

NITROGEN EXCRETION IN DAIRY COWS: EFFECT OF GROUPING ANIMALS AND BALANCING DIETS¹

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The new environmental stewardship program provides an opportunity for dairy producers to evaluate current nutritional management programs. Grouping animals and balancing diets are two important subjects to be considered. Various strategies of grouping animals have been described in different research reports. The major purpose of grouping animals is to create homogeneity among cows in each group. Although most of the papers reviewed do not include the effect of grouping animals on nutrient excretion, there are no nutritional or economical arguments to feed cows producing 100 or 50 pounds of milk per day the same diet. Both production levels are “economically” different and feeding these cows the same diet would mean losing money and/or producing more manure. This is a second newsletter of a series about nitrogen (N) excretion in dairy cows. The purpose is to discuss how grouping animals and balancing diets can impact on nitrogen excretion.

Separating the milking herd into groups often allows for better herd management. There are at least three main reasons for grouping animals: 1) saving money on feeds cost, 2) increasing management efficiency (milk yield, reproduction, animal comfort, animal health, etc), and 3) decreasing nutrient excretion. The different strategies for grouping animals should be planned according to the herd size, labor capacity, the facilities available in each dairy farm and other specifics of the farm situation. Many different criteria can be considered for each situation. One research report compared five grouping strategies: diet nutrient concentration, days in milk (DIM), test-day milk, dairy merit and merit weighted by DIM. The authors concluded that grouping systems by required nutrients per pound of dry matter (nutrient concentration) was the most effective in maximizing returns over feed cost. These results are in agreement with other papers suggesting that cows would be best grouped by nutrient requirement. Above all, this indicates that a highly controlled nutrition management program must be carried out in each dairy farm to improve returns over feed costs.

An important reduction on N excretion was observed in two papers evaluating the effect of grouping animals. One of them divides lactating cows into three groups according to the level of milk production versus one group receiving a total mixed ration. This procedure decreased the mass N balance from 51.7 to 44.7 ton N per year (15% reduction). In the second paper, the authors chose to compare the following four strategies to group milking cows by: 1) actual fat corrected milk, 2) estimated energy requirements, 3) estimated protein requirements and 4) grouping by cluster. The cluster method used simultaneously standardized concentrations of protein and energy per kilogram of dry matter intake according to herd nutritional requirements to minimize variation within groups. The results indicate that by working with 6 groups of lactating cows, it is possible to reduce N excretion by 8%, whereas pounds of milk produced per pounds of N excreted and milk production were increased with a significant impact on farm profitability. The authors concluded that more than six groups did not lead to further reduction of N excretion because, with additional clusters, the uncertainty of feed composition became the predominant component of the variance of response. According to these reports, to increase the efficiency of N utilization and reduce N excretion, a minimum of three or a maximum of six groups of lactating dairy cows must be considered; nutrient concentration (e.g. energy and protein) is one of the most important factors for grouping lactating cows.

¹ The references (papers) used in these newsletters are listed at: <http://cemerced.ucdavis.edu/>

The issue of grouping cows and balancing diets works together. It is not worthwhile to group animals and overfeed them with N-containing feeds or other nutrients. It is a common belief that lactating cows have to be overfed with N (protein). Feeding cows with more protein than needed is wasteful, resulting in elevated feed costs and thus reducing profits and the efficiency of N utilization. Furthermore, such practices do not lead to improved lactational performance and often are associated with lower milk quality for human consumption, reproductive performance and industrial milk quality. In a recent survey on an important number of farms (372), the authors estimated that N was fed at levels exceeding current requirements resulting in a 16% increase in urinary N and almost 3% increase in fecal N. The main conclusion of this survey was that feeding protein closer to recommendations and increasing milk production per cow both contributed to improving efficiency of N utilization.

Some other management practices will have to be re-evaluated and frequently controlled to improve animal well being and the efficiency of nutrient utilization. First, feeding facilities, basically bunk space and competition for feed and water. Second, frequency of feeding, diets for high yielding dairy cows are normally based on high quality concentrated feeds with high rates of rumen fermentation. It is expected that nutrient utilization can be improved by increasing the frequency of feeding (more than 2 x day). Third, social interactions, cow behavior and age of cow have to be considered during some critical moments, as transition period (3 weeks before and after calving) or fresh cows, etc, where primiparous (first lactation) and timid cows have to be separated from multiparous cows. Fourth, when moving cows between groups, cows should be moved from one group to the another based on requirements, such as milk yield, reproduction, or body condition score, age, etc. but trying to minimize social disruptions in the new group, she will have different feed, a new milker and probably different milking time. Fifth, cow comfort during hot weather or rainy seasons (mud and manure) has to be considered in some farms. Finally, sixth, optimal group size. There appears to be no problem with large groups of cows per se, but with group sizes larger than 400 cows need to evaluate productivity, feeding and other behavior. Significant overcrowding appears to reduce feeding activities, alter resting behavior, and decrease rumination activity.

Due to its impact on nutrient balance and on feed input (purchase), production of home-made feeds need consider specific objectives. For example, a recent study indicates that increasing forage quality (less fiber and higher protein) did not improve the N balance at farm level because of the increased N fixation from the air in the soil, but a significant increase in return over feed costs was obtained. That means, on-farm raised feeds must be carefully planned considering what we are looking for, improved N balance, increased quality or increased quantity of feeds.

Today, dairy farmers need to take a very active role in nutrient management. It is necessary to think of each dairy farm as a unit and adopt **a tailored made feeding strategy for each dairy farm**. According to the chemical composition of the feeds produced in the farm and the animal requirements, tailor made supplements for each individual dairy farm must be designed. Considering the new regulations, the standard grain mixes or the general mineral mixes used in some farms at the present time are not going to be used nor recommended in the future. The unique way to control inputs and outputs of nutrient will be by adding just the nutrients that are deficient, not only N (proteins), also energy supplements, macro and micro minerals. The following newsletter will address the ways in which protein supplements and protein degradability in the diet can affect N excretion in lactating cows.