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TRANSITIONAL CHALLENGES

Increased Energy Demands In Early Lactation

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Essentially all cows experience negative energy balance (NEB) in early lactation as their bodies adapt to support lactation. During transition, there are also other significant challenges for the cow: (a) The uterine lining is sloughed and must be regenerated after parturition. Pathogenic bacteria may be present and inflammation is a component of the normal restoration of the uterus; (b) Because of inflammation at this point, the immune system is active; (c) There is increased demand for calcium at the beginning of lactation and cows may become severely hypo calcemic.

The objective is to prevent and intervene before NEB, reproductive tract inflammation or the calcium imbalance shift from physiologic to undesirable, for example, ketosis, retained placentas or milk fever.

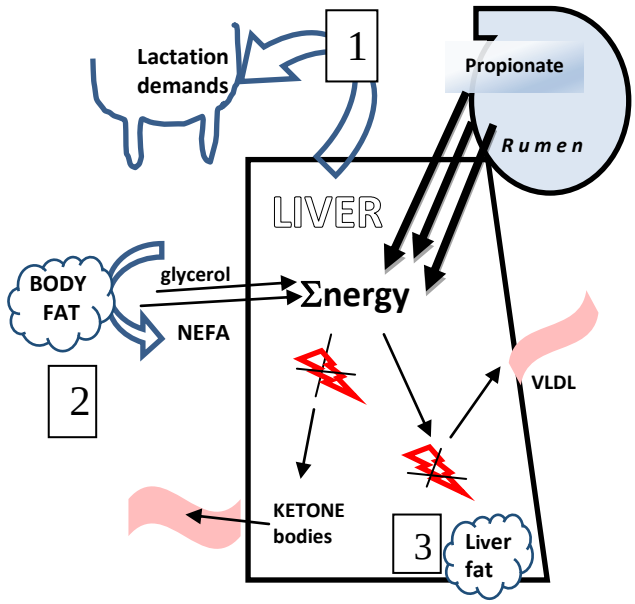
ENERGY BALANCE

The liver plays a critical role in providing energy for milk production. Figure 1 outlines three main processes or adaptations taking place.

1 The total glucose output increases by up to 267%, provided almost completely by increased LIVER gluconeogenesis which enables increased synthesis of lactose for the overriding demands of the mammary gland. The propionate from the rumen is the most important source of glucose for the liver.

2 The second key metabolic adaptation relates to mobilization of body reserves, which occurs through the release of glycerol and non-esterified fatty acids (NEFA) into the bloodstream. The glycerol is used directly for glucose in the LIVER, but the NEFA cycle needs energy to be metabolized for further energy. If energy is lacking, the NEFA accumulate as ketone bodies. With energy available, the NEFA can also be converted to fat in the liver, and exported to be used as body reserves in other tissues or used for the mammary gland for milk fat.

Figure 1.
Lactation Demands and Metabolic Adaptations



3 The transporter VLDL exports fat out of the liver to avoid excessive accumulation. Data suggests that the liver takes up NEFA in proportion to their concentration in the bloodstream or body fat utilization. Unfortunately, under conditions of lack of energy, the liver typically does not have sufficient capacity to completely dispose of NEFA. Ketone bodies accumulate (KETOSIS) and fat accumulates in the liver (FATTY LIVER).

STRATEGIES for SUCCESSFUL TRANSITION

The primary goal of nutritional management strategies during the transition period should be to support the various physiological changes, including those for glucose metabolism.

INTAKE and FEEDING PROGRAM

EARLY LACTATION

Adequate feed intake is vital because propionate from the rumen contributes 50 to 60% of the net glucose release by the liver during the transition period. Under conditions of reduced intake, the cow cannot provide sufficient propionate to the liver. Examples of low feed intakes during transition are: stress because of difficult calving, competition for feeding space, hoof problems, social stress, or high temperatures during the summer.

DRY COW PERIOD

Dietary energy concentration should be balanced to ensure enough and not too much energy intake during far-off and close-up. The objective during the dry cow period is to maintain body weight, support the end of gestation, the synthesis of colostrum and prepare the cow for the next lactation.

The acid base balance of the animal can be regulated to promote the adaptation to calcium release and to avoid acidosis when the cows freshen. The correct feeding of minerals and electrolytes helps to achieve that balance.

MANAGEMENT

The need for energy promotes the conversion of body fat and release of NEFA. Because the liver uptakes NEFA in proportion to their release, over conditioned or fat cows tend to lose more weight and be the first to exhibit symptoms of subclinical and clinical ketosis.

FORTIFICATION

Choline facilitates the formation of the transporter VLDL, but when choline is supplied in the diet is extensively degraded in the rumen. Choline supply may be suboptimal in the transition period. Substantial evidence shows that **bypass choline supplementation** reduces fatty liver, promotes liver function and the liver synthesis of glucose to support lactation and increase milk production in the subsequent lactation.

References available upon request.

Call us today to discuss dry cow feeding and fortification programs, customized premixes and management strategies for your herd.

DAIRY UPDATE is published in the interest of helping dairy producers become more profitable. We welcome your comments.

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