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Studies on Nutritional Management of Transition cows

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The term "transition" comprises the various important physiological, metabolic and nutritional changes occurring in this time period. It is a turning point in the productive cycle of the cattle from one lactation to the next. These changes with their management are of great significance are closely associated to lactation performance, nutritional status, postpartum diseases and reproductive performance, which directly or indirectly affect profitability.

Transition cow biology and management has become a crucial point for research during the last few decades. Dairy farmers as well as researchers world over are looking both for management and nutritional strategies to avoid ill effects on health and production. The transition period for dairy cows, defined as 3 week pre-calving to 3 week post-calving, is the most critical period of the production cycle as it determines the level of success acquired during the subsequent lactation. It is one of the most challenging periods of the production cycle which require profound physiological and metabolic changes that often upset the homeostatic mechanisms of the cow.

During this period a number of drasatic changes occur in the dairy cow. One of the major ill effect includes a significant reduction in DMI (Dry matter intake) with more profound effect at parturition (last 24 hrs). However, many cows experience the extended period of low DMI cows which is more difficult to explain and it is far more problematic because the nutrient requirements rise rapidly at the onset of lactation. In transition phase.the cow's metabolism shifts from the demands of pregnancy to those of lactation, with increased the demands for energy, protein and other minerals like Ca, P, Zn etc.

This down-regulation of the appetite is caused by an increase in the concentration of sex hormones. an incipient mobilization of lipid from body deposits and reduced rumen capacity. Nutritional requirements of the animals increase rapidly with milk production after calving and this result in **negative energy balance** (NEBAL). During this time the drive to produce milk is given priority over nearly all other physiological processes and a number of changes occur to partition nutrients to the mammary gland. The onset of lactation in the dairy cow is described by a drastic increase in the nutrient demands for milk synthesis which coincides with a prepartum decline in DMI; which subsequently lead to negative energy Balance in early lactation. NEBAL and homeorhetic adaptations during the transition to lactation decrease . insulin concentration substantially along with decrease in the responsiveness of adipose tissue to insulin. This lead to dramatic increase in plasma non-esterified fatty acid (NEFA) concentration, and further enhance the uptake of increased liver glucose production. The ability of a cow to successfully up-regulate gluconeogenesis in lactation is critical to avoid both metabolic problems and to maximize peak milk production. This condition aggrevated due to the negative effect of fatty liver gluconeogenesis. After parturition extreme negative energy balance predisposes the cow to various periparturent disease and health problems that can affect milk production and profitability of the cow during the entire lactation.

Grummer (2004) stated that "If transition feeding is important, then perturbations in nutrition during this period should affect lactation, health and reproductive performance.". In order to compensate

with decrease in DMI of transition animal, one approach is to increase the energy density of diet with fat supplementation. Supplemental fat sources not only provide calories, but also impact tissue

Another key component of transition cow biology is the decrease in immune function throughout the 6-week transition period.

Currently antibiotics and other chemotherapeutic agents are being used extensively for the treatment of various reproductive disorders and infectious diseases. But this can cause drug resistance in microbes and there is heavy expenditure on treatment. Hence, a preventive approach at appropriate time is more suitable than control by treatment. . One of the emerging promising technologies is the use of immune modulators which can be of natural or synthetic origin to boost the immunity of animals during the transition period.

In the recent year several different approaches have been examined to investigate the effect of various herb extracts as immune potentiator. These herb extracts contains several active principles with antioxidant and antimicrobial properties. The active principles of plants may be carbohydrates, glycosides, tannins, lipids and alkaloids. .

Poor transition period's management often results in the loss of 10 to 20 lbs of peak milk which could be 2000 to 4000 lbs of unrealized milk yield. It is, therefore, important to elaborate various nutritional strategies in this phase for optimizing productivity and minimizing health problems. Despite significant advances in knowledge of nutrition, reproduction and animal husbandry, the number of incidences of peripartum metabolic disorders have not come down. There is a high incidence of metabolic and infectious diseases reported to occur in early lactation of dairy cows.

Dry matter intake and metabolic changes during peripartum period

It is now well-known that DMI decreases as calving approaches. During transition period there is 30 % decrease in dry meter intake appears to happen very rapidly. Nutritional requirements shift abruptly at parturition as milk production increases rapidly and cows enter negative energy balance. **Grummer (1996**) observed that DMI decreased 32% during the final 3 wk of gestation, and 89% of that decline occurred during the final week of gestation and Cows had higher feed intake than heifers. Ration composition nutrient content of the diet may influence pre partum dry matter intake. In low energy feeds the quality of feed is very poor which lead to poor digestibility. Thus the feed remained longer in the digestive system that resulted in lower DMI. Energy concentration in the diets has been reported to influence DMI in ruminants. Thus energy supplementation was essential in enhancing digestibility. In contrast to this, replacement heifers fed 35 concentrate during the final 5 months before calving had lower DMI (but similar energy intake) during the final 10 days prepartum than did cows fed 6 percent concentrate during the same period. Different dietary energy density did not affect DMI in Holstein cows. However, Vazquez-Anon et al., (1997) observed that DMI has been improved by increasing energy density of the diet..

