



By HANNE SKOVSGAARD PEDERSEN, veterinarian, PhD, coloQuick International A/S



## Antibodies from colostrum means higher milk yield

Antibodies in the colostrum are a decisive factor for the future milk yield of a heifer calf.

Introduction of systematic colostrum management is simple, does not require large investments. But remember, you have only one chance.

### Four articles on optimization of colostrum management:

This is the second of four articles about optimizing management of colostrum for calves. The four articles focus on these topics:

- **Financial gain** from improved colostrum management
- **The level of antibodies** is of crucial importance to the calf
- The importance of **feeding colostrum immediately** after birth
- The significance of **good colostrum hygiene**





## About Hanne Skovsgaard and coloQuick International A/S

Hanne Skovsgaard Pedersen PhD is a qualified veterinarian, with experience from large-animal practice and ten years as a researcher. Her focus is on development and dissemination of professional knowledge about optimization of calf management.

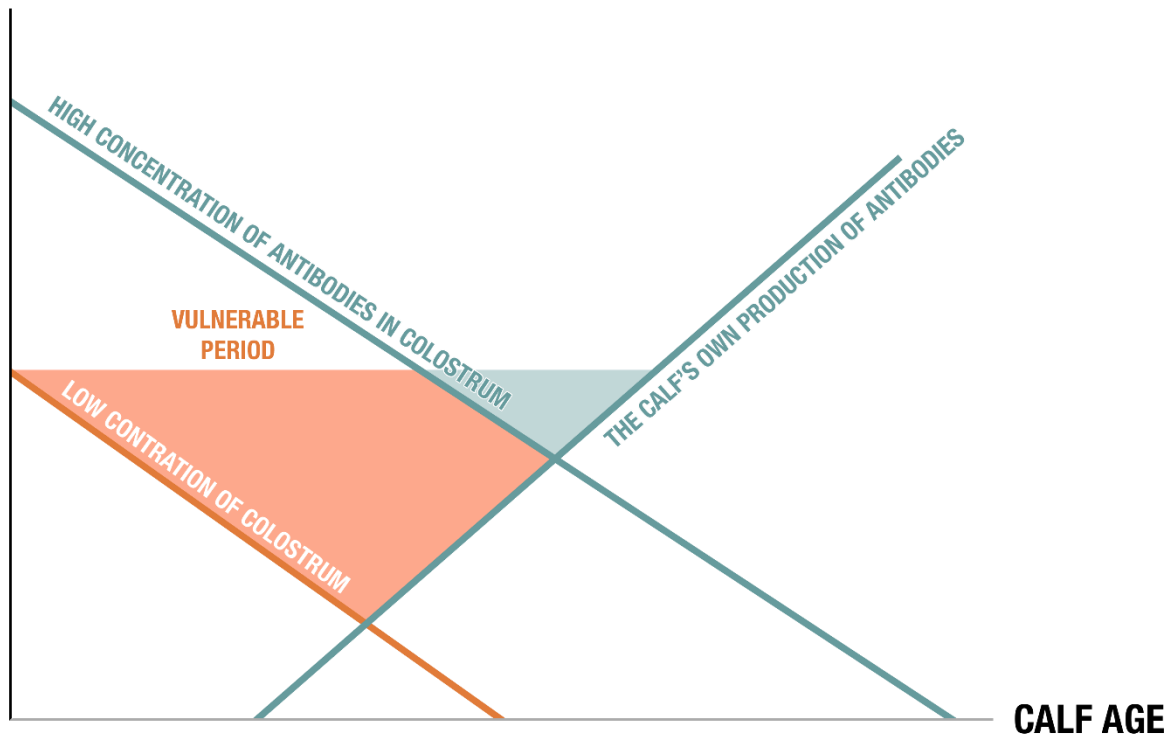
coloQuick International A/S is a Danish company established in 2015 by the owners of Calvex A/S. The company supplies products and in-depth knowledge, to increase productivity and reduce consumption of antibiotics in dairy herds by focusing on the first hours of the calf's life.





When a calf receives a high concentration of antibodies in colostrum, it makes a decisive difference to the calf's health, growth and later milk yield as a cow. These antibodies are not transferred from the cow to the calf during the gestation period, so, it is crucial that the calf receives the antibodies in the colostrum. A poor supply of colostrum leaves the calf vulnerable to disease in the first weeks, and results in a lower milk yield later (Figure 1).

