

Critical Control Points for Colostrum Handling

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INTRODUCTION

Colostrum is one of the most potent substances that we have on the dairy. When properly utilized it can set off a chain of events that lead to the lifelong health and productivity of the animal receiving it. This is, of course, dependent on whether we handle and administer it correctly. Unfortunately, there are many potential problems that can occur during the colostrum handling process that can negate its positive effects, and even create some very harmful consequences. Having a colostrum quality management program in place can help to maximize consistency and enhance calf health.

QUALITY CONTROL

To evaluate the outcome of the colostrum program on a farm, there are several measures that can be used. These measures are referred to as quality control, since they are measured at the end of the process. These are like the quality control stickers on consumer goods: if the product is acceptable, it gets a sticker and is moved to the customer. If the product does not pass quality control, it is rejected. If too many do not pass the quality control, then the process itself may need improving.

The standard measure of the outcome of a colostrum program is to measure the passive transfer of immunity to calves. This can be done by measuring IgG concentrations in calf serum by radial immuno-diffusion, but is more commonly estimated using calf serum total protein concentrations. If calves are above our cutpoint, then they “pass” the quality control; if too many are below our cutpoint, then we may re-evaluate the function of our colostrum program. Some farms aim to have more than 80% of calves with a serum total protein above 5.5 g/dl, while others aim for 90% of calves above 5.2 g/dl. Both are good monitors of the colostrum program.

Another useful quality control measure is the level of bacterial contamination in colostrum when it is fed to the calf. Most farms want the total bacteria count to be below 100,000 cfu/ml and the total coliform count to be below 10,000 cfu/ml. This does not tell us much about when or how those bacteria got to such a high level, but it is a useful starting point.

Quality control tells us if the system is working by measuring its outcomes

QUALITY ASSURANCE

Quality assurance is similar to quality control, but it aims to ensure that each step along the process is performed correctly, so that we know that the end product will be of high quality. For instance, to assure that the bacteria count in colostrum that is fed to calves is below our cutpoint, we would collect data on each of the steps where bacteria could be introduced to the colostrum, or when its temperature would allow bacteria to replicate in the colostrum. This may involve collecting samples for bacterial culture, collecting temperature data, or evaluating the cleaning process (physical, thermal, and chemical) of the equipment. These data would help us to refine the standard operating procedures for prepping the udder before collection, cleaning the collection equipment, cooling the colostrum, heat treating the colostrum, and feeding the colostrum to minimize bacteria counts.

If we want a high percentage of calves to pass our quality control measure of passive transfer of immunity by measuring serum total protein, we need to assure that the steps are performed correctly. We cannot expect good results if we are not measuring or estimating the colostrum IgG concentration with a colostrometer or refractometer. Most farms use a cutoff of 50 g/l of immunoglobulin, which coincides with the green mark on the colostrometer, or 22% on a Brix refractometer. Our quality assurance plan also must include a way to monitor and minimize the time between birth and colostrum feeding.

Quality assurance is the plan that ensures quality outcomes

CRITICAL CONTROL POINTS

The colostrum itself needs to be of **adequate immunoglobulin content and have low bacteria counts.**

IgG content: Measure or estimate IgG content with colostrometer or refractometer

Goal: Greater than 50 g of immunoglobulin per liter of colostrum

- Ensure dry cow nutrition is adequate
- Ensure dry period length is adequate
- Prevent dry cow mastitis
- Collect colostrum quickly after calving

Bacteria counts: Measure bacteria counts during various steps of colostrum handling and feeding

Goal: Total bacteria count < 100,000 cfu/ml and total coliform count < 10,000 cfu/ml

- Properly prepare udder before collection
- Collect colostrum in equipment that has been properly cleaned
- Chill colostrum quickly and maintain low temperature until feeding
- Heat treat colostrum to reduce bacteria counts

The feeding of the colostrum needs to be done with an **adequate volume of colostrum and in a timely manner.**

Goal: Feed 10% of calf body weight within 2 hours of birth

- Monitor and record calving and feeding times
- Record volume fed and the technician responsible for feeding

The calf must have the **ability to absorb the immunoglobulins** and digest the nutrients. This can be affected by the environmental temperature: cold stress after birth and heat stress to the dam before birth and to the calf after birth. The other major critical control point is the cleanliness of the calf environment: if the calf is ingesting anything before colostrum (especially manure), this can have a large impact on IgG absorption.

- Maintain calving pen hygiene
- Remove calves from contaminated environment quickly
- Dry calves quickly in cold environments

CONCLUSIONS

The colostrum program can have great positive impacts on calf health and the future productivity of those calves when they enter the milking herd. However, there are many ways in which this critical process can have less than optimal outcomes.

Without **quality control**, we have very little knowledge of whether our program is functioning correctly. Regular quality control is a must; if we are satisfied with the trend and variation of these results, then spending time, money, and effort on more advanced testing may not be worthwhile. If the results of our quality control are not acceptable, then we need to evaluate our quality assurance plan.

Without **quality assurance**, there may be lots of variability of quality across time and across employees. Quality assurance is not just about having standard operating procedures (SOPs) on paper. It also includes frequent employee education, monitoring compliance to the SOPs, and monitoring of the efficacy of each step in the process.

The level of detail and frequency of monitoring in the quality control and quality assurance plans will be highly dependent on the goals of the dairy operation and the number of employees. It is best to put together a plan with input from dairy management, employees, the veterinarian of record, the nutritionist, and any other farm consultants that work with calves.