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When Whole Milk Isn't Enough

Nearly half of all dairy calves raised in the United States are fed a diet of whole milk in the pre-weaned stage. The source of this nutrition is primarily hospital waste milk, salable milk, or a combination of the two.

While milk has been deemed "nature's most perfect food," and calves have been shown to perform very well on it, we are learning that there are ways we can optimize the consistency and nutritive value of milk fed to calves.

Not quite perfect
Recognizing the potential risk of introducing pathogenic bacteria and viruses to calves via hospital waste milk, many operations now pasteurize their waste milk before feeding it. While effective pasteurizing does address disease-prevention goals for feeding whole milk, it does not rectify a series of other important concerns, including:

Nutritional consistency -- The very nature of hospital waste milk makes it a product can be inconsistent. It typically is made up of milk from treated sick cows and fresh cows. Because colostrum is higher in fat, protein and total solids than traditional whole milk, a large number of fresh cows can alter the nutritional content of a batch of waste milk. On the other hand, a large percentage of cows with mastitis or other illnesses could result in waste milk that is lower in solids.

Parlor-management and/or pasteurizing procedures can result in excess water being flushed into the milk supply. In addition, waste milk may not be agitated as regularly as bulk-tank milk on the dairy.

As an example of waste-milk inconsistency, a recent Wisconsin study[1] of pasteurized waste milk from 31 commercial dairies and calf-raising operations showed that fat content (DM basis) ranged from 22.3 to 37.6%, and protein varied from 23.1 to 40.8%.

Nutritional content – Even if solids levels in waste milk were consistent, they are not ideal for optimal calf growth. The standard protein-to-fat ratio in whole milk is about 25-28% protein (DM basis) to 28-30% fat. But it has been documented that a higher percentage of protein in the milk diet promotes lean tissue growth and greater stature in calves. A high-fat diet, on the other hand, can result in short, fat heifers that do not meet target breeding criteria. A good guideline is to strive for a protein-to-fat ratio of greater than 1.0 (in other words, more protein than fat). An ideal target is around 1.4 (example: 24:18) which is especially important for intensive nutrition programs that feed pre-weaned calves on a higher plane of nutrition. Simply feeding more whole milk adds even more fat to the diet, suppressing starter-grain intake.

Surprisingly, whole milk also is deficient in a number of vitamins and trace minerals when comparing standard values for whole milk to the National Research Council (NRC 2001) recommendations for dairy calf nutrition. Among the elements with deficiencies are iron, manganese, copper, iodine, cobalt, selenium, vitamin D and vitamin E. Starter-grain formulations often are fortified with these vitamins and minerals, but starter-grain intake is minimal in the first few weeks of life.

Supply – Another challenge with feeding waste milk is that dairies typically only have 30 to 60 percent of the waste milk supply that they will need to feed all of their heifer calves. A recent field study[2] of a 1,100-cow North Carolina dairy showed that its waste milk supply varied by as much as 300 pounds per day over a two-week period.

Some operations remedy this situation by using salable milk from the bulk tank to make up supply shortfalls. Others use milk replacer to feed either the youngest or oldest calves. But with milk prices on the rise, feeding milk that otherwise could be sold becomes an expensive proposition. Using milk replacer usually is a more cost-effective option, but switching calves between milk replacer and whole milk can create inconsistencies in the liquid ration and management challenges in using two feed sources.

Added protection – Protective agents such as ionophores and larvacides are routinely added to milk replacer, but are not found in whole milk.

Making a good thing even better

Young calves thrive on consistency. Calves are developing babies, and frequent or abrupt changes in their diets can cause digestive upsets, immunosuppression and developmental delays. Just as it is a goal to deliver the same ration to lactating cows in every bite, the liquid ration fed to calves should be equally as consistent.

The nutritional and economic advantages of feeding pasteurized waste milk can be enhanced with the use of pasteurized waste milk balancer products. There are three important ways that pasteurized milk enhancers can improve a dairy's supply of pasteurized whole milk:

1. **Balance** – These products typically add a higher level of protein and a minimal amount of fat. In addition, when balancing, the total solids and volume of liquid typically are increased as well. When fed at the correct level, balancers also act as a fortifier bringing in the correct amount of vitamins, minerals and other additives. In summary, when a balancer is used, the protein:fat ratio is improved, the whole milk is fortified and the volume is increased.

2. **Fortify** – Fortifiers contain additives such as vitamins and minerals to bring whole milk nutrition content in line with NRC guidelines. Other options include adding larvacides for fly control, and ionophores for growth promotion and coccidiosis prevention. When fortifiers are used, the volume of liquid is not markedly increased.

3. **Extend** - The supply of waste-milk can vary considerably and milk replacers can be used with the primary objective of increasing the liquid milk volume. The milk replacer in this situation, commonly a basic 20:20 non-medicated milk powder, can add additional vitamins and minerals as well, but is limited to the contribution from the extended volume. When using extenders, there is not a focus on changing total solids or protein:fat ratios.

Pasteurized waste milk balancers can be used in both individual-feeding systems and auto feeders in a group housing setting. They are also highly beneficial in adjusting milk rations to seasonal changes to help animals cope with cold and heat stress.

Your nutrition consultant and calf nutrition supplier can provide additional advice on how to correctly incorporate pasteurized waste milk balancers in your milk-feeding program.

With the enhancements provided by pasteurized waste milk balancers, feeding a diet of whole waste milk truly can be the "perfect" choice for your pre-weaned calf nutrition program.

1 Moore DA, Taylor J, Hartman ML, Sischo WM. **Quality assessments of waste milk at a calf ranch.** *J. Dairy Sci* 2009;92:3503–3509.
2 Scott MC, James RE. Viability of waste milk pasteurization systems for calf feeding systems. M.S. Thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia.