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BREEDING AND NUTRITION OF ANIMALS FROM THE VIEWPOINT OF SUSTAINABLE AGRICULTURE IN SLOVAKIA

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Summary

The range of biodiversity is a factor of system self-regulation, consequently agricultural ecosystems seem to be markedly limited when compared to natural ones. This is best seen in the number of animal breeds raised. High production intensity is also contradictory to the above requirements. Emission of nitrogen by the excreta of animals, mainly cattle and swine, is one of the important issues. Examples are given of possibilities of regulating nitrogen emissions through composition of the feeding rations and the ways of feeding.

Key words: biodiversity, cattle, swine, nitrogen, feeding ration

Rational use of natural resources is based on the principles of sustainable development of which preservation of the genetic resources of living organisms and of the diversity of species in their natural and artificial ecosystems is one of the basic conditions. In consequence of its activities mankind depletes the genetic outfit of organisms and creates simplified ecosystems that lose their natural ability of self-regulation. Thus the range of biodiversity presents a factor of self-regulation of systems. In this respect it has to be noted that in comparison to natural ecosystems agricultural ones are rather restricted. This is mainly true for farm animals. The numbers of species bred can hardly be compared with the numbers of microorganisms or free-living animals. If we reduce the problem for instance to cattle, it will become even more intricate. Whe considering cattle breeds from the ecological viewpoint we have to issue from the period of domestication, and mainly from the requirements put on the development and properties of utility breeds. Domesticated animals differ from the free-living ones also in that the variability of the latter is much broader and animals of different regions differ from each other in exterior and utility properties. The foundations of modern animal breeding were laid in England in the 18th century. At the beginning of that period diversity decreased once more and in several regions domesticated animals differed less from the free-living forms. The 19th century was characterized by the occurrence of tenths of new cattle breeds and lines. From this it follows that diversity was created by interaction between the environment and man-induced selection which lead to the implementation of certain breeds, the numbers of which were much higher when compared to the free-living forms. Now again we are witnessing a significant decrease in the number of breeds in Slovakia, too. Efforts are being made to markedly change this process also with respect to ecological aspects. The opinion prevails that a greater variety in breeds which can better adjust to the conditions of the environment can more efficiently influence the formation of landscape, environment and thus create preconditions of sustainable agriculture.

These views are partly contradictory to the economic parameters of production dictated by the world market and have an imminent effect on Slovakia as well. Today, intensive cattle farming can not get along with the production of feeds in a certain area (however, here we have great reserves in Slovakia) but is depending on imports, thus getting into direct competition with the consumption of selected foods by humans and having negative consequences to the environment. Voluminous foods are still insufficiently used in the feeding rations of cattle. The production effectivity of the former is low (in milk production often less than 5 kg/animal and day). On several farms we purchase feeds also in cases when we could produce them by ourselves. In 1993 a project was designed to optimize the natural resources of food production in Slovakia which stressed the ecological stability of the agricultural and horti-agricultural landscape. Different levels of cattle unit loads are proposed according to the character of the region: 0.37, 0.41 and 0.54 cattle units per hectar of land in the irrigation, dry and submountainous or mountainous regions, respectively. With this load and with properly grown, protected and dunged crops biodiversity can be substantially increased.

Implementation of these aims in practice is connected with disproportions mainly in the ecological understanding of the process. On one side biodiversity is being supported, on the other side absolute production is being increased with only a small number of cattle breeds. This is closely connected with the economic conditions of production. Nowadays, a successful farmer has to produce consumer-accepted animal products of high quality („Food on hoofs“) that would be competitive on the world market, in a desirable environment. This means that formation of the environment is becoming part of the acceptability of products produced for human nutrition.

Nitrogen release by animal excreta is one of the most important issues from the viewpoint of relations between animal breeding, environment and product quality.

