



## Nutritional Management of Dairy Animals during Transition Period for Prevention of Lameness

Pragya Bhaduria, Arvind Kumar, Preeti Mamgai and Y.S Jadoun\*

ICAR-ATARI, Zone-1, Ludhiana, \*GADVASU, Ludhiana

### Introduction

The transition period of a cow involves "transitioning" from a non-lactating state in late pregnancy to a lactating state following parturition ranging from 21 days pre and post calving, is also referred as periparturient period. Transition period in the dairy cows is always associated with a series of nutritional, biochemical, hormonal which leads to majority of the health problems in the dairy cow during this period. To a large extent these health problems relate to cows having difficulty in adapting to lactation which results in physiological imbalance, a situation where the regulating mechanisms are insufficient for the animals to function optimally leading to a high risk of a complex of digestive, metabolic and infectious problems.



Lameness is quite common in high yielding cows during transition period due to: Change in gait of the animal due to increased udder size; abrupt change in diet from roughage to concentrate leads to acidosis; excessive drainage of nutrients in the form of milk; non availability of balanced diet or imbalance of specific mineral-vitamins in the diet specially during this phase. Although it is a multifactorial disease, in most dairy herds, nutritional management is the most important determinant of hoof management. The relation between nutrition, health and productivity begins at birth. The feeding system must deliver the necessary nutrients to each cow at the correct stage of lactation to maintain optimal productivity and health.

Foot health and lameness are major issues facing dairy producers because of their common occurrence and the tremendous economic losses incurred. Early detection and prompt treatment can minimize the loss, improve recovery and reduce animal suffering. Proper feeding of the dairy cow is complicated and requires a combination of scientific knowledge, creativity, and good management skills to balance the needs of the rumen microorganisms and the needs of the animal.

### Nutritional Management of Transition Cows

Nutritional management has been identified as a key component in the development of lameness. Reports have shown a depression in the blood levels of calcium (Ca), zinc (Zn), magnesium (Mg), phosphorous (P), potassium (K), selenium (Se), vitamins A and E during the periparturient period. Less severe disturbances in blood concentrations of these minerals can cause reduced feed intake, poor rumen and intestine motility, poor productivity, and increased susceptibility to other metabolic and infectious disease. Macro and trace elements plays an important role in minimizing lameness through their roles in the immune function, the production of horn tissue, and the maintenance of epithelial and connective tissue in dairy animals.

### Transition Ration

Transition rations are feeding programs that bridge the pregnant dry cow from the traditional dry cow diet (high in forage and fibre) to the early lactation ration (high in grain and protein with less long fibre). As the dry matter intake (DMI) of animal declines dramatically five days before calving. The transition diet should be fed for three weeks before the cow's due date. Transition diets need to be formulated to supply adequate nutrients and promote high DMI. Therefore farmers should provide a well-balanced separate transition diet that contains increased nutrient densities to compensate for lower DMI and for the initiation of milk synthesis and the near-term fetal calf growth. The transition ration should provide the proper amount of nutrient for the pregnant dry cow and her unborn calf. However, the following points should be considered when formulating the transition diet:

### Sub-Acute Rumen Acidosis (SARA)

Lead feeding, the practice of increasing the proportion of concentrate in the pregnant animal diet during the last few weeks prior to calving, has become common practice which leads to Sub-Acute Rumen Acidosis (SARA). SARA which is most common during transition phase leads to lameness in dairy cattle is caused by the consumption of high amounts of ruminally-available carbohydrate, low amounts of effective fibre, or both. As ruminal pH is largely a function of the balance between the production of volatile fatty acids (VFA) from the fermentation of carbohydrates, their neutralization by salivary and dietary buffers, and their removal by absorption across the rumen wall or passage from the rumen.

Rumen Buffers (Rumensin, Monensin Sodium, Monensin) may assist in the maintenance of rumen pH, particularly where the diet contains a high proportion of cereal silage or cereal grains. Sodium bicarbonate neutralizes VFA in the rumen and alters the pH of blood, while magnesium oxide acts as a neutralizing agent in the rumen.

### Dietary Forage/Fibre

Ruminant animals are designed to utilise fibre, and it is as much a shortfall of forage in diets that allows acidosis to develop. More than this, providing sufficient fibre in the diet to maintain good rumination could be significant in minimising foot problems. But all forages/roughages are not equal. Very wet, acid silages (low pH value) may have restricted intakes and will increase rumen acidity directly. Silages high in ammonia and poorly fermented are likely to reduce intake and require supplementation with additional concentrates, potentially creating problems. Very leafy (high D-value) silages contain less fibre. This may not be a concern so long as the silage forms a greater part of the diet and dependence on concentrate is reduced.

