Practical calf rearing – professional management solutions

by P. T. Van't Veld, Denkavit Nederland BV, Tolnegenweg 65, 3781 PV Voorthuizen, The Netherlands.

For reasons of future productivity, the key objective in calf rearing for dairy herd (Holstein Friesian) replacement is to establish an early and sound intake of concentrates and roughage to eventually produce a well developed heifer which reaches first calving at 23-24 months of age. In particular, the first 10 weeks of calf rearing are the most important to set the preconditions for reaching this objective. Only a dedicated and well structured approach to calf rearing will enable dairy farmers to ensure an optimal life span and overall milk production of the future dairy herd.

Being exposed to infection pressure from bacterial and viral causes of intestinal diarrhoea, cryptosporidia and coccidia, there is no equal substitute for the extremely important initial supply of colostral antibodies to the calf during the first three days of life.

After the essential colostrum period, in professional calf rearing, for various reasons, the use of a good quality, optimally digestible calf milk replacer is preferable above using cow's milk. The composition of cow's milk nowadays, coming from highly productive animals, does not properly meet the calf's early demands for supply of vitamins and minerals, and the fat content most often is too high to enable proper digestibility and intestinal safety under suboptimal circumstances.

Besides the ever important quality and composition of the feed, be it calf milk replacer, concentrates or roughage, management factors will have a major influence on the technical results of calf rearing and subsequently on future milk production.

This article highlights the main important aspects of calf rearing management based on a set of practical focus points.

Practical focus points

To fulfill all basic requirements for reaching an optimal calf rearing process, several factors have to be thoroughly checked in advance. In fact, calf rearing in its essence already starts before the calf is even born.

As a general guidance, the main focus points for optimising calf rearing include: dry cow management, preparation of the calving pen, birth management, colostrum management, preventive health measures like supplementation of vitamins when necessary, nutrition (choice of cow's milk or calf milk replacer, supply of concentrates and roughage, water supply), housing, and generating the adequate climatic conditions for the calves.

In the end, to ultimately check if all objectives are met, relevant parameters (intake of concentrates and roughage, body weight) should be evaluated on a regular basis.

Table 1. (Dis)advantages of cow's milk and calf milk replacer.

Cow's milk	Calf milk replacer
Natural composition – Deficiencies of vitamins, minerals and trace elements	Composition is optimally adapted to the nutritional needs of the calf
High fat content (35% of dry matter) can facilitate digestibility disorders and/or reduce intake of concentrates and roughage	Allows faster and more extensive rumen development (especially when whey based) by allowing early intake of concentrates and roughage
Higher pH of milk leads to increased pathogen counts	Consistent composition and acidification (pH 5.9) decreases risk of digestibility disorders
Probable transmission of certain diseases through milk. Antibiotic residues in milk may induce dysbacteriosis and bacterial resistance	Decreased risk for transmittance of diseases (Paratuberculosis, BVD, IBR, leptospirosis brucellosis). No negative effects of antibiotic residues

Pre-birth preparations

Correctly managing the dry cow is of the utmost importance to allow the calf to be born in an optimal condition and to assure a good and healthy start for the calf. Even minor problems in the cow will decrease the vitality of the calf.

The body condition of the dry cow should be well, but not overly fat. The dry cow will need enough exercise and space to walk around to prevent locomotion disorders.

Energy, vitamin and mineral supply have to be balanced to prevent milk fever and other metabolic disorders which potentially occur around calving. One or two days before expected calving, the cow should be placed in a clean calving pen, allowing sufficient space for calving. Cow manure potentially contains many causes of infectious diarrhoea in calves, so all effort should be made to maintain the highest level of hygiene.

First days after birth

Directly after birth, the navel of the calf has to be disinfected, using an iodine solution. Subsequently the calf is removed and housed individually to facilitate best possible care and attention. Most essential in the first 48-72 hours after birth is the supply of colostrum to the calf. Colostrum should be given fresh, fast (within two hours after birth), in sufficient amounts (being approximately 10-15% of body weight per day in the first two days) and frequently (daily amount divided over at least three servings). Because of the limited volume of the abomasum of the calf, the volume of each serving should not exceed 5% of body weight.

As there is no equal substitute to colostrum in terms of induction of immunity against disease, it is highly recommended to keep colostrum in stock in case the mother cow does not yield sufficient colostrum to feed the calf. This can be accomplished by keeping spare colostrum in a freezer.

Continued on page 14

Continued from page 13

As an alternative, in moderate climates colostrum can also be conserved during three days by mixing in 5-10% of yoghurt.

