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Oral Drenching: Boosting the Fresh Cow

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In the days immediately before calving, nutrient requirements are increased due to fetal calf growth and the preparation of the mammary gland for lactation. At the same time, feed intake is typically reduced by 20 percent, leading to sudden nutrient deficiencies in the transition cow that can last from one day to several weeks. The amount of energy required to maintain the metabolic rate of the cow and support milk production during early lactation exceeds the amount consumed in feed. This places the dairy cow in negative energy, protein, and calcium balance in early lactation. Calcium is critical to muscle contraction, thus even a subclinical deficiency could impair gut contractions, uterine involution, and teat sphincter closure.

Cows have some ability to draw upon body reserves to meet these deficiencies. They draw energy from body fat mobilization, protein and energy from muscle breakdown, and calcium from bone stores. While this process is normal, the degree and duration of this body weight loss is critical. When deficiencies become too great or continue too long, a breakdown in metabolism leads to diseases such as ketosis and failure to breed back. Chronic deficiencies of energy, protein, minerals, or vitamins have been associated repeatedly with depressed immune function, which increases susceptibility to mastitis, metritis, and other infections.

Oral drenching at calving

Although a well balanced diet reduces the incidence of milk fever and ketosis, this effect is compromised if feed intake declines. If the cow is not eating, she won't be getting the feed additive in the intended amount. Forced oral administration of nutrients at calving can be a useful management tool to raise blood calcium levels, minimize energy deficits, re-hydrate the cow, and stimulate rumen fermentation on the critical day of calving when intake is most depressed.

Our goal with supplementation is to supply enough nutrients to the cow to be effective, yet safe and simple. "Pop-bottle" drenching risks aspiration pneumonia and limits the amount of material that can be delivered. "Caulking-gun" pastes and gels reduce the risk of aspiration and are easier to deliver; however, these too are limited in the volume of material delivered and can also be expensive. Esophageal pump systems place the drench directly into the esophagus, and one person can deliver large volumes of material relatively safely and quickly.

Nutrients of interest

Water

There is a two-fold opportunity here: replace electrolytes lost at calving (re-hydration) and provide additional weight to the rumen. At calving, there is a sudden loss of uterine fluids (up to 125 pounds of fluids) causing electrolyte imbalances. When the calf is delivered, there is a sudden

(Continue on page 2, under Drenching)

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(Drenching, continue from page 1)

void in the abdomen allowing the abomasum to slide under the rumen to the left side of the cow. The delivery of 5 gallons of water alone adds 42 pounds of weight to the rumen. The added weight forces the rumen to quickly fall to the floor of the abdomen and prevents the abomasum from sliding under it.

Calcium

Both calcium chloride and calcium propionate have been demonstrated to effectively increase blood calcium. Calcium chloride can be rather irritating to the cow's mouth and has been implicated as a cause of ulcers in the mouth, esophagus, rumen, and abomasum. Calcium propionate is less injurious and provides both energy and calcium. Though its effect on blood calcium is not as rapid as calcium chloride, calcium propionate may have a more sustained action. Oral drenching of 1.0 to 1.5 pounds of calcium propionate in 3 to 5 gallons of water increases plasma calcium concentrations in fresh cows for several critical hours.

Glucose precursors

Supplementation of propylene glycol, calcium propionate, or glycerol increases available calories around the time of calving. Propylene glycol is commonly used at 300 to 500 ml per dose; higher doses can be associated with an upset of rumen function. Glycerol is a sweet tasting liquid, with field doses ranging from 1.0 to 1.5 liters per cow. Calcium propionate may be a good choice, as it supplies both propionate and calcium. These glucose precursors have the potential for promoting gluconeogenesis, minimizing body fat mobilization, and reducing fat accumulation in the liver on the day of calving.

Others

When supplementing other additives to the water drench consider the herd's history of health and production. A dose of 100 to 150 grams of potassium chloride helps restore electrolytes lost at calving. Another mineral to consider is magnesium. Marginal plasma magnesium levels at calving affect calcium homeostasis and contribute to hypocalcemia. Supplying 200 grams of magnesium sulfate in a drench at calving may head off problems caused by low blood magnesium. In some herds, very low blood phosphorus occurs at calving; providing 220 grams of sodium phosphate restores blood phosphorus levels for 12 to 24 hours.

Other compounds used in drenches include ground feeds, fats, direct-fed microbials, and yeast. The addition of direct-fed microbials or yeast cultures improves rumen function by stimulating fiber digestion, improving lactic acid utilization, and stabilizing rumen pH as the cow comes back on feed. These products are typically included in drenches at 2 to 4 times the recommended daily feeding rate.

Production & health responses to oral drenching at calving

A trial conducted on a commercial dairy in Central Texas examined the effect of using calcium propionate (1.5 pounds) or propylene glycol (300 ml), administered in 2.5 gallons of water, on subsequent health and productivity of the cows. One hundred sixty nine animals were drenched at calving and again 24 hours post calving. Health and production records were collected over the first four months of lactation. Those cows drenched with propylene glycol or calcium proprionate averaged more milk per pound than those cows drenched with water only. [See Table One; Data taken from (Stokes and Goff. 2001. Prof. Anim. Sci. 17:115-122)].

