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Nutritional Management of Transitional Dairy Cows

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Demand for all nutrients doubles over a few days around parturition, peaking at 3 to 5 times as high as during mid gestation. The physiologic problems resulting from this rapid metabolic shift include a severe shortage of glucose, amino acids, and major minerals such as calcium, phosphorous, sodium, chloride and potassium. To meet this sudden need, the cow must use body protein and fat.

Dairy nutritionists have devised a set of strategies, components and products available to manage transition diets. These include:

1. maintenance of dry matter intake in the dry period.
2. balance of the amount and quality of protein in the ration.
3. supply of rumen degradable protein and energy to fuel rumen microbial protein synthesis.
4. use of specific protein supplements or single amino acids protected in some way from ruminal degradation.
5. proper balance of fibrous and non-fiber carbohydrates.

Protein supplements such as high-quality alfalfa or soybean meal can be used to meet the cow's protein requirements. However, some cows cannot consume enough dry matter to meet nutrient requirements. If protein percent in the ration is increased too much, but dry matter intake is already maximal, then another ration component must be reduced. Typically carbohydrate, either fiber or starch, is reduced. This will decrease the substrate for microbial protein to maximize milk and milk protein yields. Too much of a reduction in fiber affects microbial growth and can lead to acidosis, ketosis, displaced abomasum and laminitis.

Changing the quality of the protein alone also may not provide the desired results. If the quality of the intake protein is higher than that produced by the microbes, then the microbes will convert it to microbial protein with no gain in protein quality to the cow. If too much protein passes the rumen undegraded, then microbial protein production will be limited and it may limit total metabolized protein. Individual amino acids and amino acid analogs that might be limited in the diet such as methonine and lysine can be used to optimize protein metabolism in the high producing dairy cow.

Typical feeds used in dairy rations vary widely in lysine and methionine concentrations. Corn and other cereals have low amounts of lysine, while legume proteins are usually lower in methionine. Microbial protein delivers higher methionine and lysine levels than most feeds consistently. There are commercial sources of methionine and lysine that can be used as feed supplements to make up for deficiencies. Methionine products are available which claim some degree of undegradability in the rumen. Heat processed soybean meal provides a reliable source of rumen protected lysine with an overall good balance of amino acids. The most practical individual amino acid sources are rumen protected lysine and methionine, with the choice of product often being made on a cost basis. Methionine analogs may act to supply greater microbial growth in the rumen, from which the cow benefits both in a better amino acid uptake and also in an increase in fiber digestibility.

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Production Effort Generously Sponsored By MONSANTO

Surviving the Urban-Rural Interface: The California Dairy Quality Assurance Program (CDQAP)

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Two major complaints about dairies from the non-agriculture sector are image and odor. As the urban-rural interface moves closer to livestock production, agriculture must be pro-active in protecting their industry. Demonstrating sound environmental management to regulatory and downstream stakeholders may give us a stronger position in the argument. Producers also need to market their operations to their neighbors, local community, and civic leaders. A well-landscaped and well-maintained farm has fewer odors and attracts fewer complaints than a poorly kept one.

Development of a solid environmental plan is similar to development of any management plan. The first step is to evaluate the current state of the operation and define how things are done. Third-party consultation is helpful, just as a producer would use a veterinarian to evaluate herd health. Several organizations on the national or state specific level can perform an environmental self-audit.

California Environmental Quality was one of the first organizations to function at the state level and was responsible for The California Dairy Quality Assurance Program (CDQAP) Environmental Stewardship module that began as a method to achieve compliance through education. In California the program was developed to provide assurance to dairy operators. There are 9 regional water quality control boards, multiple methods of permitting livestock facilities, and county regulations. Additionally, select irrigation districts have policies that are important to understand. Other agencies also have regulations which affect animal facility manure or nutrient disposition.

The module was designed with three components and has evolved to become a voluntary certification program. The partners in the program include U.S. EPA, state regulatory agencies, dairy producer associations, Natural Resources Conservation Service and academia. Certification is possible and does not restrict the regulatory authority of any of the agencies.

The first component is education through an environmental stewardship short course covering regulations, risk assessment documents, estimating needed liquid storage size, manure management, utilization of treatment technologies, storm water pollution prevention plan, emergency management plan, and an introduction to nutrient value of manure solids and liquids.