Results of experiments and practical observations carried out at the Reserach Institute of Animal Production in Nitra showed that *dairy cows* ingested a daily mean of 230–250 g N depending on the type of feeding ration and milk production. In most types of feeding rations an overfeeding with nitrogen substances is encountered which brings about increased excretion of

the latter by urine and faeces. On our farms dairy cows excrete about 75-85 kg N yearly, of which 35-70 % (depending on the feeding ration) are excreted by urine.
Physical modification of feeding rations and doses, application of mixed and calibrated rations, frequency and sequence of feeding can also significantly affect the digestibility, metabolism and excretion of nitrogen.
Comparison of feeding rations containing pulverized and granulated feed mixtures revealed that for instance dairy cows fed granulated mixtures excreted by 24 % less nitrogen with excretion of the latter by urine being significantly decreased.
Different results were observed when dairy cows were fed mixed and calibrated feeding rations. The digestibility of N-substances in mixed feeding rations was increased by 6.5 %.
Nitrogen excretion also depends on milk production. The absolute amount of excreted N increases with the increase in production, however, it decreases by as much as 10 % when re-calculated to 1 kg of milk produced.
Regulation of nitrogen excretion in *growing animals*, mainly feedlot cattle, is a rather complex problem. Positive results can be achieved by decreasing the content of N-substances in the feeding rations when each per cent of decrease enables to reduce the N-output in excreta and urine by about 6-8 %.
Feedlot steers with a live weight of 300–350 kg have a daily intake of 120-180 g N, depending on the type of feeding ration. From this amount they excrete an average of 24–30 kg N per animal and year.
In *swine*, reduction of nitrogen excretion can be achieved mainly by balancing amino acids in the diets. In the present feeding systems for different categories of swine nitrogen retention does not surpass 30 % of the ingested amount. Utilization of nutrients improves with the increasing level of efficiency and the amount of urea nitrogen per kg of product decreases.
Each kilogram of dry matter fed increases nitrogen production in the urea by more than 200 g.
Standardized consumption of nitrogen and multi-phase feeding of fattening pigs can contribute to a decrease in N excretion by more than 10 % when compared to the feeding of universal feeds.
If we combine *protein feeds with synthetic amino acids*, positive results can be achieved in the decrease of nitrogen emission. In practice, a real decrease of N-substances in the feeding rations by 2 % can be counted with.

UTILIZATION OF BIOLOGICAL PREPARATION KOFASIL LIVE AT SILAGING OF GRASS STAND

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Summary

We evaluated the effect of the biological preparation Kofasil Live on the fermentation process at silaging the grass stands. We found out that the silage treated by the preparation showed markedly lower losses of dry matter (8.16% : 14.5 %), higher content of dry matter (28.5 % : 26.6 %) and statistically significantly higher content of crude protein (177.22 g: 174.07 g) compared with the control. The parameters of the fermentation process and lower content of NH_3-N out of total N (4.67 : 11.66 %) were found in the treated silage also.

Key words: silage making, grass stand, biological preparation, bacteria of lactic fermentation

The quality of conserved fodder crops influences decisivelly the economy of cattle breeding. The grass stands contain to a large extent sufficient amounts of saccharides compared with other species of fodder crops and so is the utilization of probiotics in their conservation relevant.
The use of biological inoculants in silage making can improve the start and course of the fermentation process. The additive of microbial cultures into the silage matter shall provide the start of homofermentative fermentation and speed up and improve the fermentation process.

Material and methods

The aim of the work was to evaluate the effect of biological preparation on the quality of fermentation process in silage made of grass stand. The experiment was performed in operation conditions in the silage pit, in bags 30 x 61 cm. The grass stand composed of 80 % grasses, 15 % herbs and 5 % clover crops was ensilaged. The stand was renewed 6 years ago, and it was heavy degraded during the period of harvest. It was manured with 40 kg P in autumn and 60 kg N in spring.
The control matter was treated with no conservation preparation. The experimental variant was treated with the biological preparation Kofasil Live composed of *Lactobacillus plantarum* 3676 and 3677, *Propionic bacterium* 9576 and 9577, medium. The bags with conserved matter were stored 1.8 m from the surface and 80 cm from the bottom of the silage pit. The bags were removed from the pit 336 days after the beginning of ensilaging and the proportion of weight losses was calculated from the difference between the dry matter weight at the beginning and at the end of storage. The content of nutrients was determined by laboratory methods, pH of extract from silage electrometrically, content of lactic acid and volatile fatty acids by gas chromatography, alcohol and ammonia by microdiffusion method as described by Conway. The content of metabolizable