestine, which is in almost five hours literally colonized. Colonization also leads to the formation and to the release of bacterial toxins and inflammation of the intestinal mucosa. Immunoglobulin molecules easily penetrate the mucosa of the small intestine and in the case of an early administration it may actively inhibit the action of the bacterial micro-flora. The penetration capability of immunoglobulins of the intestinal mucosa decreases significantly, hour after hour, as well as decreases their content in colostrum itself. Today it is known over 37 different factors of immunity of bovine colostrum, which includes 5 basic immunoglobulins, lactoferrin further, rich peptide peroxidase leukocyte interferon, cytokines, lysosym, trypsin inhibitors and protease inhibitors and many others. If the body does not get these immunoglobulins in time and in sufficient doses, it does not have the sufficient immunity to overcome various diseases.

If the calf does not get colostrum in a timely manner and at sufficient dose these immunoglobulins do not have sufficient immunity to overcome various diseases.

The most common form of the disease of calves colostrum eating disorders are septicemia and diarrhea. Also in case of lack of vitamins and minerals appear functional disorders of metabolic processes and immune (Pavlata et al., 2012).

Selenium is one of the essential substances that affect the protection of cells, because along with other substances can maintain low concentrations of reactive oxygen species in tissues. We also have a great influence on achieving optimal reproductive performance. Its deficiency is also manifested reproductive disorders and adverse effects on the immune system (Marcinková and Beran, 2013).

The aim of this study was to map the development of serum Ig G in the course of the experiment with cows and compare Ig G in the serum of cows that were done on the ration and cows receiving a feed supplement Alkosel.

Materials and methods

Our experiment involved 28 Czech Fleckvieh cattle. Cows were divided into control and experimental group that received premix Alkosel containing selenium in the form of selenomethionin in yeast *Saccaromyces cerevisiae* addition to the existing ration the amount 3 mg Se/h/d. Experimental and control group were further divided according to the age of 7 heifers in kontrol group and 7 heifers in experimental group and the same distribution in cows. Cows received an identical ration. The feeding

supplements contained Alkosel only once during the morning feeding. Studied cows come from breeding located in the Pardubice region.

The groups were monitored during their pre-parturition stanchion housing. All monitored dairy cows were kept in the same compartment of the stable and their moisture and temperature conditions in the stable were identical too. Blood was sampled twice during the experiment:

I.- The first blood sample was taken from the high-pregnant cows and heifers ca. 23 days before the expected parturition. The blood was collected by the veterinarian from *vena coccygea* and the sample was designated as (-23).

II.- Up to 24 hours after birth the cow's second blood sampling performed. Designation of collection (+2).

All blood samples were taken by the veterinarian into the Hemos sampling tubes used for the sampling of beef cattle blood. All samples were taken at the same daytime to eliminate disturbance of the time schedule and feeding times of the experimental animals. The blood was transported to the Hospital in Svitavy where the serum was separated on the laboratory centrifuge at 3,500 rpm for 10 minutes. Labelled serum samples were kept in a freezer. Upon the completion of the whole set, the samples were brought to the laboratory of LABtechnik Brno which was assayed for bovine Ig G antibody. Research results were statistically processed by using Microsoft Excel and the Statistica 10.0 programme with the Tukey HSD test (Snedecor and Cochran, 2012).

Results and discussion

The level of serum immunoglobulin class G should be in healthy adult cows around 17.6 to 22.9 g/l (Bárta et al., 2008), agree with this Jelínek et al. (2003), which gives the value of immunoglobulins class G 17.9 g/l. In other works, states ranging from 16.2 to 26.0 g/l of Ig G (Dvořák et al., 2005) and Bouda and Jagoš (1979) investigating the activity of proteins and enzymes in the blood high-pregnant cows and their fetuses represents the value 22.6 ± 5.3 g/l Ig G.

