

Use new colostrum bags every time to ensure good colostrum hygiene

Colostrum must be handled with care to ensure a high quality. The quality of colostrum is not only a question of its antibody content, but also of its bacterial content.

Bacterial growth

Colostrum is an excellent growth medium for bacteria and storing colostrum at high temperatures further promotes bacterial growth. Most bacteria relay on binary fission and exhibit exponential growth under optimal conditions. Many bacteria cleave every 15-30 minutes. This means that a low bacterial concentration rapidly increases (Figure 1) (Domingue et al. 1996, Fossum et al. 2007).

START	1 HOUR	2 HOURS	3 HOURS
NUMBER OF BACTERIAS PER mL COLOSTRUM			
1,000	8,000	64,000	512,000
10,000	80,000	640,000	5,120,000
100,000	800,000	6,400,000	51,200,000

Figure 1. Increase in bacterial number over time with 3 different starting concentrations

Negative effects of bad colostrum hygiene

A high bacterial content impairs the value of the colostrum, since the bacteria reduces the absorption of antibodies to the calf's blood (Gelsinger et al. 2015) (Figure 2). This means in



practice that the potential benefit from sorting colostrum and feeding it quickly to the calf after birth, is compromised if great care is not taken with hygiene when handling the colostrum.

ANTIBODY CONCENTRATION IN THE BLOOD

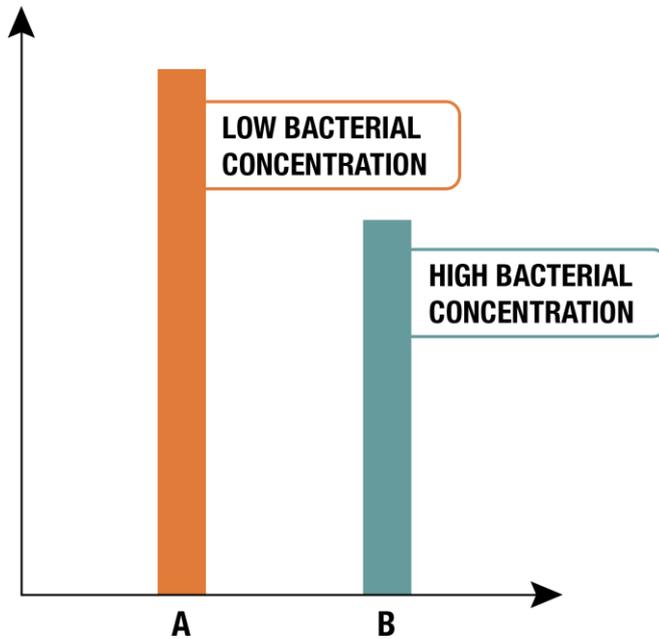


Figure 2. A high concentration of bacteria in colostrum (B) results in a lower absorption and concentration of antibodies in the blood

The reduction in antibody absorption as bacterial counts increase, is due to the fact that the bacteria occupies or destroy the antigen binding sites in the calf's intestine, so that the antibodies remain in the intestinal lumen. Furthermore, some bacteria might bring forward the time of "gut closure" (i.e. the time where antibodies can no longer be absorbed), and result in a low antibody absorption. Finally, bacteria bind to antibodies in the intestine, and thus hinder them from being absorbed into the calf's bloodstream (Corley et al. 1977, James et al. 1981, Staley and Bush 1985).

Apart from affecting the absorption of antibodies, a high bacterial count in colostrum increase the risk of disease among calves through transfer of specific pathogenic bacteria. In addition, bacteria break down the nutrients in the colostrum, decreasing the colostrum nutritional value.



Practical recommendations

Colostrum contains a low number of bacteria, unless the cow suffers from mastitis or there is specific disease in the herd, which is transmitted through the milk. The handling of colostrum is therefore of crucial importance for the quantity of bacteria added to the milk. Good colostrum hygiene is achieved by paying attention to important focus areas (Figure 3).

