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Rumen lipopolysaccharide activity is decreased by lactoferrin feeding in lactating dairy cows

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Feeding high-grain diets to induce subacute ruminal acidosis (SARA) in dairy cows has consistently been associated with increase in the concentrations of lipopolysaccharide (LPS) endotoxin originating from gram-negative bacteria in rumen fluid, and of acute phase proteins, including LPS-binding protein (LBP), in peripheral blood. Changes in the levels of acute phase proteins and LBP are indicative of a systemic immune response, possibly due to the translocation of LPS from the digestive tract. Lactoferrin (LF) is an important modulator of the immune response and inflammation. *In vitro* studies have shown that LF inhibits LPS-induced inflammatory response. We investigated the effect of bovine LF feeding on rumen LPS level and pH and plasma LBP in lactating dairy cows. 24 Holstein cows were randomly assigned to two groups: LF (10 g/day) feeding group (n=12) and LF (0 g/day, control) group (n=12) during 3 and 12 weeks after the parturition. Cows were fed a close-up total mixed ration (120% of TDN requirement). Postpartum, cows were fed the same close-up diet and commercial concentrate (NDF 33%, 100% of TDN requirement). Wireless ruminal pH sensors were used to obtain ruminal pH profiles (10 min interval) 3 weeks prior to calving until 9 weeks postpartum. Cows were considered to have SARA if the total below pH 5.8 was ≥ 180 min/day. Rumen LPS activity was lower ($P < 0.05$) in the LF feeding group than in the control group at 12 weeks after parturition. Plasma LBP concentration was lower ($P < 0.05$) in the LF feeding group than in the control group at 8 and 12 weeks after parturition. There were no significant differences in body weight, dry matter intake, milk yields, and rumen volatile fatty acids concentration in both groups. Cows in LF and control group had similar pH profile in lactating period, the amount of time at $\text{pH} \geq 5.8$ (67 vs. 81 min; SEM 0.45) and SARA cow was one of them in each group. Our results indicated that bovine LF feeding decreased rumen LPS activity and plasma LBP concentration in dairy cows after parturition.

Biography

Shiro Kushibiki has completed his PhD from Tohoku University and Post-doctoral studies from National Institute of Livestock and Grassland Science (NILGS). He is an Associate Director of Ruminant Metabolism Unit of NILGS. He has published more than 30 papers in reputed journals and is serving as a Professor of Tsukuba University.

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