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First View

Immunological effects of altering the concentrate inclusion level in a grass silage-based diet for early lactation Holstein Friesian cows

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Abstract

Concentrate inclusion levels in dairy cow diets are often adjusted so that the milk yield responses remain economic. While changes in concentrate level on performance is well known, their impact on other biological parameters, including immune function, is less well understood. The objective of this study was to evaluate the effect of

concentrate inclusion level in a grass silage-based mixed ration on immune function. Following calving 63 (45 multiparous and 18 primiparous) Holstein Friesian dairy cows were allocated to one of three isonitrogenous diets for the first 70 days of lactation. Diets comprised of a mixture of concentrates and grass silage, with concentrates comprising either a low (30%, LC), medium (50%, MC) or high (70%, HC) proportion of the diet on a dry matter (DM) basis. Daily DM intakes, milk yields and BW were recorded, along with weekly body condition score, milk composition and vaginal mucus scores. Blood biochemistry was measured using a chemistry analyzer, neutrophil phagocytic and oxidative burst assessed using commercial kits and flow cytometry, and interferon- γ production evaluated by ELISA after whole blood stimulation. Over the study period cows on HC had a higher total DM intake, milk yield, fat yield, protein yield, fat+protein yield, protein content, mean BW and mean daily energy balance, and a lower BW loss than cows on MC, whose respective values were higher than cows on LC. Cows on HC and MC had a lower serum non-esterified fatty acid concentration than cows on LC (0.37, 0.37 and 0.50 mmol/l, respectively, $P=0.005$, $SED=0.032$), while cows on HC had a lower serum β -hydroxybutyrate concentration than cows on MC and LC (0.42, 0.55 and 0.55 mmol/l, respectively, $P=0.002$, $SED=0.03$). Concentrate inclusion level had no effect on vaginal mucus scores. At week 3 *postpartum*, cows on HC tended to have a higher percentage of oxidative burst positive neutrophils than cows on LC (43.2% and 35.3%, respectively, $P=0.078$, $SED=3.11$), although at all other times concentrate inclusion level in the total mixed ration had no effect on neutrophil phagocytic or oxidative burst characteristics, or on interferon- γ production by pokeweed mitogen stimulated whole blood culture. This study demonstrates that for high yielding Holstein Friesian cows managed on a grass silage-based diet, concentrate inclusion levels in early lactation affects performance but has no effect on neutrophil or lymphocyte immune parameters.

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References

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