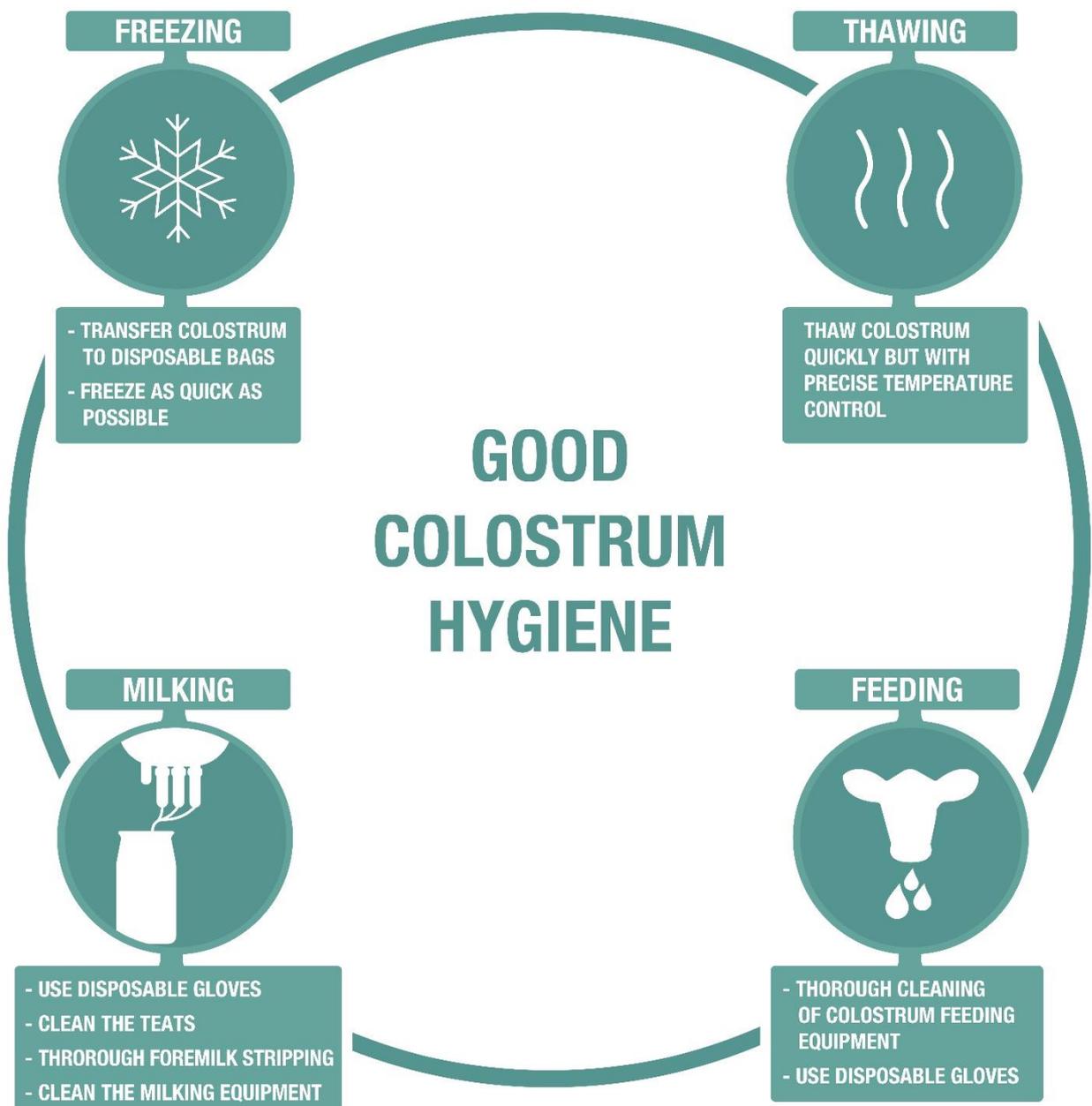


Figure 3. Important focus areas for on-farm colostrum handling

Fast thawing- and freezing is important to decrease the time span for bacterial growth. All equipment getting in contact with the colostrum (milking- and feeding equipment) needs to be clean to avoid bacterial growth and contamination of colostrum. In addition, always use disposable bags for storing colostrum! The re-use of colostrum bags compromise colostrum quality, by mixing newly milked, clean colostrum with the “bacterial soup” present in old bags.