Field application

A well-managed transition diet is the best means of supporting the cow through calving and into lactation. However, supplying nutrients at calving through an oral drench provides additional support during a critical time of metabolic and feed intake challenge. Many of the ingredients proposed for drenching sound good and should be helpful to the cow; however, few have been tested to determine actual effectiveness. Recently we have begun testing these ingredients and our results suggest that adding propylene glycol or calcium propionate does benefit the cow. Our field data would suggest that even if clinical milk fever or ketosis were not prevalent in older cows, the cost of a preventative oral drench supplying additional calcium and energy may be justified by potentially higher milk yields. While some additives will have sound physiological basis, evidence to date on many commercial products is mainly anecdotal. As with all procedures, higher than recommended doses or giving doses more frequently than recommended (24 hours apart) could oversupply the blood with calcium or glucose precursors and invite toxicity.

Table One: The Effect of Three Oral Drenches Given at Calving on Milk Production

		DRENCH	
PARAMETER	Water (alone)	Propylene Glycol	Calcium Propionate
Milk, average lbs per cow per day	91.5[a]	98.7[b]	96.1[a,b]
Cost per drench, $ per dose*	—	$ 0.82	$1.29

[a,b] Milk averages with different superscripts differ significantly (P<.05).

* Prices quoted in Stephenville, TX, on 05/31/01.

[Data taken from (Stokes and Goff. 2001. Prof. Anim. Sci. 17:115-122)].

Importation Biosecurity Guidelines for Expanding Herds

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Dairies throughout the western states are currently expanding, or considering expanding, their herds. It is wise to carefully consider the risks with the benefits because purchased animals can introduce or increase an array of debilitating infectious diseases. The term **biosecurity** refers to management and hygiene practices that reduce the risk of introducing or spreading infectious agents. Biosecurity concepts may appear vague and impractical but they are the most powerful means available ot minimize the impact of infectious disease.

Importation biosecurity includes measures to prevent introduction of infectious agents from sources that originate off your operation. Traffic onto a dairy includes off-farm vehicles and people that either deliver or pick up materials, supplies, milk, feed, dead animals, etc. Producers need to implement procedures to minimize the risks from this traffic. Necessary visitors, feeds, and purchased animals represent a special threat, because they are integrated into its operation. Guidelines to address the risks from purchased animals are listed below:

Prior to purchase

1. Evaluate the current health, management and immune status of your herd. This is an important step to help you evaluate risks that incoming cattle present to your herd and disease challenges that your herd may present to incoming animals
2. Determine which diseases are of particular importance to your operation. At a minimum this list should include the contagious mastitis pathogens (Strep. agalactiae, Staph. aureus, and Mycoplasma), Johne's disease, BVD, Salmonella, Hairy Heel Warts.
3. Develop prevention, monitoring and control procedures for specific problems.
4. Strongly consider whether purchasing additions is truly necessary. **Disease introduction risks are minimized by maintaining a closed herd**.

Evaluate sources of replacement animals

1. Risks are very closely linked to the source of purchased animals. It is worth the effort to purchase from a reputable herd that discloses previous health history and where animals can be examined prior to purchase. Knowledge of the herd of origin greatly enhances risk assessment.
2. Evaluate the disease exposure and immune status of incoming animals. Examine all animals 4 to 6 weeks before purchase.Vaccinate twice, with second dose at least 2 weeks before transport to your herd
3. Screening tests should include at a minimum bulk tank culture and bulk tank somatic cell count (3X) prior to purchase.
4. Further testing of individual animals will depend on your herd's status and your disease control programs, as well as the history of the herd of origin. Strongly consider including BVD test for Persistently Infected animals; Johne's disease serologic test; Salmonella fecal culture; BLV serologic test; Individual cow SCC and/or milk culture; TB and Brucellosis testing may be mandatory.

Management after purchase

1.Minimize risk of disease introduction from livestock vehicles by assuring the delivery vehicle is clean and delivering animals to a site peripheral to the dairy.
2. Minimize transport stress with good transportation practices.
3. Provide fresh feed and water upon arrival. Use transition ration and adapt animals to new diet slowly.
4. Quarantine or segregate incoming animals for identification and monitoring
5. Assure that vaccination has been properly conducted, and consider booster doses if necessary.
6. Evaluate and monitor health carefully for early recognition of disease development.
7. Inspect and treat for lameness with special attention to infectious foot disease.
8. Set up a monitoring program to ensure that contagious mastitis pathogens have not inadvertently been introduced to the herd. Such a monitoring program should include the following:

Culture all introduced cattle on arrival (if lactating) or at freshening;

Culture the bulk tank on a twice monthly basis;

Culture string samples from the pens into which the introduced cattle are placed.

Western Dairy News *is published as a service to the people interested in the health and welfare of the western dairy industry.*

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