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Recommended Dietary Regimens for Prevention of Metabolic Disorders and Production Diseases

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Abstract

Twenty-one days before and after calving are the critical days for animals and this period are called the transition phase or period. During these day's animal is under stress. Incorrect feeding during this phase leads to the occurrence of metabolic diseases like milk fever, ketosis, hypomagnesium tetany etc. Because of metabolic diseases in animals, there is heavy production and economic loss of farmers. The economic loss in the form of loss of milk production, increased rate of culling and death, increased cost of treatment and decreased reproductive performance. To prevent the occurrence of metabolic diseases, it is necessary to stabilize energy as well as mineral metabolism and stabilize the immunity of an animal. Certain dietary changes during the dry period can prevent the occurrence of metabolic diseases in animals. An incorrect diet can also lead to infertility problems in the animal during the postpartum period. Therefore, it is concluded that the provision of a proper and balanced diet is essential during the dry period or at the advanced stage of pregnancy in animals to prevent metabolic diseases in animals.

Keywords: Dietary regimen, Diseases, Metabolic, Production

Introduction

Immediately after calving, a group of diseases that affect dairy cows are called metabolic disorders. Incorrect or inadequate diet or feeding can lead to adverse effects on the health, productivity and welfare of dairy cows. Health disorders are associated with Heavy economic losses occurred due to milk production reduction, increased rate of culling and death, high treatment cost and hampered reproductive performance (Sundram, 2015).

Nutritional Goals for the dry period to prevent metabolic and production diseases

1. Stabilize energy metabolism.

Minimize fat mobilization in the transition cow and maximize her intake post-calving reducing the incidence of ketosis, displacements and fatty liver. Also, we need to create a

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rumen environment to help utilize the high energy feeds presented post-calving efficiently and without plunging the fresh cow into acidosis within days of calving.

2. Stabilise mineral metabolism.

Milk fever, subclinical hypocalcaemia and udder oedema all result from the poor mineral balance in terms of magnesium, calcium, potassium and sodium supply.

3. Stabilize the immune system.

During the early day's post-calving, Mastitis, Metritis and retained placenta are the conditions related to the animal's immune system. The waste products of fat mobilization and inadequate mineral and vitamin supplies reduce immune system capability. These goals are interrelated. To control these events we need to look at a single approach to incorporate elements of all three.

Nutritional strategies to reduce metabolic diseases incidences

1. Adaptation of the rumen

It is necessary to adapt the rumen microflora to the increasing quantity of the concentrate in the ration of calved animals. A Three to four weeks period is required to adopt a high starch diet that will be fed after parturition and Five weeks period after concentrate feeding is required for the full development of rumen papillae. Therefore, to fully adapt rumen to lactation diet, it is necessary to start increasing concentrates in the animal ration 3-4 weeks before calving and continue it for the first 1-2 weeks of parturition.

2. Maintenance of immunity

It is necessary to maintain a strong immune system during the period of calving that helps to reduce the incidence of infectious diseases after parturition and conditions those related to nutritional factors like retained placenta, metritis, mastitis, laminitis, etc. Around the calving and at the onset of lactation in animals, deficiency of nutrients and stressful conditions may lead to immune system depression. Vitamin E and Se are the most important vitamin and minerals related to immunity in an animal body. Also, to some extent vitamin A and beta-carotene, Cu and Zn may play a role in immunity. Negative energy balance, hypocalcemia, and hyperketonemia etc are metabolic conditions that may lead to immunosuppression.

3. Prevention of parturient hypocalcaemia

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The feeding strategies followed during the pregnancy and immediately after calving has a direct relationship with the occurrence of milk fever in animals. Thus, milk fever can be prevented by adopting appropriate feeding strategies during late pregnancy and early lactation.

a. Restriction of calcium in the prepartum (before calving) period.

b. Magnesium supplementation.

c. Supplementation of calcium to the susceptible animals after calving.

d. Forages rich in calcium should not be fed before calving particularly during the last trimester of the pregnancy period (Thilsing-Hansen *et al*., 2002).

4. Prevention of hypomagnesaemia

a. Key step in nutritional prevention of hypomagnesaemia is finding a forage with a lower ratio [K/ (Ca+Mg)], or modify this ratio in the diet by adding more Ca and Mg supplements (Odette,2005).

b. Increase Mg content in the anionic close-up diet because it usually contains more Ca.

5. Prevention of milk fat depression (MFD)

Milk fat depression is generally associated with diets high in concentrates as well as low in fibre, and diets supplemented with plant or fish oil. Dietary factors able to alter the rumen environment and those related to the supply of polyunsaturated fatty acids (PUFA) can also affect milk fat synthesis.

a. The inclusion of an adequate level of so-called ‘‘effective fibre’’ and appropriate buffers in lactation diets can prevent a drop in ruminal pH and markedly decrease MFD. Long-stemmed hay is the main source of effective fibre. Therefore, it is necessary to feed a balanced ration with adequate forage to maintain an adequate fat percentage in milk.

b. Additional management practices to maintain a stable milk fat percentage in dairy herds include regular feeding of the diet without abrupt changes, as well as feeding buffers such as Na-bicarbonate and/or Mg-oxide.

c. Inclusion of bypass fat, vegetable oils in limited quantity (3.5%DM).

d. Inclusion of dry fodder along with green fodder.

e. Use of TMR.

6. Dietary regimen to prevent fat cow syndrome

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a. Cows in loose housing should be grouped by production to feed them according to NRC requirements.

b. Concentrate intake should be limited after peak lactation and conception while the intake of all high energy feed should be limited during the dry period.

c. The energy intake can be limited during the dry period by feeding coarse grass hay or pasture which also will help prevent milk fever and displaced abomasum.

d. It is important to give high priority to feeding a balanced ration to meet nutrient requirements and to implement recommended managemental practices to prevent metabolic, digestive, infectious, and reproductive conditions that are related to the fat cow syndrome in the over fatty periparturient cow (Rico and Harvatine, 2013).

7. Dietary regimens to prevent ketosis

Gradually introduce the small quantity of concentrate during early lactation to adjust the rumen microflora. Make gradual dietary changes during early lactation. Efforts should be made to ease the transition from gestation to lactation by offering highly palatable forage at calving and providing suitable accommodation and assistance where necessary. Roughage high in butyric acid should be avoided in early lactation e.g. silage. Check forage quality several times a year. Allow animals in cobalt deficient areas to take sufficient cobalt. To monitor the herd health and detect subclinical disease the metabolic profile test should be carried out using blood samples taken from groups of dry cows and cows in early lactation. Dietary changes can then be made if necessary to reduce disease. To test ketosis in animals, milk tests are also useful. Check forage quality several times every year. Ensure cows are not too fat at calving and lactation (condition score 3.0-3.5) by regular body condition scoring. Look out for sudden changes in trends. Supply a sufficient quantity of high-quality forage to advance pregnant beef cows (Littledike *et al*., 1981).

8. Dietary regimen to prevent Phosphorus deficiency hemoglobinuria (Rahmati *et al*., 2021)

a. Regular use of phosphorous and other mineral and vitamin supplementation in the animal ration.

b. Removing the excess intake of cruciferous plants, Lucerne, berseem and sugar beets from the ration of pregnant and dairy cattle and buffaloes.

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c. Vitamin D and copper supplementation.

d. Do not provide only dry fodder to animals.

9. Dietary regimen to prevent downer cow syndrome

a. Cows should not be fed too much during advanced pregnancy to avoid obesity.

b. Parenteral Vit.D3 should be given in milk fever prone cows during pregnancy.

c. Low calcium and slightly more phosphorus diet should be given during pregnancy.

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