The second component is development of an environmental stewardship farm management plan. This umbrella plan includes all documents associated with permitting and compliance issues, completed homework from the classes, and a prioritized list of facility needs and alterations with anticipated dates for completion.

The third is an on-farm evaluation by an independent third party and takes 2-3 hours. The evaluators go through the paperwork and then thoroughly evaluate the fields used for land application of nutrients. A certified facility is one where the facility infrastructure and managers appear to comply with all regulations enforced in their area (this includes Federal, State and local laws). Producers can have up to two evaluations with no cost as a result of a grant from U.S. EPA.

The program has evolved to provide almost all components of an environmental management system. It provides a step-by-step planning process to assess current environmental performance. The homework serves as a risk assessment to define options for improvement. The prioritized list describes the timeline and method to achieve change. An annual questionnaire is used to revisit, revise and update the plan as necessary. Record keeping, in the form of operation and maintenance reports, visual monitoring of property perimeter and retention pond structures, typically improves during the process. The CDQAP does not require a farm environmental policy statement but there is a section on nutrient management to serve as a holding place until the federal CAFO and ELG rules are promulgated.

Peace of mind is a valuable product of participating in the voluntary program. A certified facility has less probability of a regulatory action. Certification serves as a sign to the regulatory inspectors that 'this facility IS doing things right—your time will be best spent elsewhere'. The entire process increases the pride and ownership of valuable employees and should serve to improve management. Both because of our regulatory partners and more importantly as a result of the incredibly stressful litigation environment the program has a high bar—defined by compliance requirements. Additionally, one of the greatest benefits of the program has been the improved communication between regulatory, industry, and academic communities.

Six Reasons Not To Use Clean-Up Bulls To Breed Your Heifers

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The detrimental impact of using natural service, even in a clean-up situation, cannot be overemphasized. AI has been integral in reducing disease transmission, allowing for genetic selection, and increasing the milk yield of dairy cattle. Nevertheless, after as few as one or two AI services, many dairy producers and heifer ranch operators use clean-up bulls on their heifers. Here are six reasons not to use clean-up bulls on your heifers.

Reason #1. **Clean-up bulls cannot provide the genetic advancement possible with proven AI sires.** No information regarding production, physical conformation, and calving ease is available for natural service bulls. Dairy producers must recognize that any natural service bull used on the farm is the offspring of the 99% of all cows that were *NOT* considered to be potential bull mothers by the USDA and the AI industry. In addition, it is important to remember that for every 10 bulls sampled in an AI progeny test program, only 1 or 2 will make it to active service. Therefore, the odds of selecting a natural service sire that will compare with a proven AI sire are remote.

Reason #2. **First lactation heifers represent the greatest potential contribution to your herd's genetics.** Why? Because first lactation heifers represent the highest number of calvings per lactation group on most farms. For example, with an average annual replacement rate of 35%, a minimum of 35 heifers (per 100 cows) must calve each year to maintain herd size. In reality, more than 35 heifers (per 100 cows) must calve each year, as you must consider death loss, infertility, and selection within the heifer pool. If you assume a 15% increase is necessary to cover death loss, infertility, and selection within the heifer pool, then 41 heifers (per 100 cows) must calve each year (35 heifers minimum x .15 = 6; 35 + 6 = 41 heifers).

Reason #3. **Open heifers after one or two AI services are not necessarily subfertile, but rather victims of "chance" (probability).** If you achieve a 55% conception rate in your heifers, only 80% of your heifers will conceive after two or fewer services (Table 1). If heifers are limited to two AI services, then the clean-up bull will sire 20% of the offspring in this scenario. This is unacceptable as open heifers after two AI services are not necessarily subfertile, but rather these heifers most likely haven't conceived due to "chance" (probability).

Table 1. Cumulative percentage pregnant at different conception rates after up to four AI services.

AI service number	Cumulative percentage pregnant at different conception rates		
	55% conception rate	65% conception rate	75% conception rate
1	55	65	75
2	80	88	94
3	91	96	98
4	96	99	99

Reason #4. **Clean-up bulls cost more than most producers recognize.** Management must recognize the costs of natural service which include: a) the purchase price of the bull, b) daily feed costs, c) veterinary costs, and d) lost income because the offspring of the clean-up bull will produce less milk than the offspring of a proven AI sire.

