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Non protein nitrogen (OPTIGEN ™) in highly productive dairy cows: Ukrainian experience

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Application of the slow release non-protein nitrogen in the protected form (Optigen ™) in the rations of high yielding cows allowed to increase milk yield, butterfat content as well as nitrogen efficiency.

Non-protein nitrogen, ration, yield, butterfat content, manure structure, nitrogen efficiency

Today it is known that some feed additives may improve rumen fermentation and microbial viability. One of the promising avenue is to add a non-protein nitrogen to ruminant rations in a protected form. The name of this products is - OPTIGEN ™, which is represented on Ukrainian market by Alltech. Alltech is the global leader that improve the health and productivity of people, animals and plants, providing natural solutions to feeding through scientific innovation. OPTIGEN is a technology that allows to formulate diet that fully meet the needs of the rumen microflora, resulting in increased growth of microbial populations, improved digestion fiber and rumen nitrogen uptake efficiency.

Reformulation of diet with OPTIGEN: optimization of milk production; continuous and consistent level of nitrogen in rumen; increased microbial protein production and digestion of fiber; it helps to maintain rumen efficiency and performance during periods of heat stress; decreases urea level in milk; decrease service period length; decrease the nitrogen elumination.

One of the available on the market today non-microbial nitrogen sources in diets of cows contains 41% of nitrogen, 25.6% crude protein. However, according to research, non-protein nitrogen 6.3% available immediately after use, and the speed of its output is further 0,238 x h^{-1} (23.8% per hour).

In addition to improving the composition of the diet, adding OPTIGEN helps to balance nitrogen output and provide a constant level of it. Controlled and constant output of nitrogen promotes protein synthesis ideal for milk production - microbial protein - 10 - 20%. In addition, these additives can reduce the amount of total nitrogen in the diet, it is more effective used in the body and lower costs. Using non-protein nitrogen oxide contributes to the transformation of bacterial nitrogen feed.

Modern science and practice of dairy farming clearly shows that for high-yielding cows hours it is very important not just balanced diet, that is, the presence of dry matter enough nutrients (protein, energy, etc.), But it synchronization, characterized measure the availability of energy and protein rumen microbial fermentation at any time. Ideal ration for high-performance cows should have energy sources with different speed of fermentation in the rumen (sugar, various forms of starch, pectin, cellulose) and those should be secured by different sources of protein (feed with high, medium and slow protein utilization rate in the rumen). So we will have an optimal (not less than 10 g and not more than 60 grams of free nitrogen in the rumen), and, last but not least, stable rumen nitrogen balance, which helps to maximize the efficient function of rumen microflora (primarily cellulose –utilizing bacteria "responsible" for digestion of diet), and - more complete realization of the productive potential of cows and better feed conversion [1].

It should be noted that in contrast to the diversity of energy sources (bulky feed different types of cereals, the breakdown of starch, characterized by speed, feed sources fats) in the diet it is difficult to achieve with traditional feeds the optimal combination of different speeds the breakdown in the rumen protein sources. And, given the high cost and protein in farms of Ukraine we rarely use more than 2 types of protein feeds. This inevitably leads to disruptions in the "supply" of nitrogen for rumen microflora and mean - inefficient use of energy feed, microbial protein synthesis reduction, and as a result - a shortfall of cow performance, compared with the "theory" expected level of milk yield.

In addressing the most important task - support optimal and stable nitrogen balance in rumen - OPTIGEN in a porous matrix for the rate of release of nitrogen in the rumen, which will take intermediate position between the feed and the "fast"

protein (sunflower and rapeseed meal and cake) and foods with "slow" protein (soybean cake and meal, brewer's grain).

The aim was to study the use of non-protein nitrogen (OPTIGEN ™) in a protected form in the diets of high-yielding cows.

Materials and methods of research. Experiment was done with the use of OPTIGEN in diets of highly productive cows in autumn 2011 on Mayak farm, Zolotoniyskiy district, Cherkasy region (about 1000 cows black and white Holstein breed and yield - 8000 kg). Facilities provided high-protein alfalfa hay (20% crude protein), below the average for corn silage calories (5.5 MJ net energy of lactation / kg CP) of protein concentrates used sunflower meal, soybean meal and soybean extruded.

In the first experiment of the feed was introduced OPTIGEN excluding from the diet 1.0 kg of sunflower meal and 0.5 kg of soybean meal and so reformulated diet with lower level of crude protein on a dry matter (16,5-17,0%) kept optimum rumen nitrogen balance (55 g).

In the second experiment we used forage mixture of 100 g/head og OPTIGEN replacing of 1.0 kg of dry beer pellet feed and 0.4 kg yeasts. Vacant place in the diet of partially filled additional amount barley bran increasing caloric intake and optimizing the nitrogen balance in rumen (lowering it from 65 to 35 g).

During the period of OPTIGEN feeding we conducted the regular monitoring of manure consistency, structure, by sifting through a special set of screens - manure separator (Visual pH Box set of Celtic, Franz I).

Results. For 2 weeks it was observed – the increased milk yield to 1.0 kg per cow (and from 22 to 23 kg) and a significant increase in milk fat content (from 3.85 to 4.0%) and protein content (from 3.15 to 3.20%).

That is, reducing the level of protein from 20 to 16.5%, but improved availability, increasing caloric intake we increased quantity and quality of milk. Thus, to improve the productivity of cows in lactation it is more importants not the total amount of crude protein in the diet as optimal and stable nitrogen balance in rumen.

Results after 3 weeks of the experiment: the milk yield has not changed much, but significantly increased the fat content of milk (3, 80% to 4.0%), while with the cow dayly milk yield at the farm - 26 kg so is it equivalent to increasing productivity by 1, 4 kg per cow per day. Analysis of the manure showed a

significant decrease in the number of long fibers and large particles of grain on the top and bottom sieve separator sludge. This improvement can be attributed to increased digestion of fiber, which in turn was the reason for increasing milk fat content.

It should also be noted that constant use of non-protein nitrogen source (OPTIGEN) in a protected form at the "Ukrainian agricultural holding" Ichniansky district, Chernihiv region (860 Symental-Holstein cows, productivity in 2014 was 98 00 kg of milk per cow, fat content of 4.0% and 3.4% protein content) to the diets containing 16.5% of crude protein on a dry matter at the level of dry matter intake and feed 22 kg daily milk yield of 32 kg per cow in milk - made it possible to achieve phenomenal high nitrogen feed conversion into milk protein - within 31%, while the majority farms hardly reaches 25% -28 [1, 3].

Conclusion

Using OPTIGEN in the diet of highly productive cows in farms with well proven technology of milk production in best conditions resulted in increased milk yield and improved milk quality. You can expect that in households where feeding is far from optimal balanced, the effectiveness of readily available nitrogen sources will be even more pronounced.

References

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