## ANTIBODY LEVEL IN THE CALF



*Figure 1: A good supply of colostrum ensures excellent health and growth until the calf's own production of antibodies is established. In contrast, a poor supply of colostrum increases the risk of infection and reduces the calf's growth in the first weeks of its life.*

## Large variation in colostrum antibody content

A planned colostrum strategy lays the foundation to produce strong milking cows with a high milk yield. One of the challenges in practice, is the great variation in the antibody content of the colostrum, between the cows in a herd. This has been demonstrated both in Danish studies and abroad. (Table 1). The variation in colostrum quality between cows is due to several factors, including genetics, numbers of lactations, the interval from calving to milking, feeding and management in the dry period.





References:	No. of colostrum samples	Antibody concentration in colostrum samples (Min. - Max., IgG g/L)	Average antibody concentration (IgG g/L)
Løkke et al., 2016	126	3 - 154	60
Baumrucker et al., 2010	214	9 - 166	38
Gulliksen et al., 2008	1250	4 - 235	45
Kehoe et al., 2007	55	11 - 70	35
Swan et al., 2007	457	9 - 186	76
Quigley et al., 1994	88	30 - 121	70
Pritchett et al., 1991	919	20 - 111	48

*Table 1: Scientific studies which show large variations in the antibody content (IgG) in colostrum from different cows. (Please note: The antibody content of the colostrum is shown in grams of antibodies per litre of colostrum, which is not directly comparable with the Brix value.)*

The colostrum antibody content varies widely, and it is consequently impossible to predict in advance, to what extent a cow will produce colostrum of a high or low quality. This means that if the colostrum is given directly from the cow to the calf without testing the quality, the calves that receive large or small quantities of antibodies will be random and determined by chance. On the other hand, if colostrum management is systematically optimised, all calves in the herd would have a chance to develop into strong dairy cows with a high milk yield.

## It is not possible to predict antibodies in colostrum

In every herd the antibody content of colostrum will vary, and the colostrum should therefore always be tested. The antibody content of colostrum cannot be predicted — even based on the cow's lactation number. Purely statistically, there is a greater chance that older cows produce milk with a high content of antibodies, but in practice some heifers produce high-quality colostrum, whereas, some older cows produce low-quality colostrum! The number of lactations is not suitable as an independent criterion for selecting colostrum for new-born calves, similarly, the antibody content cannot be assessed precisely enough from factors like the consistency or colour of the colostrum.





## Test the antibody content of the colostrum

The antibody content of the colostrum should therefore always be tested with a Brix refractometer (Figure 2). A refractometer measures the content of milk solids, which is a reasonable estimate of the antibody content of the colostrum, since there is a good correlation between the concentration of antibodies (proteins) and the total solid content of colostrum. A Brix refractometer is a fast, easy and reasonably correct indicator of the antibody content of the colostrum. For practical purposes it is possible to use either an analogue refractometer (on which the Brix value can be read off on a scale as shown in Figure 2) or a digital refractometer (which shows the Brix value on a display). After a few drops of colostrum are placed on the glass plate of the refractometer, the Brix value can be read off quickly and easily. It is a matter of preference whether an analogue or digital refractometer is used, but either type is suitable for the purpose. However, digital refractometers cost relatively more, and since a manual reading on a Brix scale is fully adequate for quality testing and screening colostrum, this instrument can be recommended.



*Figure 2: The antibody content of the colostrum should always be tested with a refractometer, with which it is possible to ensure that all calves receive high-quality colostrum.*





## Determine the herd's individual cut-off limit

It is extremely important for the calf's health and later production level, that the concentration of antibodies in the colostrum is measured, and that the calf is given the best colostrum from the cows in the herd. The higher the antibody content in the colostrum, the higher the antibody concentration in the calf's blood.

The threshold of Brix 22 (corresponding to an antibody content of over 50 g/L) in the colostrum is often cited but should be ignored. Instead, the aim should be to implement a colostrum strategy that uses the best possible colostrum available in the individual herd. To do this, an individual cut-off limit (Brix value) should therefore be established for the herd, determined based on the average and variation in the antibody content in colostrum among the herd's own cows (Figure 3). This ensures the best possible start for all the new-born calves in the herd. At the same time, efforts should be made to raise the level of the herd's colostrum quality, so the cut-off threshold can be raised as much as possible (Figure 3, herd B) – for example through focus on the feed and management of dry cows, and milking the cow as soon as possible after calving.

