

Popular Article

Metabolic diseases: a significant adversary of economic animal production

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Metabolic diseases are one of the most commonly occurring ailments in high producing animals, which imposes a significant burden on the economics of animal production and adversely impacts the livestock sector. Metabolic diseases, sometimes called production diseases are a group of conditions that are caused by deficiencies of particular minerals or nutrients that upsets the normal metabolic pathways in animal body. They are often multifactorial and usually occurs at the advent of significant physiological stress like the situations where the demand for these nutrients/minerals/energy increases drastically.

Common metabolic diseases in farm animals

These are diseases which results from an imbalance between the demand and supply between key nutrients or energy due to production practices that aren't aligned to animal's needs. These occupy a significant space at places where high producing animals are needed, viz., dairy industry. Common metabolic diseases in cattle include milk fever, ketosis, fat cow syndrome, downer cow syndrome and hypomagnesaemia, which are usually associated with an acute, transient, but potentially fatal deficiency. Monitoring cow diet and improving diet as per requirement during the period from late pregnancy to peak lactation is crucial in preventing these diseases. Diseases such as hypocalcemia, hypomagnesemia, and hypoglycemia are augmented by management practices directed toward improving and increasing production. They are therefore correctly considered production-related diseases. However, they are also metabolic diseases because management of the animal is directed at production, which at its peak is beyond the capacity of that animal's metabolic reserves to sustain a particular nutrient at physiologic concentrations. For example, ketosis occurs when cows are in negative energy balance, and parturient paresis of cows (milk fever) occurs when the mass of calcium in the mammary secretion is greater than the cow's diet or its skeletal reserves can supply. Comparable situations occur with magnesium and glucose metabolism, and with phosphorus in relation to post parturient haemoglobinuria.

Other factors that contribute to hypocalcemia in dairy cattle include age, breed, and endocrinologic factors (eg, estrogen concentration). Most production-induced metabolic diseases result from a negative balance of a particular nutrient. In some cases, dietary intake of the nutrient is rapidly reduced while the animal is experiencing an ongoing high metabolic requirement for that nutrient. Examples include pregnancy toxemia in ewes, protein-energy malnutrition in beef cattle, fat cow syndrome in dairy cattle, and hyperlipemia in ponies. Furthermore, some diseases may be precipitated when producers, primarily because of economic concerns, are compelled to not supplement the diet of animals that already have a substandard nutritional plane. Exertional rhabdomyolysis of horses is another production-induced metabolic disease. In this case, the production activity (draft or racing) is maintained by and matched to a level of caloric intake. Management decisions not to work or race these horses without a concomitant decrease in caloric intake may result in accumulation of muscle glycogen to dangerous levels. Disease results when work is resumed and the production of lactate exceeds its metabolism.

The difference between production-related metabolic diseases and nutritional deficiencies is often subtle. Typically, nutritional deficiencies are long-term, steady-state conditions that can be corrected via dietary supplementation. Metabolic diseases are generally acute states that dramatically respond to the systemic administration of the deficient nutrient or metabolite, although affected animals may require subsequent dietary supplementation to avoid recurrence. An important aspect of dealing with production-induced metabolic diseases is accurate and rapid diagnosis. Ideally, diagnostic tests can be used to predict the occurrence of disease before its clinical onset. The signs of these conditions can overlap and look similar and it is not uncommon for more than one disease to occur at the same time further complicating the picture. For this reason, it is important to understand the causes of these diseases because the prevention and treatment are different.

Among domestic farm animals, the metabolic diseases achieve their greatest importance in dairy cows. The high producing dairy cows always verge on abnormality because the breeding and feeding of dairy cattle for high milk yield is etiologically related to the diseases of metabolism so common in these animals. In dairy cows, the incidence of metabolic diseases is highest in the period commencing at calving and extending until the peak of lactation is reached, and this susceptibility appears to be related to the extremely high turnover of fluids, salts and soluble organic materials during the early part of lactation. The biological cycles of milk production and reproduction determine dairying profitability thus making management decisions

dynamic and time -dependent. The dry period in cows looks apparently to be a resting phase between lactations, in reality considerable fetal growth, mammary tissue remodeling and high nutritional demands occur. During past two decades, the average annual milk production per cow has increased significantly due to advancement of our knowledge and techniques in genetics, breeding, nutrition and management. As the production of milk has increased per cow, metabolic diseases have become more common because huge amount of nutrients are drained from the cows in milk, which is difficult to replenish back through feed dry matter intake, which is less and fixed for cattle especially in first three weeks of parturition. Thus, proper nutrition and management of these high-producing cows become increasingly complex and critical.

Conclusion

Because the disorders mentioned above are interrelated and can occur as a complex in one animal or in a herd, herd health management strategies designed to prevent these diseases are urgently needed. So, an understanding and day to day update of these metabolic diseases becomes essential and critical for successful venture of dairy farm.

References

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