Energy and protein requirements of transition dairy cows

Maintenance requirements of large ruminant correspond to a major input energy. Maintenance energy expenditures varied with body weight, breed or genotype, sex, age, season, temperature, physiological state, previous nutrition and production level. Energy shortage limits the performance of dairy cattle, more

than did shortage of any other single nutritional factor. Increasing energy supply in the diet might produce a protein sparing effect, reducing the maintenance protein requirements of the animal with increased protein deposition. This indicates that high energy intake increases the efficiency of protein utilization. Energy intake did not influence protein utilization when protein intake was limiting.. During transition period, to prevent a change in energy balance the energy density of the diet should be increased.

Even it has been reported that on increasing concentrate content of the diet immediately postpartum instead of delaying the increase until 21day of postpartum is associated with a higher rate of increase in milk production and higher DMI.

Effect of energy and protein on body weight change during transition period

During transition period, body weight and body condition score has been affected by weight of foetus, nutritional status and milk production in early lactation. **Lalman***et al.* (2000) found that change in weight at early lactation stage was not influenced by increasing dietary energy density .Also,**Grummer (**1995) reported that body weight changes were not affected by dietary fat supplementation postpartum. Broderick, (2003) reported that increasing dietary energy density improved weight gain in lactating Holstein cows. Due to decline in DMI in this period, the cow tends to use its body reserve for milk production which results in decline in body condition score of the It has been demonstrated that there is a negative correlation between prepartum body condition score and postpartum DMI. A severe reduction in body condition score in the transition period can also increase the time between calving and the first ovulation, thus decreasing fertility. In contrast, cows calving at a body condition score exceeding recommendations will mobilize more energy than cows calving at optimum weight, and will be more likely to develop fat related metabolic disorders.

Effect of energy and protein on reproductive performance

High protein diets typically are fed during early lactation to meet out the requirements but high protein diets have been associated with reduced reproductive performance.

Feeding fat to improve reproductive performance

Some studies suggested that feeding fat to lactating dairy cows has improved reproductive performance, lessen stress has benefits on lifetime production potential of the animal. Various Studies have revealed the improvement of reproductive performance by supplementing fat, These include: higher conception rates, increased pregnancy rates, and reduced open days.. Butler *el al.* (1981) reported that negative energy balance delays ovulation and the initiation of the first normal luteal phase in cows.

Immune status in dairy cows during transition period

Hormonal changes and variations in immune responsiveness during the periparturient period have been associated with increased susceptibility of the cows to mastitis and other infections. The uterine immune system of the cow plays an important role in maintaining pregnancy, supporting fetal growth and preventing infection. Innate immune defenses, particularly phagocytosis of microorganisms by neutrophils, may play an important role in preventing invasion of the bacteria in uterus, but active mobilization of adaptive cellular or humoral immune responses is needed to eliminate other infections.

Conclusion

This is revealed that there is need for determination of nutrient requirements separately for transition cattle

Literature Cited

1) Broderick, G. A., (2003). Effect of varying dietary protein and energy levels on production of lactating diary cows. J. Dairy Sci., 86: 1370- 1381.
2) Butler, W.R. and Smith, R.D. Interrelationships between energy balance and postpartumre productive function in dairy cattle. J. Dairy Sci. 1989; 72: 767–783
3) G.A.Broderick 2003 Effects of Varying Dietary Protein and Energy Levels on the Production of Lactating Dairy Cows, J. Dairy Science,86, 4,1370-1381
4) Grummer, R. 1993. Feed to avoid fatty liver and ketosis. Hoard's Dairyman. October, 1993, p. 754.
5) Grummer, R. 1996. Make sure cows eat well before calving. Hoard's Dairyman. March 10, 1996, p. 184.
6) Grummer, R. and R. Shaver. 1992. Dry cow nutrition: Fatty liver and ketosis prevention. In: Proceedings of the Advanced Nutrition Seminar for Feed Professionals. August 19, 1992, Wisconsin Dells, WI.
7) Grummer, R. R., D. G. Mashek, and A. Hayirli.(2004) Dry matter intake and energy balancein the transition period. Veterinary Clinics of North America: Food Animal Practice 20(3):447-470
8) Grummer, R.R. & Hoffman, P.C. & Luck, Melissa &Bertics, S.J..(1995). Effect of Prepartum and Postpartum Dietary Energy on Growth and Lactation of Primiparous Cows.Journal of dairy science. 78. 172-80. 10.3168/jds.S0022-0302(95)76627-9.
9) Grummer, R.R.(1998) Transition cow energy, protein nutrition examined. Feedstuffs.September 14, 1998, p.11.
10) Lalman, D. L., J. E. Williams, B. W. Hess, M. G. Thomasand D. H. Keisler (2000). Effect of dietaryenergy on milk production and metabolichormones in thin, primiparous beef heifers. J.Anim. Sci. 78:530-538
11) Lammoglia, M.A., Willard, S.T., Hallford, D.M. &Randel, R.D., (1997) Effect of dietary fat on follicular development and circulating concentrations of lipids and insulin on follicular development and circulating concentrations of lipids, insulin, progesterone, oestradiol 17β, 13, 14-dihydro-15-keto-prostaglandin F2α and growth hormone in oestrous cyclic Brahman cows. J. Anim. Sci. 75, 1591-1600.
12) Oldick, B.S. and J.L. Firkins.(1996) Imbalanced, inadequate diets effect reproduction performance, bottom line. Feedstuffs Magazine, December 9, 1996.
13) Vazquez-Anon, M., S. J. Bertics and R. R. Grummer (1997). The effect of dietary energy source on during mid to late lactation on liver triglyceride and lactation performance of dairy cows. J. Dairy Sci. 80: 2504-2512.