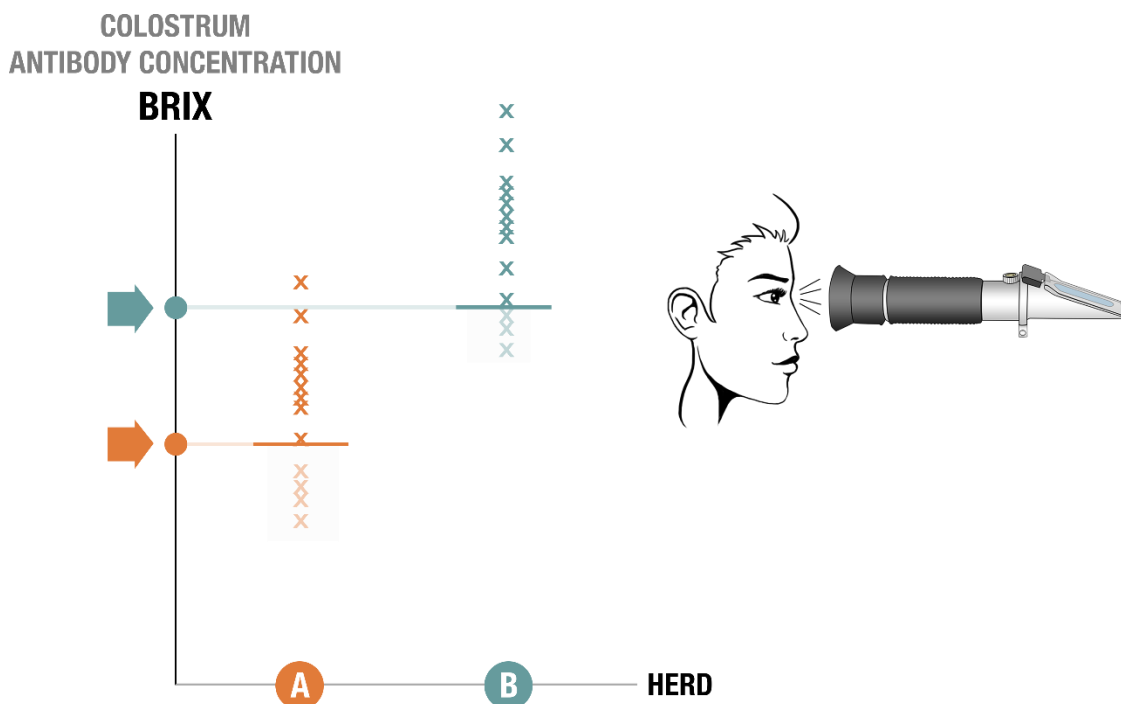


Figure 3: Illustration of the practical approach for optimising colostrum management in two herds (A, B) with different colostrum quality. Herd A produces colostrum with a lower antibody content (lower Brix value) compared with herd B. An individual cut-off limit should be set for each herd ( → Herd A); → Herd B), to ensure that all calves receive the best colostrum in the herd.





