

Study on intravenous fluid therapy using a clinical scoring system

as an index for the treatment of suckling calves

Abstract of Doctoral Thesis

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A fluid therapy is considered to be the most effective treatment for diarrhea in calf, and it is necessary to evaluate the effectiveness of infusion therapy focusing on sodium (Na) concentration in the blood as well as the pathogenesis of dehydration and acid-base imbalance. In this study, we developed a clinical scoring system that can be applied in clinical practice to treat calf diarrhea and proved the usefulness of fluid therapy strategies using various infusion fluid with different sodium concentrations based on pathological analysis.

In Chapter 1, Kasari's depression score correlated significantly with the concentrations of Hematocrit, total protein, potassium (K), and inorganic phosphorus, blood biochemical parameters that are indicators of dehydration, in Japanese Black cattle and their crossbred diarrheal calves. However, it became clear that when the score generally exceeded 10, it deviated from the reference values of these measurement items. Therefore, to correct dehydration in calf diarrhea, if the depression score is higher than 10, intravenous infusion is actively performed, and if the score is higher than 6.5, sodium bicarbonate is used to correct metabolic acidosis.

In Chapter 2, a model of mild acidemia was created by inducing mild metabolic acidosis due to malabsorption of milk replacer, and isotonic electrolyte infusions (physiological saline [ISS], The correction effects of acid-base imbalance of DL-type lactated Ringer's solution [DLR], L-type Lactated Ringer's solution [LR] and Acetated Ringer's solution [AR]) were compared. Since acetate ion does not rely on liver metabolism alone for BE concentration than lactate ion, it was suggested that AR is superior to DLR and LR in the treatment of mild metabolic acidosis in calves in this study.

On the other hand, resuscitation therapy by intravenous administration of hypertonic saline solution (HSS) is an economical and efficient treatment method in the bovine clinical medicine. However, it is not clear whether rapid fluid movement and increased blood circulation are safe enough for calves which undeveloped cardiovascular and renal urinary systems. Chapter 3 described the usefulness of 2.16% HSS for patients with hyponatremia as an application to HSS diarrhea calves. As a result, we clarified 2.16% hypertonic saline solution is extremely effective in improving dehydration and hyponatremia of diarrhea calves with hyponatremia, although caution is required for plasma K concentration.

To summarize this study, it is the most important and fastest cure method to accurately grasp the condition of diarrhea in suckling calves with the change of time in the field and to select an infusion solution suitable for that condition and treat it early. In the clinical practice of food animals, the scoring system used this time are comprehensively diagnosed by obtaining a lot of information and an appropriate infusion solution.