In all diets for high yielding cows there is a need to be more conscious of the chop length of forages. Short chop length will benefit consolidation of drier material in the clamp which is important, but it does little to stimulate good rumination and saliva flow. Where diets contain high amounts of short chopped maize or wholecrop, it is especially important that the chop of the grass silage is long, or additional long (5cms+) forage as hay or straw are added.

An adequate intake of neutral detergent fibre (NDF) and acid detergent fibre (ADF) is necessary for the maintenance of a rumen pH within the normal range. Effective NDF from long forages has important physical effects, including the maintenance of normal rumen pH, the encouragement of chewing and rumination, the formation of the floating rumen mat of large particles on the liquid pool of rumen contents and the stimulation of rumen motility.



#### TMR (Total Mixed Rations)

The use of TMR (total mixed rations) feeding systems has increased during transition phase. TMR diets have several advantages: cows consume the desired proportion of forages, risk of digestive upset is reduced, feed efficiency is increased, by-product feeds may be used, accuracy of diet formulation is higher, and labour needs are reduced. The performance of herds using TMR diets can be lowered by errors in ration formulation and feed delivery.

#### Vitamin and Minerals.

These nutrients are often overlooked yet essential for proper hoof growth and development. Hoof quality, that is the process of keratinisation of epidermal cells, is influenced by:-

- Vitamins A, D, E & Biotin (Vitamin H)
- Minerals, Calcium & Phosphorus
- Trace elements, Zinc & Selenium

Many of these, such as Calcium, Zinc and Biotin are activators or co-factors for enzymes that are essential for normal hoof production. Deficiencies of minerals, vitamins and trace element lead to disturbances in the keratinisation process and result in a decrease in hoof quality. Trace elements and vitamins may be added via compound feed or a mineral/vitamin supplement. Research with dairy cows is limited using chelated and complex trace minerals. Biotin improves the quality of hoofs, which encourages the replacement of defective horn, improves healing, and makes it less likely for sole lesions to develop from lameness in its early stages. Feeding 10, 20 or 30 mg/cow/day supplemental dietary biotin reduced the hoof problems in dairy animals. While vitamin E is not an additive, but it can be added improve immune response. Transition ration should contain 1000 added units of vitamin E. Higher levels of zinc, copper, manganese, and selenium can also stimulate the immune system. Niacin can be added at 6 grams per day that can minimize postpartum disease risks after calving while stimulating dry matter intake.

#### Feed Additives

Along with these nutrients, several additives can also be considered. Yeast culture (*Selenomonas ruminantium*) can be added to stabilize the rumen environment and pH while stimulating fibre digesting bacteria. The level varies from 10 to 113 grams per day. Yeast products are palatable and will not affect DCAD (dietary cation-anion difference).

Anionic salts should be added at the rate of 2 to 3 equivalents which brings the DCAD less than zero. To reach this balance, feeding 200 to 250 grams of a salt mixture is needed. Anionic salts are unpalatable and require careful management to insure consumption.

Propylene glycol can be drenched to dry cows one week before calving at the rate of 250gm a day which can reduce fat liver formation, raise circulating blood glucose levels, and minimize disease risk.

Probiotics and use of direct-fed microbials (DFM) are also receiving positive comment in the field to assist cows in transitioning dry cows. But still no controlled research is available at this time to support or refute the field observations. Mixture containing *Lactobacillus plantarum*, *Enterococcus faecium*, and yeast, *Megasphaera elsdenii*, and *Propionibacterium* strains are some examples of DFM.

#### Conclusion

Feeding management should provide a sufficient and balanced supply of nutrients to the pregnant animal. The supply of the major minerals should be part of the diet formulation. Trace elements and vitamins especially biotin may be added via supplement or compound feed. A methodical approach should be taken to supplement nutrients as an excess is as undesirable and potentially as costly as deficiency. Therefore always take care what the diet provides, compare this with recommendations and supplement as necessary.

## SUBSCRIPTION FORM

India's First and Only ISO 9001:2008 Certified Livestock Magazine



Address : # 734, Subhash Colony,  
Vikram Marg, KARNAL-132 001 (Haryana) INDIA  
Ph.: +91-98965-23333, 94665-88099  
E-mail : dinesh@srpublication.com  
Website : www.srpublication.com

Receive  
Complimentary Copy  
Free

### LIVESTOCK TECHNOLOGY



Subscription	One Year	Three Year
India (by Post)	Rs. 600	Rs. 1500
India (by Courier)	Rs. 1,000	Rs. 2500
Institute (by Post)	Rs. 2,000	Rs. 5000
International	Please visit our website <a href="http://www.srpublication.com">www.srpublication.com</a>	

DD Should be favour  
S.R. Publications, payable  
at KARNAL (Haryana).

Name \_\_\_\_\_ Company's Name \_\_\_\_\_

Full Address \_\_\_\_\_

Phone No. \_\_\_\_\_ Mobile \_\_\_\_\_ Fax No. \_\_\_\_\_ e-mail \_\_\_\_\_