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TECHNICAL INFORMATION FOR TODAY'S FEED PROFESSIONAL

Issues to Consider When Evaluating Which Choice of Milk Solids to Feed Pre-Weaned Calves

A calf is born essentially as a monogastric mammal, and performs best when fed a milk-based diet until its digestive system adapts and matures enough to be able to handle more complex carbohydrates and fibrous feedstuffs. Therefore, dairy producers are faced with the management decision of what type of milk-based solids to feed calves in their first 30 to 60 days of life.

Waste milk feeding

Because there is often no cash outlay for the waste milk itself, it is often viewed by dairymen as a cheap alternative to purchased milk replacers. There are hidden costs and risks, however, in the use of both pasteurized and unpasteurized waste milk products for calves. Waste milk has the potential to harbor numerous unwanted organisms. Researchers have found mastitis-causing *Strep*. species in over half of waste milk samples tested, and *Staph*. species in nearly half.[1] Other studies have found *Mycoplasma*, *Clostridia*, and *Salmonella spp*, among others. Several of these bacteria, and the toxins they produce, can have serious detrimental effects on calf health. Many calves from herds fed discard milk from cows positive for *M. bovis* develop pneumonia[3] and [ear infections].[2] Additionally, calves fed unpasteurized waste milk also are weaned later,[3] experience more diarrhea,[3] have higher medication costs,[3] and weigh less at 6 months of age.[1]

In short, every time a producer feeds waste milk, particularly unpasteurized waste milk, calves may be exposed to significant numbers of pathogens, including those which cause Johne's disease and BVD.

"Don't allow pasteurization to create a false sense of security…"

Antibiotic residues in waste milk

Antibiotic residues are also likely; a UC-Davis study found that 63% of waste milk samples contained tetracycline.[1] Antibiotics in the waste milk present several potential problems to the calf operation. First, feeding of this antibiotic milk may lead to tissue residues within the calves consuming it. Should an animal be sold for slaughter, tissue residues may be present. Secondly, because of the varying type and level of antibiotics in the waste milk, producers may in fact be helping to develop antibiotic-resistant bacteria on the calf operation. Finally, calf feeders attempting to raise calves without sub-therapeutic antibiotics may be inadvertently providing unknown dosages of antibiotics in the waste milk.

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Pasteurizing guidelines

The documented risks of bacterial contamination have encouraged producers to consider pasteurizing available waste milk. Done correctly, pasteurizing can kill most, if not all, of the pathogenic bacteria in milk. "Done correctly" is the key, however. For consistent implementation, lack of effective training and quality control monitoring are likely the two biggest pitfalls and causes of pasteurization failures. Ken Mitchell, DVM, Tulare, CA, offers the following tips:[4]

- Routinely culture samples of pasteurized milk to monitor quality.
- Pull samples at random times so that implementation is consistent every day, not just "sample day."
- Conduct face-to-face training sessions with staff members responsible for pasteurizer operation and cleaning, and follow-up training and reviews.
- Keep a daily log of operator, temperature, time, and correlate this data to culture results. [Ed. Even 5°F or a few minutes difference can mean the difference between effective and ineffective pasteurization.]
- Prepare [and post] written protocols, in English and Spanish if needed, for all aspects of pasteurizer operations.
- Perform regular post-mortem and culture/sensitivity evaluations on calves with suspected bacterial causes of morbidity and mortality.

Mark Thurmond, DVM, PhD, UC-Davis adds that improper on-farm implementation can cause pasteurization to quickly go awry. "Just because milk has been pasteurized does not mean it is completely sterile, and its bacterial loads will not stay low indefinitely."

Just as pasteurized milk from the grocery store will spoil if left unrefrigerated, pasteurized calf milk will become contaminated again if it is not fed immediately, or not chilled properly for storage. In both colostrum and whole milk, flash pasteurization, or HTST, appears to be more effective in eliminating *Mycoplasma spp.* than batch pasteurization.[4]

While pasteurizing waste milk provides clear benefits when done correctly and consistently, it should not be viewed as a panacea that will mask other management problems. "Pasteurization is important, but it's not the only issue," states Mitchell, "I think the most important thing is to focus on hygiene in the milk delivery system in general. Also, don't overlook the simple things like the amount of nutrients provided to the calf."

Thurmond cautions not to allow pasteurization to create a false sense of security on the dairy. "It's easy to get a little sloppy in other procedures, thinking pasteurization will cover up our mistakes," he notes. "But pasteurization can only do so much. Like most management practices, it's only as good as the ability to carry it out."[4]

Consider solids changes

One potential cause for other non-disease digestive disturbances is the significant change in solids which invariably occurs in waste milk, most notably transitional milk. Solids content moves from 24% for normal colostrum, to 12.5-13% solids in just a few milkings. Pooled waste milk varies considerably from feeding to feeding depending upon how much transitional milk, mastitic milk, or colostrum is being included in the pool. Young calves have difficulty adjusting to rapid changes in milk solids content.

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Toxins

Although the pathogenic bacteria themselves will be reduced in number or destroyed completely during pasteurization, it is not yet fully known what the potential damage is from the toxins produced by a number of different pathogenic bacteria. These toxins are not believed to be reduced during the pasteurization process, and in fact may increase as bacteria are killed by pasteurization.

Economics of waste milk

While it seems nearly free on the one hand, perhaps the most compelling reason to not use waste milk, whether pasteurized or not, comes down to economics, with consideration of *all* costs involved. Whole milk-fed calves typically wean later than milk replacer-fed calves. The labor costs involved in delaying weaning and continuing to feed a liquid diet is a value we can calculate. Weaning two weeks earlier translates into a $15-25/calf savings, even when waste milk is obtained at no cost.

The Bottom Line

Waste milk is a pool varying in volume available, nutrient composition, presence and level of pathogenic organisms, and presence and level of antibiotics. This can result in health problems and variable performance of calves fed waste milk. The goal of cleaning up waste milk fed to calves is a good one. Calves fed pasteurized waste milk vs. unpasteurized have lower health costs, weigh more at weaning, and experience fewer scour and pneumonia days. To be economically feasible to operate a pasteurizer, the minimum number of calves on milk has been calculated by one group of authors to be 315 calves on milk at a time, or a dairy herd with 1260 cows.[3] When feeding unpasteurized whole milk, negative factors, such as antibiotic residues and infectious pathogens, can impact calves' health and performance.[1] Feeding high quality milk replacer carries little to none of these potential liabilities.

Sources

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