

Abomasal and Duodenal Activity Alterations in Periparturient Dairy Cattle

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Introduction

Abomasal dysfunction is theorized to underlie development of abomasal displacements. Abomasal function studies in healthy animals have not shown a conclusive role for diet, hypocalcemia, or neuroendocrine factors in altering abomasal motility. However, none of the studies were performed in the periparturient cow. The goal of this pilot project was to detect any significant alterations within the peripartum period in either antral or duodenal myoelectrical activity. We hypothesized healthy cows would not show significant alterations either during mid-lactation (as previously described) or between pre- and postpartum periods.

Materials and Methods

Six cows without evidence of systemic disease or previous surgery were implanted with strain gauges and electrodes via a right-sided paracostal celiotomy approximately three weeks prior to calving. Two pairs of stainless steel electrodes were implanted on the duodenum at the pylorus and 5-10 cm distally. A third pair of electrodes was implanted as far proximally on the antrum as possible (15-20 cm from pylorus). At least one strain gauge was positioned near each pair of electrodes. An omentopexy was performed. Monitoring was begun after one week and continued for at least two weeks postpartum. Spike bursts per minute, peak amplitude of abomasal spikes, and duration of duodenal myoelectrical activity phases was determined from electrode recordings. Multiple regression analysis was used to evaluate data in terms of cow, duodenal myoelectrical phase (pattern of spiking activity), date in relation to calving, time of day, and time in relation to milking in

postpartum cows, and whether or not medical treatment was required. Correlation data was considered significant at $p < 0.05$.

Results and Conclusions

All cows calved without assistance. Three cows developed retained placentas and required medical treatment, but were healthy by the end of the study. Abomasal peak spike amplitudes were correlated with date from calving and/or relation to milking. Postpartum cows had higher amplitude spikes than those more than five days prior to calving. Cows being treated medically had lower peak amplitudes than those not being treated. Abomasal spiking frequency increased following calving, particularly following milking as compared to prepartum levels. While cows being treated had fewer spikes per minute than untreated cows, those with retained placentas averaged more spikes per minute than those without.

Five of six cows showed no significant change in abomasal spiking amplitude with duodenal phase (normally observed) for at least six days postpartum. Duodenal phase durations appeared prolonged for all stages, particularly intermittent spiking activity (average 73.3 ± 1.6 minutes). Periods of no spiking activity tended to be absent within a few days of parturition and were variable in the time of return. No tested factor appeared related to the increased duration.

Duodenal spiking frequency increased following calving, particularly post-milking. While the factors involved are difficult to interpret at this stage due to low numbers of subjects, changes in antroduodenal myoelectrical activity appear to occur in peripartum dairy cows compared to mid-lactation cows or steers, and in postpartum dairy cows compared to prepartum cows.