Most often, calves have too low Hb and vitamin E blood levels at birth, which can be corrected either by oral supplementation or by injection.

Feeding after colostrum

Starting from three days of age, after the colostrum period, the choice has to be made whether, next to feeding concentrates and roughage, the calf will be fed on cow's milk or on calf milk replacer (CMR).

Age	Feeding system – nutrition
0-3 days	Teat bucket feeding – colostrum three times daily
3-14 days	Teat bucket feeding – CMR two times daily. Additional water or highly palatable solution in between CMR servings. Start on concentrates and roughage
14-35 days	Teat bucket or machine feeding – increasing daily volume of CMR twice daily or according to machine schedule. Free access to additional water. Free access to roughage and concentrates
35-70 days	Decreasing of volume CMR after reaching sufficient daily intake of concentrates
70 days - 6 months	Free access to water. Free access to roughage, limited supply of concentrates

Table 2. Age groups and feeding system.

For several reasons, to achieve the best possible results, feeding of a quality CMR is recommended above feeding cow's milk. Some considerations for making this choice are included in Table 1 (see previous page).

Application of CMR

Regardless of which method is used for application of CMR, hygiene is of utmost importance. CMR should always be mixed in the right concentration, and mixed at the right temperature (preferably 45-50°C for bucket feeding, 43-45°C in drinking machines). Using too hot water (over 65°C) to mix CMR will lead to denaturation of protein, decreased vitamin activity and impaired emulsification of fats. Drinking temperature should be 41-42°C to avoid rumen drinking and subsequent digestive diarrhoea.

Using a drinking machine has its advantages, because of allowing more flexible deployment of labour and constant assessment and control of mixing temperature, drinking temperature, concentration, homogeneity and individual intake.

However, automatic feeding also demands ongoing care and attention. Drinking machines are less suitable to feed the youngest animals (before 10-14 days of age), unless extensive care can be guaranteed. Even when eventually using an automatic feeder, during the first 10-14 days calves should preferably be housed individually and fed by (teat) bucket to correctly start them up on a ration of CMR, concentrates, roughage, and water. After this period of habituation they are switched to the machine on a fixed feeding schedule.

A CMR to be used in a drinking machine has to be of high quality, having adequate free flowing properties to function properly. The mixing temperature, concentration and calibration of the machine have to be set correctly and to be checked repeatedly.

The machine should be kept clean on a regular basis to assure hygiene and prevent flies from contaminating the CMR. Last, but not least, one should be aware that the calves will need more intensive monitoring

to appropriately assess intake of milk, concentrates and roughage. Rearing calves should always have free access to water to avoid dehydration and to assist the digestion of concentrates and roughage.

Choosing a certain type of housing will, to some extent, be a compromise between the demands of the calves and efficiency for the stockman. For the calves minimising infection pressure is a key factor.

Calves should be divided in age groups (see Table 2), allowing a minimal amount of contact between the oldest and the youngest calves, which have not yet built up sufficient resistance against disease. The housing should provide clean bedding and adequate shelter from heat, draughts, moisture and ammonia, but still allow easy access for the stockman. The stockman should also be able to carry out cleaning simply and efficiently.

The prevalence of disease, most specifically respiratory disease, up to a high extent is determined by climate. High relative humidity, draughts and lack of shelter can substantially contribute to the occurrence of respiratory problems amongst rearing calves.

Maintaining favourable climatic conditions during the rearing period will reduce costs of medication, increase feed intake and growth performance, improve uniformity of calves and, most important, optimise development of calves into healthy and well performing heifers for herd replacement.

Moisture and draughts are considered to be the calf's natural enemies. As a guidance some criteria can be mentioned, however much depends on the breed of the calf and specific (regional) circumstances.

The ambient temperature comfort zone of (HF) calves will be between approximately 15-25°C, at a relative humidity between 60-80%. Under moderate conditions, air flow should be limited to 0.1-0.2m/second. Ideally each calf requires a volume of $10m^3$ of clean, ventilated air to thrive maximally.

Accumulation of ammonia, carbon dioxide and other potentially detrimental gases should be avoided, under maintenance of sufficient ventilation and shelter for the calves.

Reaching objectives

In the end, only a thorough evaluation will enable the farmer to make a good assessment of calf rearing procedures. Measuring certain parameters at set intervals will guide the farmer in finetuning the above mentioned aspects.

Important parameters are mortality, intake of concentrates at 5-6 weeks of age, age at weaning, body weight at three months of age, body weight and age at first insemination respectively at first calving and, of course, the overall clinical impression of the calves (activity, coat, feed intake, consistency of faeces) at any time during the rearing period. ■