Figure 4 illustrates the increase in bacterial number (x 400!) when re-using colostrum bags. The use of disposable colostrum bags in the coloQuick system is therefore important, for decreasing colostrum bacterial number and increasing antibody absorption.

E-COLI, 44 °C CULTURE, COLOSTRUM, DAY 0

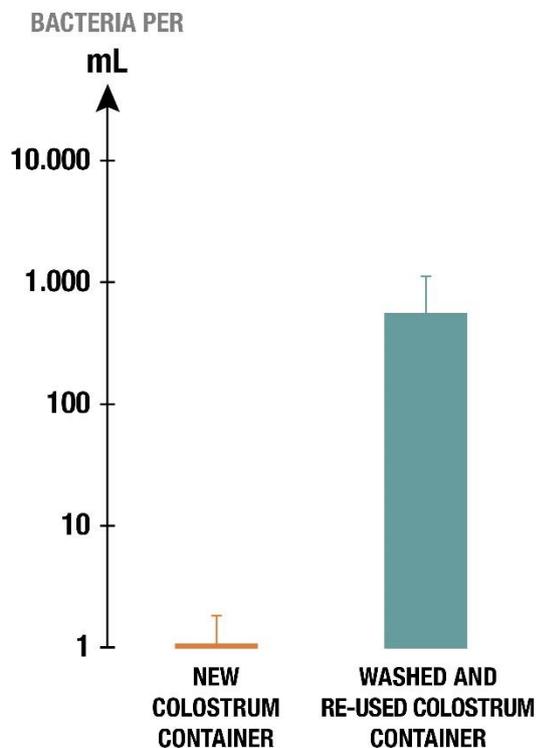


Figure 4 Increase in number of E.coli after culture (44°C) from new versus washed and re-used colostrum container (modified from Børsting & Røntved 2009)

Investment in the coloQuick system, including NEW colostrum bags every time!

To ensure good colostrum hygiene, it is very important to have standard operating procedures that minimizes the risk of bacterial growth - since one weak link in the chain compromises colostrum quality and decrease the calf's absorption of antibodies.

Milk residues in containers, feeding equipment etc. stored at room temperature, makes up a nice warm, humid environment with lots of nutrients, supporting bacterial growth and decreasing colostrum quality.

Therefore, clean feeding equipment and the use of new colostrum bags is very important to optimize colostrum management.

Investment in the coloQuick system, including 1 disposable colostrum bag per calf, costs approximately EUR 11 per calf. Saving EUR 2 per calf (prize of 1 colostrum bag) and losing the calf's potential for a high milk production (EUR 114 per cow per year), is just not worth it!



References

Børsting, C.; Røntved, C.M. Brug af råmælksbank kræver god hygiejne. 2009. Ny kvægforskning 7(5):4-5

Corley, L.D.; Staley, T. E.; Bush, L. J.; Jones, E. W. Influence of colostrum on transepithelial movement of *Escherichia coli* 055. 1977. J Dairy Sci 60(9):1416-1421

Domingue, G.; Costerton, J.W.; Brown, M.R.W. Bacterial doubling time modulates the effects of opsonisation and available iron upon interactions between *Staphylococcus aureus* and human neutrophils. 1996. FEMS Immunology and Medical Microbiology 16:223-228.

Fossum, S.; Crooke, E.; Skarstad, K. Organization of sister origins and replisomes during multifork DNA replication in *Escherichia coli*. 2007. *EMBO J* 26(21):4514-4522

Gelsinger, S.L.; Jones, C.M.; Heinrichs, A.J. Effect of colostrum heat treatment and bacterial population on immunoglobulin G absorption and health of neonatal calves. 2015. J Dairy Sci 98: 4640-4645

James, R. E.; Polan, C. E.; Cummins, K. A. Influence of administered indigenous microorganisms on uptake of [iodine-125] gamma-globulin in vivo by intestinal segments of neonatal calves. 1981. J Dairy Sci 64(1):52-61

Staley, T. E.; Bush, L. J. Receptor mechanisms of the neonatal intestine and their relationship to immunoglobulin absorption and disease. 1985. J Dairy Sci 68(1):184-205



