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DAIRY NEWS

NITROGEN (N) EXCRETION IN DAIRY COWS

In the coming years, one of the dairy producer's main challenges will be to identify an appropriate balance between environmental stewardship and dairy farm profitability. Nitrogen (N) balances in each dairy farm will probably be one of the key factors. There are at least three questions that we need to answer about N excretion in our dairy cows.

- Why do we have to decrease N excretion in our dairy cows?
- Is it possible to decrease N excretion through management practices?
- How much N excretion can we decrease on the farm?

Why do we have to decrease N excretion in our dairy cows?

It is very well known that new federal and state regulations are going to affect all California dairy producers. In the following years, these new regulations will resolve the underground water quality problems, through a strict control of the inputs and output of N in each dairy farm. The two main inputs of N in a dairy farm, which can be controlled by dairy producers to balance N, are fertilizers and feeds.

Due to the low price of milk, all these new regulations are coming at a very difficult moment for the producers. Many dairies will have difficulties achieving a zero balance of nitrogen because they have little land or a high number of animals per surface area unit. Despite the fact that some farmers can sell manure, in most cases the way to close the N balance at the farm level will be to reduce the nitrogen input and/or improve the efficiency of nitrogen utilization in the animal. From the nutritional point of view, it means to use all the management practices, nutritional strategies and available technologies to reduce nitrogen excretion.

The aim of this and the following newsletters is to discuss N excretion in dairy cows, mainly the management practices related to feeding lactating cows, such as diets and/or to specific ingredients to help decrease N excretion.

Is it possible to decrease N excretion through management practices?

In the last few years, different management practices and feeding strategies studying the effects of the efficiency of N utilization in the animals have been published in scientific journals. Some of them can have an important impact to decrease nitrogen excretion in dairy cows. The impact could be totally different according to the conditions on how they are implemented. Moreover,

they can have short and long-term responses, which means, some of these practices need time to produce an effect. For these, it is difficult to consider a fixed response for each of them. Some of these practices can directly help to decrease nitrogen intake and consequently nitrogen excretion. Others can decrease nitrogen excretion by increasing the efficiency of N utilization through more milk and milk protein yield or improving tissue protein retention. A combination of both effects can be also possible, decreasing N intake and increasing the efficiency of N utilization.

The management practices that could have a direct effect in reducing N intake are basically two, they work together and they are: grouping animals and balancing diets. It is possible that in some farms these practices will produce the most important impact to reduce N intake and excretion and improve lactation performance. Improving cows genetic merit, mixing grain with different rates of rumen degradation, decreasing the proportion of non-protein N in the diet, using bST, increasing the number of daily milkings, managing longer daily photoperiod, and using protected fat with high quality protein supplements, are some of the technologies that can improve the efficiency of N utilization. The use of protected amino acids (AA) can have the double effect of decreasing N intake and increasing the efficiency of N utilization. All these technologies are going to be discussed in the following newsletters. It is important to mention that most of them are high cost technologies (price and labor). Many dairy farms are using most of them, but many others are not. For this reason, they must be carefully studied and planned to be applied and to have a successful result of not only decreasing N output but also improving the economic income.

How much N excretion can we decrease in our farm?

According to recent publications, it is possible to achieve a range of 10 to 30% reduction in total N excretion in a normal dairy farm in the U.S. Considering a 10% reduction for a lactating dairy cow consuming an average of 550 g N/day and excreting 400 g N/day (feces + urine) it would be possible to decrease 40 g N/cow/day. In other words, it represents 15 Kg N/cow/year or for an average dairy farm in Merced County CA, with 660 lactating cows it would represent almost 10 Ton N /year. But we are not talking about fresh manure. The pure 40 g N/day means that we are decreasing about 8 kg of fresh manure/cow/day (6 kg of urine + 2 kg of feces). That is 3 Ton of manure/cow/year, or 2,000 Ton of manure/year for an average dairy farm in Merced County.

Some authors indicate that many dairy farms might reduce much more than 10% of N excretion. However, these conservative numbers can give us an idea of how much N we can probably reduce. In a cost benefit analysis, it would be advisable to include some of these estimations. For our example, not only the reduction in the management of 2,000 Ton/year of manure for an average dairy farm, also, the cows are going to eat less N, or less protein. Fifteen Kg of N/cow/year represents 400 Kg of Cottonseed, or 32 kg of urea, or almost 200 Kg of any protein supplement containing 50% Crude Protein.

Finally, it is necessary to say that besides the environmental impact, any improvement of N utilization in lactating cows could have a positive effect on milk quality for human health and industrial purposes by decreasing milk urea nitrogen content (MUN) and increasing the milk true protein yield. In the following newsletter we are going to discuss how grouping animals and balancing diets can impact nitrogen excretion in lactating dairy cows.