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Popular Article

Milk Fever (Parturient Paresis) In Dairy Cattle

Sulekha*& Alpa Lamba**
PhD scholar, Department of Veterinary Surgery and Radiology, LUVAS, Hisar.
MVSc Scholar, Department of Veterinary Surgery and Radiology, LUVAS, Hisar.
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Milk fever is a production disease of dairy cattle which is due to low serum calcium levels either before or soon after calving. It is one of the most commonly found mineral related metabolic disorders of cows. It occurs commonly within 48 hours of parturition in adult cows. It is prevalent in modern dairy industry which tries to maximize its profitability. Considerable risk is there at onset of lactation in dairy cows when there is sudden increase in calcium excretion from 10g to 30g per day. Due to this stress in the homeostasis of calcium blood calcium levels falls below the normal reference range of 8.5mg/dL. Cows which suffer with parturient paresis have even lower levels of serum calcium typically below 5.5 mg/dL. Parturient paresis can occur in dairy cows at any age but it is more common in high yielding animals in third or later lactation. Breed disposition is also there, Jersey and Guernesy breeds of cow are more susceptible to milk fever.

Calcium demand is relatively less during the dry period in cows. Hence during this time, intestinal absorption and bone resorption of calcium is relatively inactive. When there is onset of lactation, there is loss of calcium through milk and calcium homeostasis is unable to meet calcium requirement for milk production, then hypocalcemia occurs. About 50% of dairy cows have sub-clinical hypocalcemia in their second lactation.

Risk factors

These are the factors which contribute to the occurrence of milk fever and these are divided into intrinsic and extrinsic factors. The risk factors of milk fever includes intrinsic factors which are linked within the animal itself and extrinsic factors which are outside of animals body. Intrinsic factors includes number of parity and milk yield, age of the cow, breed of the cow and body condition score. With increasing parity and milk yield of animal, incidence of milk fever also increases. The chances of getting milk fever increases with age and certain breeds are more prone to milk fever as compared to others. When high body condition score is there before calving it is a risk factor for development of metabolic disorder. Extrinsic risk factor includes

dietary factor. Diets which have high level of calcium on daily basis increases the chances of milk fever. Also, prepartum diet high in cations like sodium and potassium increases the risk of milk fever.

There are three recognized stages of parturient paresis. In stage one, cows show signs of excitability and hypersensitivity. There may be presence of mild ataxia, ear twitching and bobbing of head. Animal might be restless, bellow and shuffle their hind feet. If cow is not treated during this stage it enters into stage two. In stage two, cow cannot stand and attains sternal recumbency. Cows are anorectic, muzzle is dry, cold extremities and subnormal body temperature. Auscultation of affected animals reveals tachycardia and reduced intensity of heart sound. Milk fever affected cows tuck their head in flank. Paralysis of smooth muscles leads to stasis of gastrointestinal tract which causes bloat and loss of anal sphincter tone. In stage three cows progressively lose their consciousness and enters into coma. Cows attain lateral recumbency, have extreme muscle flaccidity and unresponsive to external stimulus.

Diagnosis of milk fever is based upon the history of the animal including age, breed, milk yield and stage of lactation. Laboratory tests to determine the serum calcium level aids in diagnosis. The normal serum calcium in cows is 8-10mg/dL and cow whose serum calcium level is below 7.5mg/dL are considered to be hypocalcemic. Different stages of milk fever have different serum calcium levels. Stage one have serum calcium levels as 5.5-7.5mg/dL, stage two as 3.5-5.5mg/dL and in stage three serum calcium levels fall below 3.5mg/dL.

Differential diagnosis for milk fever in cows includes toxic metritis, toxic mastitis, traumatic injury (coxo-femoral luxation, spinal compression, fractured pelvis and stifle injury), calving paralysis syndrome (damage to obturator nerve and Lumbar 6) and compartment syndrome.

Treatment of hypocalcemia in cows

- Oral supplementation of calcium in standing cows
- Intravenous administration of calcium in recumbent cows
- Prevention of relapses in affected cows

Cows which are in recumbency are at risk for muscle and nerve damage and needs quick treatment. If excessive exogenous calcium is given in excess, chances of relapse of milk fever increases. Hence, the lowest effective dose of calcium should be given for the treatment of hypocalcemia. When stage one of milk fever is there, oral supplementation of calcium can be given. Oral calcium supplementation is absorbed well in bloodstream and little risk is there for rebound hypocalcemia. For oral supplementation, acidogenic source of calcium like calcium chloride or sulfate is good. These acidogenic sources increases the responsiveness to parathyroid receptors and promotes calcium homeostasis in cows. A standard oral dose provides 40 to 55 grams of elemental calcium and blood calcium levels reaches to peak within 30 minutes post oral supplementation. However higher oral doses of calcium may cause reduced feed intake, metabolic acidosis and increased risk of hypocalcemia relapse. Oral calcium supplementations in form of bolus is safest. Oral

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www.thescienceworld.net
thescienceworldmagazine@gmail.com
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supplementations in form of paste, gel or liquid formulations are not recommended as there is risk of pharyngeal irritation and aspiration. Non acidogenic source of calcium like calcium propionate requires higher dose of elemental calcium and does not enhance calcium homeostasis.

Cows which are in second or third stage of parturient paresis requires immediate intravenous calcium infusion. Standard treatment for an adult dairy cow is administering 500ml of 23% calcium gluconate solution. In addition to calcium, other products having phosphorus, magnesium, glucose and potassium are also available. The response to intravenous calcium therapy is usually immediate and excellent. Routine blood samples could be collected to monitor the serum calcium levels of cows at various time intervals. Response to intravenous administration of calcium includes declining heart rate and increasing pulse. Around 75% of recumbent cows stands within 2 hours of treatment. In cases where animal is unable to rise even after treatment is mainly due to pre-existing musculoskeletal and nerve damage.

Prevention

Feeding low calcium diets during prepartum dry period is main strategy of prevention. This does not depress the calcium homeostasis in the body and body is able to meet the calcium requirements during lactation. Calcium intake should be limited to 20g per day. Supplementing feed with calcium binders such as calcium aluminosilicate during dry period mimics the calcium deficiency. This reduces the risk of milk fever. Another approach includes feeding of acidogenic diet for 3 weeks before calving. This increases calcium absorption from gastrointestinal tract, improves responsiveness to parathyroid receptor and mobilizes calcium from bone. Prepartum diet with a dietary cationic-anionic difference (DCAD) between -50 to -150 milli equivalent per kg of diet is helpful in prevention of milk fever. Regular check upon urinary pH to monitor the metabolic status of the animal is advisable. Urinary pH of about below 5.5 is suggestive of metabolic acidosis and over acidification of the diet. Prophylactic use of oral calcium is beneficial in cows susceptible to milk fever. Cows milked incompletely or delay milking is another way of prevention of hypocalcemia.

Impacts of milk fever

Economic loss in milk fever is due to drop in milk yield, medical expenses, culling and mortality rate. Other impacts are due to reduced fertility rate, recurrence of milk fever in future and predisposition to other metabolic disease like uterine prolapse, dystocia, and retained placenta.

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