Analysis of the Stability of Rumen pH Measurements Obtained Postmortem in Feeder Calves

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Introduction

The value of rumen pH readings postmortem as a diagnostic aid in feeder cattle has long been debated. Obtaining a rumen pH measurement as part of a routine postmortem examination has been described to help determine cause of death due to digestive system disorders such as acidosis. Some dispute the use of pH readings, arguing that rumen pH will continue to change after death, yielding inaccurate results. The goals of this study were to determine the difference in postmortem pH levels between cattle fed one of two diets, and to determine how stable postmortem pH is over a 24-hour period.

Materials and Methods

Seventeen 285 ±30 lb (129.5 ±13 kg) Holstein steers that were also enrolled in a concurrent model development trial were used in this study. Cattle were randomly assigned to a finish-ration treatment group: 1) limit fed or 2) ad libitum access. Calves were humanely euthanized and transported to the KSU Veterinary Diagnostic Lab, where they were held for 24 hours at room temperature. One 10 mL sample was taken from each animal at 0, 1, 2, 3, 6, 12, and 24 hours after death, and the pH was measured and recorded. Five samples from each treatment group were randomly chosen for determination of volatile fatty acid (VFA) and lactic acid concentrations using gas-liquid chromatography (GLC). Data was analyzed using the proc mixed procedures of SAS with a repeated measures statement to account for the multiple samplings used in this study.

Results

No interactions between time and feed were significant for pH or VFA results ($P>0.05$). Feeding regimen had a significant effect on the ruminal pH of calves ($P=0.05$). The average postmortem rumen pH of calves fed ad libitum (5.75 + 0.8) was significantly lower than cattle limit-fed a finish ration (6.18 + 0.07; $P=0.05$). Postmortem pH was different at different sampling times ($P=0.003$). There was a trend for the pH of rumen samples to rise for the first six hours postmortem, and then to gradually fall over the next 18 hours. Total VFA concentrations were analyzed and found to change significantly with time ($P<0.0001$), but not with feeding regimen ($P>0.05$).

Significance

If determined to be an accurate diagnostic tool, pH could be very useful in determining cause of death due to digestive disorders. Economic losses due to bloat and acidosis include decreased gain, decreased efficiency, and many times, increased mortality in feedlots. Thus far, little published scientific evidence has been produced, making studies such as this essential if the use of pH to determine cause of death is to continue.