

Feed to meet cows' needs

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THESE days, there is a heightened focus on improving feed efficiency. Recently, we reported that a large proportion of surveyed dairy farmers fed only one total mixed ration (TMR) to all lactating dairy cows (*Hoard's Dairyman*, February 10, 2015, issue, page 92). The TMR concept implies that all cows in a group receive a diet with the same nutrient density. Formulation of the TMR is for a "reference cow" in the group, which is normally a top-producing cow. Therefore, the resulting diet often overfeeds nutrients to many cows in the group.

Considering that cows' nutrient requirements are highly variable because of their lactation and pregnancy status, and also because of their genetic potential, providing only one diet to a large group of lactating cows results in waste of nutrients with important negative economic and environmental implications. By feeding one TMR to all lactating cows, we are not optimizing income over feed cost and are likely to make less money.

Target the individual

The dairy industry is always looking for practical and more efficient

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feeding management alternatives. Nutritional grouping is one of those alternatives that we have previously discussed. Other alternatives include technologies under the umbrella of "precision dairy farming." Some of these are already in place helping farmers in everyday decision-making. Examples include individual milk component monitoring, pedometers or rumination monitors.

Automated milking systems (robotic systems) and precision feeding systems are also part of "precision dairy farming." Precision feeding involves feeding each cow individually according to its nutrient requirements for maintenance, growth, pregnancy and level of milk production.

The introduction and dissemination of automated milking systems offers an opportunity for improving feed efficiency since supplemental feed is allotted to motivate cows to visit the milking machine. Although the amounts fed are controlled by milk production level and days in milk, these systems still usually use only one common supplemental concentrate mix for all cows.

Automated milking systems are "voluntary," where cows enter when they please and, therefore, their milking frequency and, hence, supplemental feeding varies substan-

tially from cow to cow, imposing a challenge on their management. Although some pasture-based farms have adopted these technologies effectively, most of these automated milking systems have become more of a management necessity to attract cows to the milking machine than a nutrient feeding strategy.

Precision may pay

A new type of precision feeding is the dynamic concentrate feeding that may offer advantages for improving feed efficiency by targeting multiple feed ingredients or concentrates and providing cow-specific supplementation based on actual cow nutrient requirements. The system requires individual cow radio-frequency identification (RFID), electronic milk meters, online meters for measuring fat and protein content in milk, a scale for body weight, and a feed mill capable of mixing different ingredients and delivering the mix to the cow soon after milking starts.

This system calculates the individual nutritional needs of each cow as the cow enters the parlor by taking into account milk yield, stage of lactation, parity, body weight, body weight change, pregnancy and milk composition. Once the concentrate supplementation is delivered, the

cow has between 5 and 10 minutes to consume it.

This dynamic concentrate parlor feeding technology and management has the potential to be adopted by dairy farms to improve feed efficiency, boost economic net returns and decrease environmental impacts. Preliminary research results from this system in Europe are encouraging. Reports indicate that, in comparison with a single TMR, the dynamic concentrate parlor feeding system had \$128 and \$51 per cow per year more income over feed costs for first and second-plus lactation cows, respectively. These economic gains are due to both savings on feed nutrients and improved productivity.

In the U.S., results from the University of Florida comparing conventional feeding and precision feeding, with weekly adjustments of net energy density of the diet for each individual cow, found a \$1.46 per cow per day greater income over feed cost for the precision feeding. This was due to an increase in energy-corrected milk with no change in dry matter intake between the two systems.

Although the technology looks promising, further study, additional refinement and a full economic assessment are required before it can be widely recommended. 🐄

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