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Changes in pH of the ruminal and reticular fluids in Japanese black beef cattle

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Objectives: Japanese black beef cattle produces high quality meats, whereas clinical or subclinical ruminal acidosis (SARA) have been frequently occurred due to feeding a high-grain diet with small amount of forage. However, the characterization of reticulo-rumen fluid is unknown in Japanese black cattle for fattening. Therefore, the objective of this study is to characterize the rumen and reticulum fluid, especially pH and VFA, in Japanese black beef cattle.

Materials & Methods: Japanese black beef cattle equipped with fistula in the middle (n=3) and later (n=3) fattening stage were used. Cattle were fed much concentrates and hay twice a day by the routine manner, respectively. Ruminal and reticular pH measured continuously every 10 min using a radio transmission system (YCOW-S; DKK-TOA Yamagata, Japan). Rumen and reticulum fluids for VFA, NH3-N, and lactic acid analysis were collected in the 4 hours after morning feeding. The 24-h mean pH, and VFA, NH3-N, and lactic acid concentrations were analyzed using two-way repeated measures ANOVA with Bonferroni's multiple-comparison post-test, and Pearson's correlation coefficients were calculated between pH and other parameters in the rumen and reticulum.

Results: The 24-h mean ruminal and reticular pH were low in each of the middle (5.5-6.6 and 5.1-6.2) and later stage (5.3-6.1 and 5.5-6.1), and the ruminal pH was tended to be lower than the reticular pH. Furthermore, the ruminal and reticular pH values of the later stage showed a tendency to be lower than the middle stage. No significant difference was observed in the ruminal and reticular VFA, NH3-N, and lactic acid concentrations. Although high variations among the individual cattle were observed, a positive correlation was identified between the ruminal and reticular pH. However, 24-h mean pH was not significantly correlated with VFA, NH3-N, and lactic acid in the rumen and reticulum.

Conclusion: Low ruminal and reticular pH were identified in the middle and later fattening stage of Japanese black beef cattle, and the ruminal pH was slightly lower than reticular pH. Further research is required to reveal the pathophysiological evaluation of SARA in Japanese black beef cattle.

Biography

Shigeru Sato earned MS degree in Pathology of Bovine Leukemia from Iwate University in 1980, thereafter he worked at the Miyagi Prefectural Federation of Agricultural Mutual Aid Association from 1980-2006. He earned PhD in ruminal bacteria and immune response of calves from Tohoku University in 1991, and also in immunity of periparturient cows from Kitasato University in 1998. Now he is a Faculty Member of Iwate University, and teaches a course on Food Animal Internal Medicine and Bovine Clinics.

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