Reason #5. **Clean-up bulls can introduce venereal disease into a herd, whereas AI bulls are free from disease.** Venereal diseases such as campylobacteriosis (previously called vibriosis) and trichomoniasis can be devastating to your herd's profitability as heifers may become infected during natural service, abort, and become either temporarily or permanently infertile. In contrast, health, semen quality and fertility of AI bulls are routinely monitored by the AI industry.

Reason #6. **Bulls pose a health risk to you, your employees, and the entire herd.** Bulls are dangerous and unpredictable. AI eliminates the risk of catastrophic injury or death to you and your employees.

(Please continue on page 4, under Six Reasons)

(Nutrition, continued from page 1)

We conducted a study to test the effects of two rates of protein intake prepartum and the use of methionine hydroxy analog on aspects of metabolism of dairy cattle. We fed 11 and 14 % crude protein (CP) total mixed rations to dairy cattle from 21 days prepartum, balanced with RP-Met, and with or without 20 grams/d methionine hydroxy analog. Dry matter intake averaged 25.4 kg (55.9 lbs) and milk production 41.6 kg (91.5 lbs). Cows fed the 14 % CP ration ate 0.7 kg (1.5 lbs) more and gave 1.7 kg (3.7 lbs) more milk than those fed the 11 % ration. Cows fed methionine hydroxy analog prepartum lost less body protein by d 60: 4 kg (9 lbs) versus 12 kg (25.4 lb). To put this in perspective, if the difference in body protein (16.4 lbs) was converted completely to milk protein it would provide an extra $36 at today's milk protein price over the first 60 days of lactation. If one-half of the amino acids converted to milk lactose, then this would provide an extra 2 lbs of milk per day! The bottom line is that we need to think about the whole cow, not just the milk—if we help the cow save protein and energy stores, she can make more milk and stay healthier.

Challenges in dairy business require integrated solutions, even at the cow level. Our goal during the transitional period is to prevent cows from 'going off feed' for whatever reason. For every one cow you prevent a displaced abomasum, ketosis, fatty liver or lost production, you save hundreds of dollars. Find out what is really happening with your herd's transition nutrition. The following areas are especially pertinent:

- Balance of soluble and insoluble protein and amino acids.
- Percentages of Neutral Detergent Fiber, Acid Detergent Fiber and Lignin.
- Percentage of Starch and solubility of starch.
- Effective fiber-know the average and distribution of particle length.
- Feed a TMR, twice a day, and keep it pushed up and fresh.
- Allow sufficient bunk space for easy feeding of all animals.
- Monitor and estimate intake by using delivery data and occasional weighing of refusals. Monitor sorting.
- Use a fresh cow group.
- Expect and manage for rapid increases in milk production and feed intake in early lacation- a target may be 10 % increase in milk production per day for 14 days for cows and 8 % a day for 18 days for heifers (100 lbs in 20 days, 70 lbs for heifers). This target may be modified to the situation in your herd.
- Aggressively offer a well-balanced ration in the late

{Please continue in next column, under Nutrition)

(Nutrition, continued from previous column)

dry period (30 days out) to include all of the above and sufficient energy and protein to stimulate the rumen microbes and body systems.
- Aggressively and preventatively treat fresh cows at all levels of risk. Take daily temperature for 10 days postpartum. Institute medical treatments after consultation with your veterinarian.
- Consider feeding some direct gluconeogenic precursors (calcium proprionate) to all cows, and/or warm drenching with this or other solution (propylene glycol).

(Six Reasons, continued from page 3)

Conclusion. The use of clean-up bulls has long-term detrimental effects on dairy profitability. To achieve genetic progress and increased profitability, management should focus on increasing the conception rate of heifers. A 75% conception rate is a reasonable goal in heifers. With a 75% conception rate, 94% of the heifers will conceive after two or fewer services (Table 1), and if up to four AI services were utilized, essentially all heifers would conceive to an AI sire. This is the best scenario for genetic advancement and profitability of the herd. Set your goals high. Contact your local Cooperative Extension and AI Stud to formulate a strategy to increase the conception rate of your heifers to AI and eliminate the clean-up bulls in your herd. You'll be securing a more profitable future for your business and family.

Western Dairy News *is published as a service to the people interested in the health and welfare of the western dairy industry. Archives of this publication may be found at http:// animalscience-extension.tamu.edu/dairy/wdn/ wdn.html*

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