The transition period is a challenging time for the dairy cow. Her metabolism needs to adapt rapidly from a non-lactating to a lactating stage, in preparation for the forthcoming calving. In addition, the reproductive system is preparing ovulation for the next breeding period.

This sudden change increases the glucose demand from the mammary gland and the foetus, which cannot be met solely by the liver. In order to meet this demand, muscle tissues spare glucose, while fat tissues are mobilized to produce NEFA as an additional energy source. Fat tissue mobilization is triggered by the insulin resistance mechanism, which is more active during the prepartum period (Overton T., 2011). Elevated blood NEFA will reduce dry matter intake and the responsiveness of fat tissues to insulin, leading to greater fat tissue mobilization and higher blood NEFA… creating a vicious cycle.

This adaptive metabolism becomes detrimental to the cow when the extent of fat tissue mobilization is more important than the liver’s capacity to metabolize it. The result is an incomplete oxidation of the fat, which leads to the production of BHB (Beta Hydroxy Butyrate).

High BHB levels are an indication of subclinical ketosis, a metabolic disease occurring during the post calving period. The incidence rate of subclinical ketosis is estimated at 43% (Leblanc S., 2010) but can vary from 30-60% (Oetzel G.R., 2012). Estimated economical loss varies from $50 to $100 per case.

To evaluate the incidence of subclinical ketosis on farms, it is proposed to measure blood BHB levels of transition cows by using a cowside blood test with BHB strips, using a pocket-sized meter. To identify subclinical ketosis, different BHB thresholds have been identified (Ospina et al., 2011; Duffield et al., 2009) and vary according to the sampling time period. Oetzel (2012) is suggesting a sampling period from 3-16 DIM, with a blood threshold of 1.2 mmol/L. It appears that the highest number of positive cows occurs at 5 DIM.

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Reduced milk production is directly linked to subclinical ketosis, hence blood BHB levels. During the first 30 DIM, each 0.1 mmol/L exceeding threshold (1.2 mmol/L) is linked to a milk production loss of 0.5 kg/day (Oetzel G.R., 2012).

Moreover, cows identified with subclinical ketosis were reported to be three times more likely to be removed from the herd during the first 30 DIM (McArt et al., 2012). Increased risk of metritis and displaced abomasum has also been related to higher level of blood BHB (Duffield et al., 2009; Ospina et al., 2010). Impaired fertility is not always directly linked to subclinical ketosis (Oetzel G.R., 2012) but negative energy balance affects fertility during the pre and postpartum periods (Butler R., 2012).

**B VITAMINS FOR A SUCCESSFUL TRANSITION**

It is well understood that energy balance needs to be improved during the transition period. Maintaining dry matter intake (energy intake) during the week before calving is primordial to reduce the extent of the negative energy balance (Jorritsma et al., 2003). The energy and protein density of the transition ration, as well as feeding management are important factors in the equation of a successful transition period, but some essential micronutrients are often disregarded. B vitamins have been identified as being critical during the transition period due to their direct and indirect roles for immune function, liver health, energy metabolism and reproduction.

Folic acid and vitamin B12 improve energy balance by reducing fat tissue mobilization (Duplessis et al., 2012). Methyl donors, like Choline and Folic Acid, reduce fatty liver by increasing the production of fat transport proteins (VLDL). During the transition period, choline use is prioritized toward milk production at the expense of the liver function. Folic acid role becomes more important to improve liver health (Pinotti et al., 2002). Increasing the exportation of fat from the liver reduces blood NEFA and BHB levels, creating a positive impact on the immune function (Bradford B.J., 2012; Ster et al., 2012). Feeding a blend of protected B vitamins (folic acid, choline and riboflavin) minimized the reduction of prepartum dry matter intake, reduced blood BHB levels and the incidence of infectious diseases, such as mastitis and metritis (Evans et al., 2006).

Oxidative stress, which has a negative impact on immune system and reproduction, is increased during the transition period (Bradford B.J., 2012).
Riboflavin also plays an important role in the activation of immune cells destroying bacteria (neutrophils) (Sato et al., 1999).

Negative energy balance, and its resultant factors, will delay the resumption of the ovarian activity (Butler R., 2012). A nutrigenomic study revealed that supplementation of folic acid and vitamin B12 during the transition period improved the development of the dominant follicle towards the ovulation process (Gagnon et al., unpublished 2011). This may be related to the positive effects of these B vitamins on energetic efficiency (Girard and Matte, 2006).

Protected* B vitamins are an innovative tool to improve the health of your cows during their transition period. Healthier cows leads to increased milk production and improved reproduction, which represents substantial economic gains for the dairy producer.

*Microencapsulated to prevent ruminal degradation of the B vitamins.

For more informations on Protected B vitamins, contact us at info@jefo.ca or visit our website at www.jefo.ca.

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