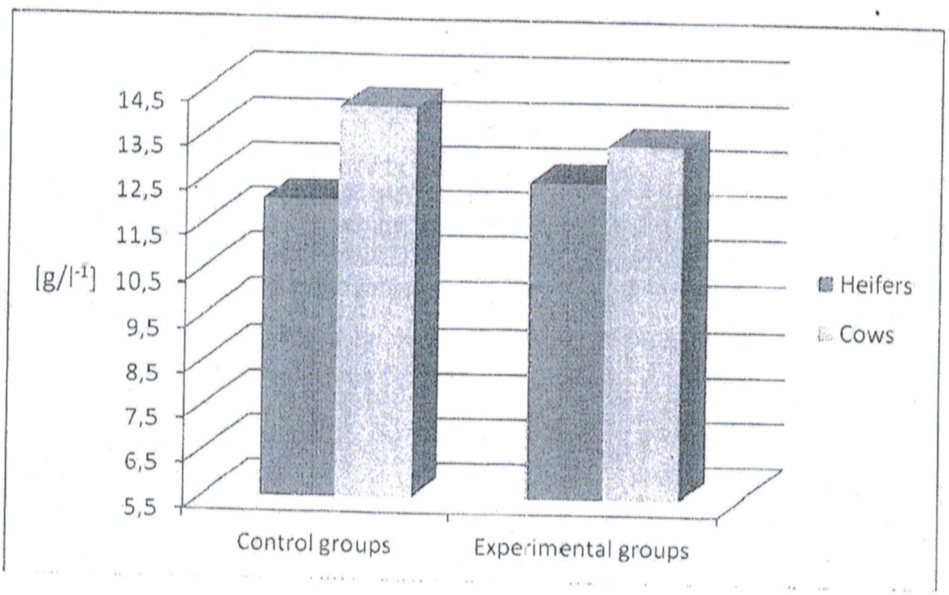

Figure 1: Effect of supplementation of feed supplement on the concentration of serum Ig G high-pregnant cows for the collection (+2).

For heifers in the control group reached values 10.43 ± 3.479 Ig G g/l for sampling before feeding the feed supplement (-23) and take postpartum values 12.03 ± 3.048 Ig G g/l (+2). The experimental group heifers reached values 12.05 ± 1.884 Ig G g/l for sampling before feeding the feed supplement (-23) and take postpartum values 12.47 ± 2.587 Ig G g/l (+2). For cows in the control group reached values 16.68 ± 4.912 Ig G g/l for sampling before feeding the feed supplement (-23) and take postpartum values 14.13 ± 6.072 Ig G g/l (+2). The experimental group cows reached values 17.08 ± 3.548 Ig G g/l for sampling before feeding the feed supplement (-23) and take postpartum values 13.31 ± 3.001 Ig G g/l (+2).

Bárta et al. (2008) reported that a somewhat lower value Ig G for cows, as in the control group and the test may be due to physiological immunosuppression during the period around birth, when the mother's immune response reduces reasons still little known causes, which is confirmed by results of our experiment. From these results it is clear that the experimental group was cows compared with the control group at the second sampling (+2) slight increase in the concentration of Ig G. However, this increase was not statistically significant (P> 0.05).

Conclusion

In conclusion, we can state that the concentration of serum Ig G cows involved in our experiment is in a satisfactory way, given that lower concentrations of Ig G in cows is physiological. In the first sampling (-23) at the concentration of heifers in the control group 10.43 ± 3.479 g/l Ig G and heifers in the experimental group the same sampling 12.05 ± 1.884 g/l Ig G. In the first sampling (-23) at the concentration of cows in the control group 16.68 ± 4.912 g/l Ig G and cows in the experimental group the same sampling 17.08 ± 3.548 g/l Ig G .The second collection (+2) the concentration in the heifers control group 12.03 ± 3.048 g/l Ig G and heifers experimental group 12.47 ± 2.587 g/l Ig G. The second collection (+2) the concentration in the cows control group 14.13 ± 6.072 g/l Ig G and cows experimental group 13.31 ± 3.001 g/l Ig G. In the age group of heifers was an increase in serum Ig G, while the cow was a slight decrease in the level of Ig G. There was however confirmed a statistically significant difference between the experimental and control groups for the collection +2.

The importance of high-quality colostrum for the successful rearing of calves is undeniable. Despite the fact that in our experiment occurred statistical relevance of the effect of selenium added to the ration, we believe that the consequent deficiency in nutrition high-pregnant cows should result in increased morbidity and their calves due to immune weakness.

Acknowledgments

This project was supported by IGA MENDELU BRNO No: IP 4/2013.

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