## The more antibodies the better

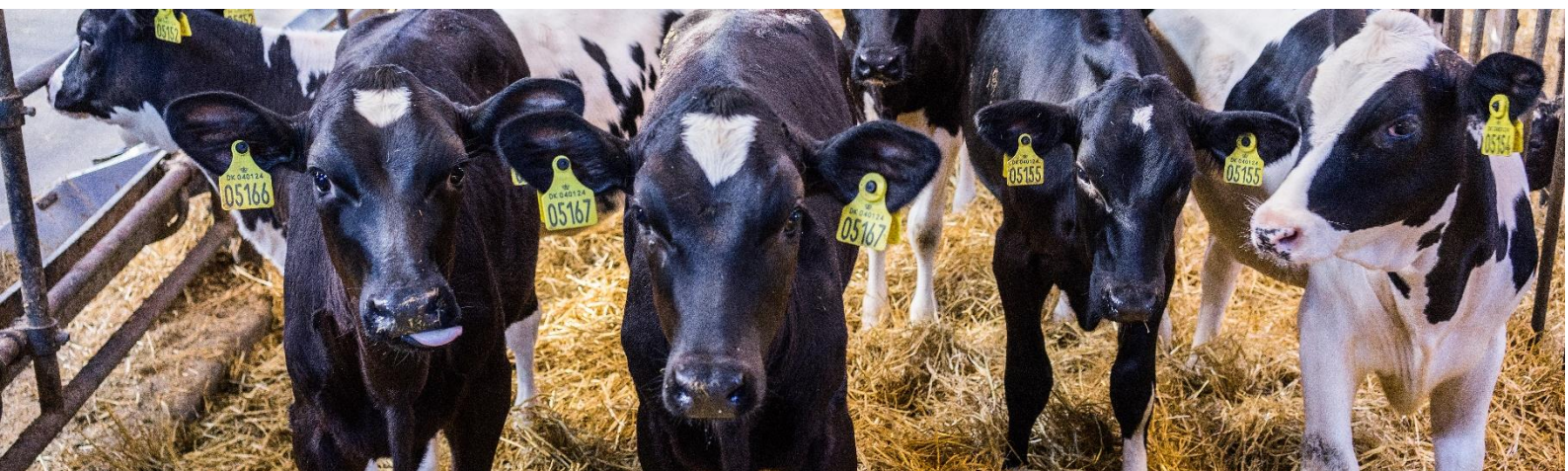
In the discussion about colostrum quality and threshold values, it is important to remember that the traditional threshold of Brix 22 is based on studies from the 1980s and 90s, carried out in the conditions and with the targets for dairy milk yield which prevailed at that time (Gay 1983, NAHMS 1994). The results of these studies showed a reduced frequency of disease and mortality among calves with a blood antibody content of over 10 g/L. There is nothing to suggest, that it would not be beneficial to the calf's health, growth and development, and subsequent milk yield, if the degree of immunisation was increased further. Newer studies also show an effect from raising the bar and aiming for a higher antibody concentration in the calf's blood (Urie et al., 2018).

## A simple, but highly effective step

Measuring the colostrum antibody content and storing the herd's best colostrum is advisable with all herds. This will improve the colostrum quality for all calves. Measuring the colostrum is a simple and easy step towards optimising colostrum management, lowering the frequency of disease, increasing growth and, ultimately, producing a better dairy cow.

### The three most important points of the article:

- Many antibodies give good calves and strong, high-yielding cows
- It is necessary to measure the antibody content of the colostrum, due to the great variation in colostrum quality from one cow to another
- Set your own cut-off limit and use the best colostrum in the herd. The cut-off limit must be adjusted regularly according to the current level in the herd.





*The increased focus on Brix measurement and sorting of colostrum has resulted in improved health and growth among the calves in the herd.*



*Thawing of quality-tested colostrum from the colostrum bank in the coloQuick water bath, makes it easy to ensure an optimal start for all calves.*

## Strong calves by testing and sorting colostrum

Many antibodies in the colostrum give good calves and strong, high-yielding cows. Vedsted Cotel screens the colostrum and only uses the best for all calves, resulting in better health and growth.

Consistently measuring the antibody content in the colostrum with a Brix refractometer and storing the best colostrum in the herd in a colostrum bank has led to stronger calves and increased growth at Vedsted Cotel.

That is how Emil Vestergaard and Kristina Lund explain progress in the calves in their herd. Together, they are responsible for the calves at Vedsted Cotel.

“We had serious problems with diarrhoea and mortality among the calves. We sharpened our focus on housing, cleaning and colostrum management, and we saw great improvements in health and well-being,” says Emil Vestergaard.

The workers in the stall were discouraged and frustrated about the situation.

“It was tough going to work, both because the calves were not thriving, and because we know that the heifer calves are the future of the herd. Fortunately, we had good advice from coloQuick International A/S about optimising colostrum management, and in that way, we became aware of the antibody concentration in the colostrum,” says Kristina Lund.







“Before the changes, we did not test and screen the colostrum for the calves, so we had no control over how many antibodies the calves were actually given,” says Emil Vestergaard.

“So, it was a matter of chance whether a new-born calf got off to an optimal start.”

