Calf rearing for highly productive cows

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The basis for a highly productive cow is laid during the first months of life. In fact it has already started before a calf is born. The feeding of the highly pregnant cow determines the vitality of the new born calf. This article aims to mainly deal with calf feeding during the first three months of life. However, genetics, management, housing and health condition have an equally large influence on the milk production.

All information and data in this article refer to Holstein-Friesian cows, kept under European conditions. It is important to keep in mind that a high milk production is only possible if a cow is capable of consuming and digesting sufficient quantities of feed.

The goals of calf rearing

The first and foremost goal is to keep a calf alive, since a dead calf represents a considerable loss of future milk production.

Therefore, all available measures have to be taken to reduce mortality. In Europe the average mortality during the first three months of life is 12-13%. A mortality rate of even 20% during this period is not exceptional.

The development and condition of the rumen is pivotal to the total feed consumption and digestive capacity of a milking cow.

The quality and the kind of feeds, as well as the feeding regime applied during the first months, determine, to a large extent, the growth of the calf during the rearing period and the condition and weight at weaning.

A typical growth rate for healthy Friesian heifer calves from birth until weaning at approximately three months of age is 750-850g per day. Depending on the birth weight of the calf that gives a weaning weight of 100-120kg.

Colostrum management

The colostrum plays an essential role in building up the calf's passive immunity, especially the first colostrum which is very rich in immunoglobulins. These large protein molecules create a certain level of protection against diseases. However, the quantity of immunoglobulins in the colostrum substantially decreases in the course of the first day after calving.

Even more important is the fact that the permeability, which determines the absorption of immunoglobulins via the intestinal wall, rapidly decreases after birth. It is therefore most important to give the first colostrum within two hours after birth.

Given the size of the abomasums, being approximately 5% of the body weight, the quantity of colostrum should be limited to 1.5-2.5 litres per feeding. It is recommended to feed the colostrum at least three times per day.

An even better alternative is to offer the colostrum in a bucket with a teat. In that case the colostrum is offered cold and the calf can drink ad libitum.

Feeding after the colostrum

After three to four days the question comes up whether to switch to a milk replacer or to continue feeding cow's milk. Many farmers think that cow's is the best for rearing their calves, because it is the most natural. However, is today's cow's milk still that natural?

By nature a cow does not produce more than 8,000 litres of milk per lactation with a fat level of 4.0-4.5% and a protein level of 3.0-3.5%. The current highly productive cow is the result of many decades of genetic improvements. Therefore, today's cow milk is less suitable for calf rearing. The high pH of the milk, especially in combination with bucket feeding, makes a calf susceptible to pathogenic bacteria. Certain diseases are transmitted via cow's milk.

The high fat level in the milk is detrimental to development of the rumen. Many farmers feed their antibiotic milk to the calves. However, the antibiotics in the milk affect the intestinal flora and may create bacterial resistance. Such antibiotics may be less effective when required as a therapeutic treatment. Last but not least, cow's milk is deficient in several vitamins and trace minerals, specially vitamin E, iron (Fe) and copper (Cu). Deficiency related diseases are often seen amongst calves fed with cow's milk.

For calf rearing a good quality milk replacer is a much better alternative. Much attention has to be paid to the quality of the milk replacer.

The starting point has to be the digestive system of the calf. A milk replacer has to be formulated in such a way that it meets the requirements of the calf, at the same time as much as possible stimulating the development of the rumen.

A milk replacer has to be palatable, easily soluble and highly digestible. To that purpose a careful selection of suitable, high quality raw materials is essential. High quality whey based milk replacers are considerably safer than casein based ones.

Moreover, a milk replacer based on whey derivatives stimulates an early intake of concentrates and roughage.

A high quality milk replacer offers many advantages compared to cow's milk. Whey based milk replacer can be acidified to a pH of 5.6-6.0. In unrestricted feeding systems it is even possible to acidify to a pH as low as 4.5. That helps preventing bacterial growth and diarrhoea.

The safety of a milk replacer can be further enhanced by the inclusion of probiotics or

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prebiotics and essential oils. Contrary to cow's milk, a good milk replacer has a constant quality. Via the vitamin and mineral premix all micro ingredients are offered in the correct balance and quantity, thus avoiding deficiencies.

Preparation of a milk replacer is easy but it has to be done in the right way. The concentration of the powder in the water should be approximately 125g per litre, which is roughly equal to the dry matter content in cow's milk. We recommend using water at a temperature of 45-50°C. The powder has to be dissolved completely (no lumps), which should be possible within one to two minutes of mixing. The recommended drinking temperature is 40-42°C, in order to stimulate the oesophageal groove reflex and thus avoid the milk coming into the rumen instead of the abomasum.

That is especially important when feeding via a bucket or drinking bowl. If teat feeding is applied via an automatic milk dispenser or a bucket with a teat, the temperature is less critical.

The milk replacer is generally fed for some 10 weeks according to a fixed feeding schedule. A proper schedule ensures that the requirements on protein and energy are sufficiently covered for the first four to six weeks of life.

After that period shortage of energy and protein has to be covered via the intake of dry feed. Restricted feeding stimulates an early intake of concentrates and roughage.

Dry feed and water

The importance of the development of the rumen can not be over estimated. A high milk production can only be realised under the intake of big quantities of concentrates and roughage. The concentrates play an important role in the development of the papillae of the rumen.

During the first few weeks of life the intake of concentrates and roughage is still limited as the calf mainly lives on the milk replacer. Notwithstanding the low intake it is important to provide a calf with dry feed at an early age, as a calf gradually has to get accustomed to the intake and digestion of concentrates and roughage.

We recommend restricting the quantity of concentrates once the intake has reached a level of 2.5kg per day. The roughage to be fed to the rearing calves should be of a high quality, as the scratch factor, resulting from the fibre in the roughage has a major influence on the thickness of the wall of the rumen.

The higher the intake of dry feed, the more important the availability of good drinking water. For the digestion of dry compound feed and roughage fresh and clean drinking water is indispensable. The quantity of water given in the first and second week of life has to be restricted to one to two litres per day.

After two weeks, calves should have free access to the drinking water. Even in the moderate European climate the average total water intake per calf until the age of three months is approximately 400 litres.

Weaning

There is a lot of misunderstanding on the criteria for weaning. Many farmers wean their calves by age. Depending on the farmer the age of weaning varies from 8-16 weeks. Other farmers wean their calves as soon as they have reached a certain weight. Again a substantial variation in weight is seen between the countries and even between farmers in a certain country.

The best standard for weaning is the daily consumption of concentrates. Once the intake of concentrates has reached the level of approximately 2kg per day a calf can safely be weaned.

The quantity of 2kg concentrates per day indicates that the calf has a sufficiently developed rumen to prevent a post weaning growth check.

When following the calf rearing procedure as described in this article, in addition to a professional approach of management, housing and health care, the result will be a healthy, well developed heifer calving at the age of two years. And starting from then on a highly productive milking cow! ■