

Monitoring Ruminant pH by Datalogger Using Wireless Telemetry

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In the ruminant, bacterial fermentation of forage generates volatile fatty acids (VFA). A healthy rumen environment depends upon maintenance of a narrow 6.8-7.0 pH range. Unless carefully managed, feedlot diets of beef cattle and high concentrate dairy rations can induce a marked fall in ruminal pH to around 5.0 resulting in sub-acute ruminal acidosis. This affects the health and productivity of the animals. The objective of this study was to examine the *in vivo* accuracy and durability of a device capable of non-invasively monitoring rumen pH under these dietary circumstances.

Traditionally, the rumen pH has been recorded by testing ruminal fluid collected via a stomach tube or fistula, by using sensors suspended in the rumen at intervals (Dado and Allen, 1993), or exceptionally, with data recorders (Beauchemin and Yang, 2005; Penner et al., 2006). This study examined the performance of a telemetric bolus that measured and recorded pH continuously (Well Cow Rumen pH Datalogger and Transponder system; WCpH). When interrogated by wireless the WCpH bolus transmitted the recorded data to a receiving station held by an operator standing beside the cow.

A pair of WCpH boluses was placed into the ventral rumen of a fistulated steer. Rumen pH of fluid directly aspirated from the bolus location in the rumen and measured using a calibrated bench top pH meter (TPS pH Cube, Brisbane; LABpH) was compared with the data obtained from the WCpH. Use of a bolus pair within the same rumen also enabled between-bolus comparison. Figure 1 illustrates the LABpH readings taken at intervals for an 8 week period following insertion. They correlated closely with the downloaded WCpH bolus results for the first 4 weeks (to point 55), although one bolus (#173) appeared to lose its accuracy earlier than the other (#150), perhaps due to poorer electrode interface quality. After 4 weeks, both boluses deviated markedly from the LABpH readings and each other.

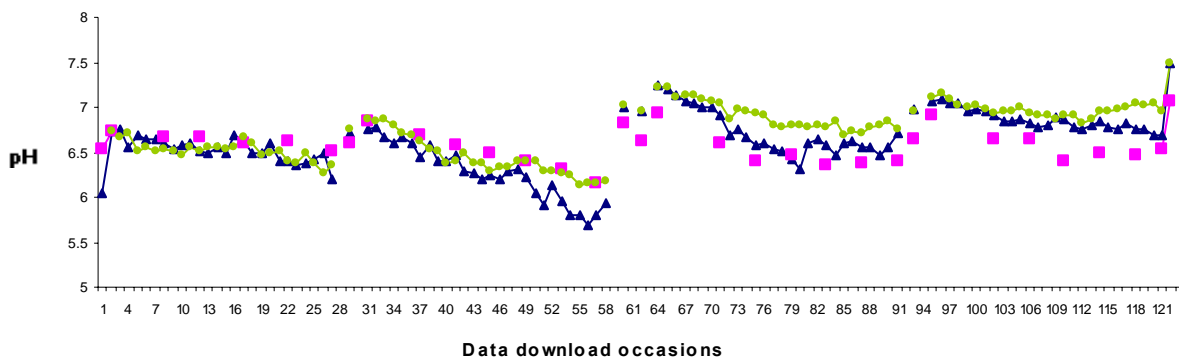


Figure 1. pH readings by 2 boluses (▲ bolus #173; ● bolus #150) within one fistulated animal and the corresponding bench top pH meter readings (■) taken from ruminal fluid in the bolus location

The WCpH bolus accurately recorded and transmitted the temporal variation in rumen pH for up to 4 weeks after insertion with no interference to the animal. This period would enable aberrant animal response to a new or changed ration/s to be identified. Whilst not identical, readings by both boluses within this period were very similar (within pH 0.2). One did appear to lose accuracy earlier than the other, perhaps due to variation in quality of the device. Further development to increase the accurate reading lifetime and the between-bolus consistency of the WCpH bolus has since occurred and further trials are underway.

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