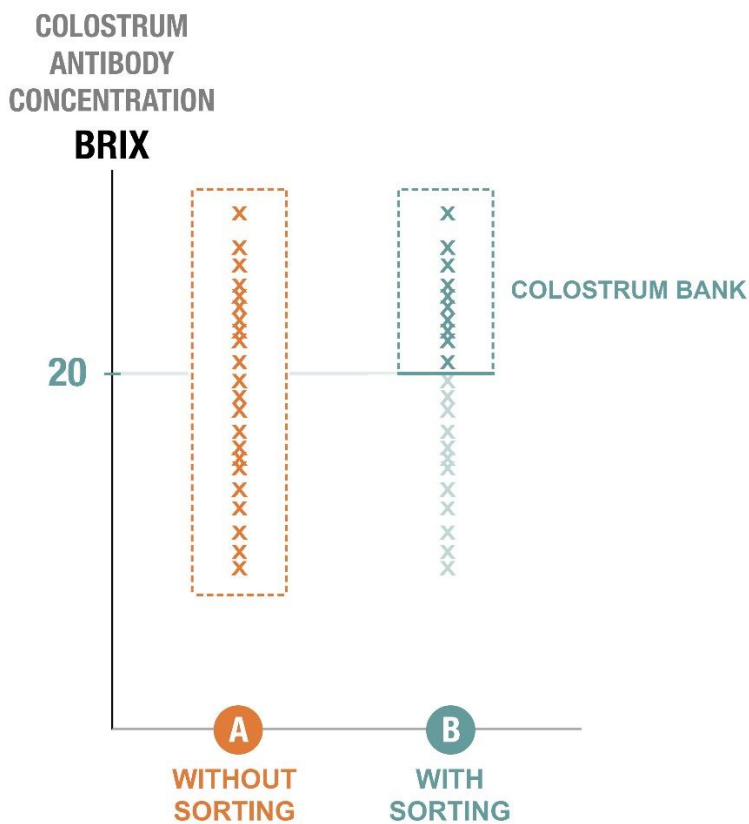
## Six out of seven calves had a low antibody level

Blood samples taken to test the calves’ uptake of antibodies showed that six of the seven calves tested had very low antibody levels.

“We started to measure all colostrum with a Brix refractometer and became aware of the great variation in colostrum quality among the cows. Some cows produced colostrum with a Brix value of 13, while others were up to 25,” says Kristina Lund.

On the farm, Kristina Lund and Emil Vestergaard can at present set their cut-off limit to Brix 20 (see Figure 1) and still have a portion of colostrum for all new-born calves.

“In busy calving periods we may be forced to lower our cut-off limit, but we will still carry out the quality assessment, and ensure that all calves always get the best colostrum in the herd,” says Emil Vestergaard.



**Figure 1**

Two different scenarios for using the herd’s colostrum. Before Brix measurement and sorting of colostrum, all available colostrum was used for the new-born calves (A). After optimisation of colostrum management including Brix measurement and sorting (B), the herd only use colostrum with high a Brix value, according to the herd’s cut-off limit (blue dotted line)





At the same time, great care is taken to give the calf colostrum as early as possible after birth, and to optimise the feeding of dry cows.

On the farm the coloQuick system is used to manage colostrum, which means that good colostrum management is easier in practice.

“We freeze the tested and selected colostrum in 4-litre disposable bags, and then warm up a portion of colostrum in the coloQuick water bath after each calving. A systematic work routine like that also frees up time and enables us to work efficiently in the stall,” says Emil Vestergaard.

There are fixed procedures for giving colostrum, and it means the general gut feeling is good, and job satisfaction is better.



*Picture 3: Using a refractometer for testing the antibody concentration in colostrum, is easy to do and is used consistently in the herd, for quality testing and sorting of colostrum*

## The calves thrive outdoors

Apart from the changes around colostrum management for the herd, the housing for the calves was changed from indoors to calf sheds in the open air. At the same time, attention was concentrated on continuity and stability about looking after the calves, and now fewer individuals are involved. Emil and Kristina feel quite different about going to work now. The changes have resulted in considerably fewer cases of illness, very low mortality and larger calves.

“The calves thrive and come to the feeding bucket when they see us,” says Kristina.

Blood samples to show the calves’ uptake of antibodies, also showed recently, that all the calves tested now have a far better antibody uptake.





Screening the colostrum for quality means tangible improvements in the calf stall, motivated the workers looking after the calves to make an extra effort, and ensured confidence in production of strong heifer calves that can become high-yielding dairy cows in the future.





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