

8. Summary

Experimental investigation of the effects of different anionic salts to the acid-base balance of dairy cows

The aim of this study was to get further information about the influence of different factors to the effect of anionic rations, to optimize the use of anionic salts in the prevention of milk fever of dairy cows. These factors are the influence of a prolonged administration of anions, of different energy and calcium supply, the effects of the sodium-potassium relation, the maximal tolerated dose of calcium sulfate as well as the investigation about the application of the daily dose of calcium chloride and calcium sulfate once a day.

From february 2003 to march 2004 the investigations were performed on cows with rumen fistula. During the trials the animals got the acid salts calcium chloride and calcium sulfate through the rumen fistula twice a day at the feedings (except for the trial about the once a day application and the trial with sodium- and potassium bicarbonate). Several times a week blood and urine samples were taken to determine the blood gas analysis (ph, be, CO₂, O₂) as well as the net acid-base excretion. For each trial the feed was analysed and the dcad of the ration was measured. In all 1401 blood and urine samples have been taken and examined.

The prolonged administration of anions showed, that the entire effect of the anionic salts is completely developed after 3 – 7 days. A significant metabolic acidosis set in. The values of ph, be and bicarbonate of the blood decreased. In the urine the effect of the acidosis was observed as well. There was a significant decrease in ph and nsba. Because of the fact, that the complete effects are developed within 3 – 7 days, and because of the risk of strong disturbances of the acid-base equilibrium, the use of the acid salts should last 7 days at least, but not longer than 14 days. The results of the investigation about the different energy supply showed, that the concentration of energy should be sufficient to avoid a further increase of the acidosis by the metabolic products, which result from the degradation of fatty and amino acid at catabolism. The degree of the calcium supply had no significant influence of the impact of the anionic salts relating to the acid-base status. Never the less, when feeding acid salts, it is very important to supply calcium in sufficient amount (120 – 180g/d), because of the strong renal calcium excretion. The investigation of the impact of sodium and potassium showed, that cations can counteract and compensate the effects of the anions and with it the mechanism of the prophylaxis of milk fever.

The application of anions and cations in equivalent amounts at the same time had no effect of the acid-base-balance. The exclusive use of sodium- and potassium bicarbonate did not show the expected alkaline effects. The investigation of the maximal tolerated dose of calcium sulfate showed, that the cows developed a strong metabolic acidosis after one week of application of 3 equivalents of calcium sulfate. Because of that, the dose of 3 equivalents should not be exceeded. It is better to think of 2,5 equivalents as upper limit. The results of the daily range of activity show, that it is not advisable to administer the daily dose of calcium chloride or calcium sulfate only once a day, because the effect of the salts, especially of calcium sulfate does not last 24 hours, whereas the application of anionic salts twice a day results in an unchanged level of the values over 24 hours. Because of that, the time of taking the samples is independent of the moment of the anion application. The results of this study help to make the use of anionic salts more reliable and safe.