Monitoring hygiene in calf feeding equipment

Disclaimer: The following material presents general guidelines; each farm should develop their own Standard Operating Procedures.

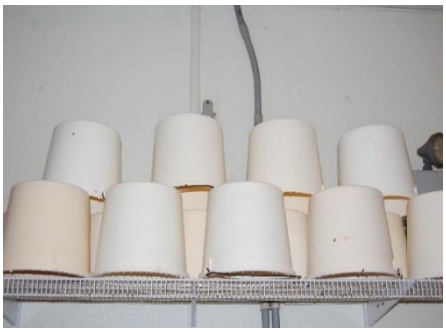
Introduction

Calves represent the future of any dairy farm because they will become the next generation of lactating cows. At birth, calves have an immature immune system and are unable to fight off infections by themselves, therefore, it is imperative that calves receive high quality colostrum shortly after birth. The colostrum contains proteins called immunoglobulins or antibodies that protect the calf against diseases. These antibodies are produced by the mother but do not transfer to the fetus, so they must be obtained through colostrum. In order to start and maintain a healthy life, calves must be cared for in a way that prevents outbreaks and spread of diseases, and promotes growth and development of their digestive system.

Environments for pathogens

Raising calves involves aspects such as housing, feeding and nutrition, vaccination, and handling. In any of these aspects, it is important to highlight that hygiene is of upmost importance because calves may be susceptible to diseases caused by pathogens harbored in housing facilities, transportation trailers, other calves, or in the feeding equipment. Of these, feeding equipment is perhaps one of the most suitable environments for pathogens to grow, particularly bacteria. Milk or milk replacer are very rich sources of nutrients not only for calves but also for bacteria.

Moisture and abundance of nutrients are key elements that favor bacterial proliferation, therefore, proper sanitation ensures the removal of remaining nutrients and moisture from feeding equipment. The latter is easily achieved by allowing feeding equipment to dry thoroughly. For example, it is highly discouraged to stack wet buckets even if they are put upside-down; instead place them in a drying rack individually. Removal of remaining nutrients is more difficult and harder to evaluate.

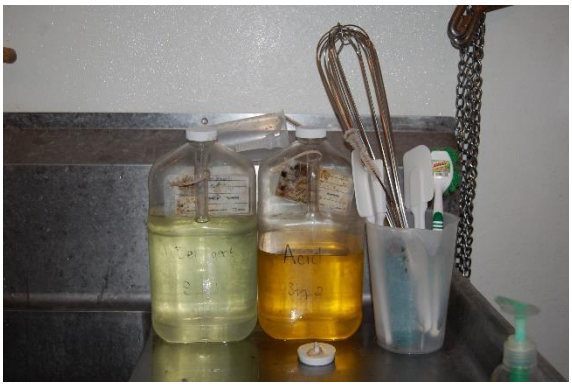


Protein, sugars and fat contained in milk or milk replacer can linger on surfaces of feeding equipment such as buckets, bottles, nipples, whisks, mixing jar in automatic calf feeding systems and even on the bristles of brushes intended to clean bottles. The presence of residue on surfaces is easy to recognize when there is water beading. When water beading occurs, it is likely that the surface has been accumulating residue for a relatively long time. When bacteria proliferate they form a layer of residue known as biofilm. This biofilm is a matrix of various substances that allows bacteria to adhere very strongly to a surface. This is commonly seen when feeding equipment is simply rinsed with water and mild soap or no soap at all. To control the development of biofilm, it is necessary to use proper physical and chemical cleaning practices.

Thorough cleaning is accomplished by initially rinsing all equipment with lukewarm water to remove as much milk residue as possible followed by vigorous scrubbing with detergent and water at 120 Fahrenheit (49° C)

Physical	Chemical
Water temperature and contact time	Detergents
Scrubbing and rinsing	Disinfectants
Drying	Sanitizers

It is important to note that each one the chemical agents listed in the table above has a very specific function.



Detergents are used to break up organic deposits such as fat and protein; rinsing with water alone is not effective, and bacteria can lie beneath the surface created by residual fat and protein. Once a surface is cleaned with a detergent, a **disinfectant** is used to kill microorganisms. Using detergents and disinfectants is an effective combination to reduce the bacterial load and prevent formation of biofilm. A **sanitizer** helps reduce the number of microorganisms on a surface but is not as effective as a disinfectant. It may be used as a way to improve hygiene in the calf kitchen, but not as a substitute of good practices.

Clean facilities and housing with clean dry bedding is also very important to raise healthy calves. It is recommended to sanitize calf hutches or individual pens before a newborn calf is placed in it.

Monitoring cleanliness in the calf kitchen

Even though surfaces may appear clean to the naked eye, there may be bacteria actively growing and thriving on miniscule amounts of residue caused by improper cleaning. There are two common ways to evaluate cleanliness of surfaces. One way is through the use of a protein swab and the other is through a hand-held device that detects the presence of bacteria via a chemical reaction that produces light, properly known as bioluminescence. Both of these methods are widely used in human food processing facilities to monitor effectiveness of their surfaces and equipment sanitation procedures and prevent the spread of pathogenic bacteria. A calf kitchen is also a food processing facility, therefore, both techniques can be easily applied at the farm level.

Protein swabs

This is a quick and economical method to detect the presence of protein on surfaces. If protein is detected, it is an indication of improper removal of residue due to poor physical or chemical cleaning practices. Prior to the test, the swab must be brought to room temperature. The first step is to twist and remove the swab from the tube, then swab a 4 × 4-inch area in a crisscross pattern applying enough pressure to slightly bend the swab shaft. Re-insert the swab into the tube and hold firmly, snap the valve, squeeze bulb to force the liquid reagent down the tube. Shake for 5-10 seconds, keep the tube upright and wait for the reaction to develop.

The quickest result can be seen in 1 minute with highly soiled surfaces and 10 minutes in cleaner surfaces. This test is based on a chemical reaction that produces a change in color depending on how much protein residue is present. For this test, the results may be:

Bioluminescence

This method is used to evaluate the presence of bacteria on surfaces. Like any living organism, bacteria obtain energy from a molecule known as ATP (adenosine tri-phosphate). After cleaning feeding equipment, a swab is rubbed on a surface. If there are live bacteria present on that surface, the swab would pick up traces of ATP. When the swab is inserted in the luminometer, there is a chemical reaction that produces light and the intensity of the light is measured by the device. The reading is shown in RLU which stands for relative light units. The brighter it is, the more bacteria are present on that surface, indicating deficient cleaning practices. The readings may vary by farm depending on the type of surface and cleaning protocols in place. It is recommended to work closely with a veterinarian or calf care specialist to determine a base line, caution and correction values and acceptable values.

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