

# Enhance that colostrum!

Maureen Hanson | Updated: August 1, 2012

Just a decade ago, pasteurizing colostrum was virtually unheard of in the U.S. dairy industry. Then, as the benefits of pasteurizing waste milk for calves were realized and the practice was embraced on-farm, interest in colostrum was sparked as well. Could the bacteria-reducing, calf-performance-enhancing results of pasteurization also be applied to colostrum?



University of Minnesota veterinary researcher Sandra Godden is a pioneer in the field of heat-treating colostrum. Early efforts to test the practice were not entirely successful, mostly because of the differing characteristics between waste milk and colostrum. “We made many batches of ‘pudding’ and gummed up a lot of equipment in those first attempts,” shares Godden. In addition to creating a product that was an unacceptable consistency for feeding, Godden and other researchers found that the pasteurization process denatured all-important colostral antibodies, lowering immunoglobulin (IgG) levels by up to 30 percent.

Eventually, the Minnesota team arrived on a practice that worked: heating colostrum in batches at a lower temperature (60°C or 140°F), for a longer period of time (60 minutes). Godden is quick to point out that it is important to describe this process as “heat-treating” versus “pasteurizing,” because the time and temperature guidelines do not meet the specifications of true pasteurization.

They proved, though, that the process does significantly lower bacterial levels, including *E. coli*, *Salmonella*, *Mycoplasma*, *Listeria* and hard-to-kill *Mycobacterium paratuberculosis*, the bacteria that causes Johne’s disease. And follow-up on calves fed the heat-treated colostrum showed that they had higher 24-hour serum total protein (TP) and IgG levels. “We think this is because there are fewer bacteria in the gut to interfere with passive absorption of antibodies in the colostrum,” says Godden.

## Applicable on-farm?

Still, studies in a laboratory setting, conducted by trained researchers, are not always guaranteed to translate into real-life application at the farm level. Godden and her teammates were anxious to explore whether this one could.

They worked with six commercial dairy farms in Minnesota and Wisconsin to compare the effects of feeding raw versus heat-treated colostrum to more than 1,000 newborn calves. Farm staff were trained by the researchers but then left to implement the study protocols on their own.

Sarah Kreft, calf manager at Jon-De Farms, Inc., a 1,700-cow dairy near Baldwin, Wis., was one of the cooperating on-farm researchers for the study. “At the time, we still were feeding milk replacer and not even pasteurized waste milk, but I was very curious about switching over,” says Kreft.

“I thought trying the heat-treating process on colostrums would be an interesting test of both the value of the practice and our

ability to manage it.”

Calves were fed 4 quarts of either raw or heat-treated colostrum within two hours of birth. Total bacterial plate count and coliform count were measured in all batches, as was IgG concentration in the colostrum.

The results: the researchers found that on-farm staff could indeed replicate the results achieved in a research setting. Bacterial counts for the heat-treated colostrum were significantly lowered across the board, with no significant effect on colostrum IgG levels.

### **Healthier calves, too**

The study also included a blood draw on every calf at one to seven days of age to compare serum IgG concentrations and TP between the two groups. What’s more, farm staff recorded every disease treatment event of all calves in the study from birth to weaning. “The ultimate measure of this research was to find out if the calves fed the heat-treated colostrum were healthier,” says Godden. “We were pleased to find out that indeed they were.”

Specifically, they found that serum IgG concentrations were significantly higher in the calves fed the heat-treated colostrum. The calves from the heat-treated group also were less likely to suffer from scours, or to be treated for any other disease condition.

“I probably was somewhat biased, but I thought all along that the calves fed the heat-treated colostrum were doing better — eating starter grain earlier and sick less often,” says Kreft. “The numbers proved that they truly were healthier.” As a result of the study, Kreft and the Jon-De crew now feed both pasteurized waste milk (processed in a high-temperature, short-time [HTST] flash pasteurization system), and heat-treated colostrum, which is processed in the same batch pasteurizer they used in the study more than five years ago. A side benefit that Kreft appreciates is that heat treatment preserves the shelf life of colostrum, which they refrigerate after processing but usually do not freeze. The result is a consistent supply of high-quality colostrum that maintains low bacteria numbers for up to five days, compared to the 24 hours that it used to last in refrigeration without heat treatment.

“It takes a lot of work to produce good colostrum, starting months ahead of time with cow nutrition and immunity,” says Kreft. “It’s really important that we take the best possible care of that high-quality product in the final stage —from the time it leaves the cows until it is fed to the calf. Heat-treating helps us to maximize, rather than waste, all of that effort.”

### **TIPS FOR HEAT-TREATING COLOSTRUM**

Successfully heat-treating colostrum requires routine attention to detail, advises University of Minnesota researcher Sandra Godden. Among her suggestions:

1. Do not attempt to heat-treat fermented (soured) colostrum or you may find yourself with a batch of pudding. Fresh colostrums should be heat-treated within two hours of harvest from the cow, or refrigerated immediately and then heat-treated within one to two days of collection.
2. Regularly monitor the time and temperature of the batch-heating process. Processing for less than 60 minutes will result in substandard bacterial kill, while temperatures higher than 61°C/142°F will start to cause damage to the vital immunoglobulin (IgG). The system must be able to precisely control the temperature in both the water jacket and colostrums to avoid over-ride in temperature above these limits. Temperature over-ride may result in reduced colostrum IgG and/or increased viscosity, possibly to the point of producing a gelatin-style colostrum in high-total-solids product.
3. Colostrum should be agitated during the heating-up, holding and cooling-down phases of the heat-treatment procedure, to ensure even treatment of all colostrum and to avoid overheating/IgG denaturation.
4. Culture raw and heat-treated colostrum at least once a month to measure the benefit of the heat-treating process. Goal: total

plate count of heat treated colostrum of less than 20,000 cfu/mL.

5. Establish effective cleaning protocols for heat-treating equipment, colostrum storage, and colostrum feeding equipment. At Jon-De Farms, Inc., Baldwin, Wis., they recently have started using Perfect Udder receptacle bags (DairyTech, Inc., Windsor, Colo.) for storing and feeding heat-treated colostrum. Calf manager Sarah Kreft says the system helps preserve colostrum quality and dramatically reduces colostrum-handling errors.

6. Immediately cool down heat-treated colostrum in the pasteurizer and then either refrigerate or freeze. Heat-treated colostrums that is allowed to sit out unrefrigerated can quickly re-grow bacteria to pre-treatment levels or higher.

7. Routinely monitor disease incidence and passive transfer rates in calves. Goal: 90 percent of calves tested between one and seven days of age should have a serum IgG concentration of at least 10.0 g/L, and a serum TP value of at least 5.0 gm/dL.

---

Find this article at:

<http://www.dairyherd.com/dairy-herd/features/Enhance-that-colostrum-164423756.html?view=all>