Heat Treated Colostrum and Pasteurized Milk Management Considerations

There are nutritional and health benefits to providing young calves with whole milk that may otherwise be discarded at the farm. Yet, young calves are very susceptible to disease causing pathogens that can be transmitted through raw milk from cows to calves. Such pathogens include *Mycobacterium avium* subsp. *paratuberculosis*, *Salmonella* spp, *Mycoplasma* spp, *Listeria monocytogenes*, *Campylobacter* spp, *Mycobacterium bovis*, *Staphylococcus aureus*, *E. Coli*, *Pasteurella* spp, *Bovine Virus Diarrhea* (BVD), and *Bovine Leukosis Virus* BLV.

Most recently, *Highly Pathogenic Avian Influenza* (HPAI), has been identified as being transmitted through raw milk from exposed dairy cattle and has the potential to infect young calves. Any raw milk from exposed cattle that cannot be heat treated or pasteurized should be disposed of and not fed to cats, dogs, or other farm animals.

Heat-treating of colostrum and pasteurization are effective methods to manage non-saleable milk before using it to feed to calves.

**Heat-Treating Colostrum**

Colostrum is the single most important management factor for calf health and survival. It is an important source of nutrients and of passively absorbed maternal antibodies known as immunoglobulins (IgG), critical to protect the newborn calf against infectious disease in the first few weeks and months of life. Longer term impacts include reduced treatment and mortality rates, improved growth rates and feed efficiency, increased 1st and 2nd lactation milk production, and decreased age at first calving.

However, colostrum can also be one of the first potential exposures to calves of infectious pathogens. Bacterial contamination of colostrum is also a concern because pathogenic bacteria can act directly to cause diseases such as scours or septicemia. Bacteria may interfere with passive absorption of colostral antibodies thereby reducing passive transfer of immunity in the calf. Some colostrum infections, like BLV and *Mycobacterium avium* *paratuberculosis* may not become apparent until cattle are adults.

Heat treating colostrum has been found to be the most effective method in eliminating pathogens while maintaining the integrity of the colostrum and its IgG concentration. This requires a lower-temperature at 140 °F and a longer-time of 60 minutes in a smaller batch commercial pasteurizer.

**Handling Heat-treated Colostrum**

- Collect colostrum using properly sanitized milk equipment and best management practices in milking protocols
- Use only high-quality colostrum measured using a Brix refractometer with a minimum cut-off of 22%. This assures colostrum be fed to the calf at a minimum of 50 grams/liter of IgG for a total of 150-200 grams of IgG in the first feeding
- Store heat-treated colostrum like saleable milk
  - Cool colostrum as soon as possible or feed immediately after heat-treating
  - Consider a food preservative like potassium sorbate to limit bacterial growth
  - To reduce bacterial contamination or additional bacterial growth, limit refrigeration to 48 hours
  - Freeze excess colostrum to maintain quality
**Pasteurization**

Pasteurization is the process of heating liquids for the purpose of destroying harmful organisms. It is important to remember that pasteurization is not sterilization; rather it reduces the bacteria load so that they are unlikely to cause disease. Utilizing milk that would otherwise be discarded, can potentially offer economic and nutritional benefits. However, if this process is not properly managed, it poses a substantial risk of introducing infectious diseases to calves. The temperature to pasteurize nonsaleable milk is different than heat-treating colostrum. It requires heating the milk to a high temperature of 145 ºF and holding it at that temperature for at least 30 minutes. Another option is referred to as high temperature, short time pasteurization where milk is heated to 161 ºF and held for at least 15 seconds.

Pasteurization demands meticulous adherence to several essential steps, including proper handling of both pre and post-pasteurized milk to limit bacterial contamination or growth. Additionally, monitoring the functionality of pasteurizers and routinely cleaning and sanitizing all pasteurization equipment, as well as milk collection, storage, transfer, and feeding equipment, are crucial measures.

### Handling Nonsaleable Pasteurized Milk
- Collect milk using properly sanitized milk equipment and best management practices in milking protocols
- Discard milk that is excessively bloody or watery-type mastitis
- Cool milk as soon as possible (40 ºF) or pasteurize and feed immediately
- Clean and sanitize pasteurization equipment, follow label instructions for concentration and contact time
- Provide adequate water temperature for cleaning (160 to 170 ºF). Temperatures over 172 ºF may result in residues on surfaces which are difficult to clean.

### Routine Management

Heat-treating and pasteurizing require careful attention to detail of the process from collection of milk to feeding of calves. Periodically culture milk samples to determine how well the pasteurization process is working as well as any area of contamination. This would include sampling pre-pasteurization, post-pasteurization, sample during feeding, and a sample after last calf is fed. Regular sampling of milk for nutrition content is also recommended to ensure adequate solids, fat, protein, and other nutrients are being met with the milk. Commercial supplementation may be needed to ensure adequate growth and of calves. Equipment hygiene is also another area to evaluate for cleanliness and sources of possible contamination to the milk feeding process.

Recording disease incidence and treatment rate will help monitor the health status of calves. These management areas should be discussed with the herd veterinarian and farm staff managing the calves to ensure a well-manage calf feeding program.

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