

Feeding in the critical transition period

by Karst Mulder, Nutreco Ruminant Research Centre, Veerstraat 38, PO Box 220, 5830 AE Boxmeer, The Netherlands.

The transition period, defined as the period of eight weeks before calving until about four weeks after calving, is a very critical period in the lactation cycle of the cow. About 80% of the disease problems are related to the dry period.

Problems like metabolic disorders, mastitis, lameness and low fertility can often be linked back to suboptimal transition feeding. About 25% of the total cullings take place in the first 60 days of lactation.

However, the fact that dry cows only get less than 20% of the attention, shows that the importance of the transition period is often neglected. The costs of metabolic disorders for a 70 cow herd have been estimated to be between €750 and €22,000.

During the transition period, the cow undergoes a lot of changes: in the udder, in the rumen, as well as immunological changes, hormonal changes and changes in the mineral metabolism.

In order to manage these changes well, it is important to set clear objectives. In this article the eight most important objectives will be discussed.

Maximise dry matter intake

In the week before calving the dry matter intake (DMI) decreases down to 20% of the level in the far off period.

The NEFA (Non Esterified Fatty Acid) level increases dramatically. It has been shown in several studies that cows with a lower DMI before calving develop more

health problems postpartum than cows with a higher DMI.

More precisely, Drackley et al. found that it is the decrease in DMI which causes higher NEFAs and more liver TAGs.

Attention points to increase DMI include:

- Feed palatable feed with a higher energy density.
- Prevent stress.
- Prevent milk fever (milk fever decreases DMI).
- Body Condition Score (BCS) should be lower than 3.75 at calving.

Minimise negative energy

At the beginning of lactation the energy requirement is high and the DMI is low. The energy supply is insufficient, which results in a negative energy balance (NEB) and the cow will mobilise body reserves. The body fat reserves are broken down into glycerol and NEFA, because the liver needs glycerol to produce glucose.

The NEFA will, to some extent, be used (oxidised) by the peripheral tissue (mainly muscles) as an energy source or will be used by the mammary gland for milk fat synthesis (up to 40% of the milk fat during the first days in lactation are derived from NEFA). The excess of NEFA will enter the liver.

In the liver cells, a part of the NEFA can be oxidised by the mitochondria and peroxisomes. In a complete oxidation the NEFA enter the Krebs cycle and ATP is produced. However, when glucose is limited, the Krebs cycle can not be completed and ketone bodies will be formed.

Ketone bodies can, to some extent, be used as an energy source by muscles, adipose tissue and mammary gland.

However, the cow is unable to utilise the ketone bodies fast enough, which causes accumulation of ketones in body fluids (ketosis). This disturbs metabolism when it exceeds a certain level.

The part of the NEFA which is not built into milk fat or is oxidised by peripheral tissue or by the liver will be esterified to triacylglycerol (TAG=fat=triglyceride) and accumulated in the liver or secreted as very low density lipoproteins (VLDL).

However, the secretion of VLDL in rumi-

nants is very low, which results in fatty livers.

Because of the limited secretion of VLDL, once fatty liver has developed, it will persist for an extended period of time. Fatty livers have a negative effect on the capacity of the liver to transform ammonia into urea, which means a higher toxin load for the animal.

In addition, fatty livers decrease the capacity of liver hepatocytes to produce glucose out of propionate.

High NEFA correlate with diseases like dystocia, retained placenta, ketosis, displaced abomasum and mastitis.

Attention points to minimise negative energy balance:

- Increase energy density.
- Increase concentrate level.
- Feed glucogenic energy.
- Feed propylene glycol (Glucolac).
- Right BCS at calving, preferably 3.25-3.75 at calving (higher BCS gives reduced DMI and higher NEFA).
- Give the cows space to move/walk.

Stimulate rumen function

During the dry period, the length of the rumen papillae is more than halved, this means a much lower absorption surface. A lower absorption means a lower DMI again and a higher risk of rumen acidosis.

Therefore, it is important to stimulate the rumen papillae at the end of the dry period. This can be done by feeding a higher energy ration with sugars and starch.

Prevent milk fever

Milk fever is a well known problem after calving. The main cause of milk fever is a shortage of calcium. After calving about nine times as much calcium is required than is available in the plasma.

This reduces muscle contractions, which causes many other problems, like mastitis, displaced abomasum, ketosis and reduced fertility. The shortage of calcium can have several underlying reasons.

A low DMI is an important reason for milk fever. When the intake is low, the calcium

Continued on page 31



Continued from page 29

intake is also low. Lower intakes are often related to higher BCS (>4 at calving).

Milk fever can also be caused by a surplus of cations, especially potassium. When cation levels are high, the calcium metabolism is not active and the calcium mobilisation from the bones will be low.

Anionic salts can decrease the blood pH which activates the calcium metabolism. A high level of cations can also cause oedema.

A third underlying cause of milk fever is a shortage of magnesium and/or vitamin D. Both have an important stimulating effect on the calcium metabolism.

Attention points to prevent milk fever include the following:

- BCS<3.75 at calving.
- Maximise DMI.
- Sufficient magnesium and vitamin D (Maxcare).
- Low calcium level in ration.
- Use anionic salts.
- Low potassium level.

Optimise immune status

Around calving, the immune status is suppressed. The high progesterone levels during the dry period inhibit leucocyte function. The increase in oestrogen in the last weeks of the dry period inhibit the cellular immunity around parturition. Also cortisol is pro-

duced as a result of stress and the zinc level around calving is considerably reduced.

This all means it is important to support the immune system. This can be done by feeding higher levels of vitamin A, E, selenium, zinc and, again, by keeping the DMI as high as possible.

Optimise udder health

During drying off and during the onset of lactation the udder is very susceptible to new infections. The milk which is produced after drying off is resorbed and milk solids are broken down by white blood cells. This results in a reduced resistance.

The higher the milk production is at drying off, the higher the risk of infection by environmental bacteria. It would be good to aim at a milk production at dry off of <12 kg per day.

Attention points to optimise udder health by decreasing milk production at drying off:

- Decrease feed intake (give rations dry cows).
- Decrease energy density.
- Decrease crude protein level.
- Once a day milking.
- Never withhold water.

Minimise stress

Stress causes the release of corticosteroids, which can decrease DMI. Besides that, it can slow down the calving process and cause abortion in late gestation. It also reduces resistance and enhances body fat mobilisation.

To minimise stress, moving of cows should be limited and isolation of cows before calving should be avoided.

Big ration changes should also be avoided and cows should have unlimited access to water. Heat stress is also a form of stress which should be minimised.

Healthy start lactation

It is not only the dry period which is very critical, but also the first few weeks after calving.

Optimising health in this period is more important than maximising milk yield. It is important to start up the concentrate intake gradually.

The maximum concentrate intake should be reached after 25-30 days.

From our own research we have seen that there is a huge variation in dry matter intake after calving.

For a quick recovery after calving Reviva is a good product to use. It is a very tasty powder dissolved in water and contains easily available energy.

It stimulates the dry matter intake immediately after calving and, therefore, supports the prevention of ketosis and displaced abomasum. ■