Association among pasture-level variables and dairy cow responses to supplements

C. Poole\textsuperscript{1,2}, D. J. Donaghy\textsuperscript{1}, R. R. White\textsuperscript{2}, and J.R. Roche\textsuperscript{3,4,5}

\textsuperscript{1}DairyNZ Limited, Newstead, Private Bag 3221, Hamilton, New Zealand 3210.
\textsuperscript{2}Department of Dairy Science, Virginia Tech, Blacksburg 24061
\textsuperscript{3}School of Agriculture and Environment, Massey University, Palmerston North, New Zealand 4410
\textsuperscript{4}School of Biological Sciences, University of Auckland, Private Bag 92019, Auckland 1142, New Zealand.
\textsuperscript{5}Current address: Ministry for Primary Industries, Pastoral House, Wellington, New Zealand.

ABSTRACT

In grazing systems, the marginal milk production response to additional feed (i.e., supplement) is dependent on the relative feed deficit of the cow. We hypothesized that the relative feed deficit could be defined by post-grazing residual (PGR), with a greater PGR indicating a smaller relative feed deficit (RFD). The objective of our study, therefore, was to determine the relationship between post-grazing residual and the marginal milk production response to supplements. We undertook a computerized literature search utilising key words associated with grazing systems and supplementary feed. We collated data from 26 experiments and 90 treatments, wherein pasture-level, supplementary feed, and milk production variables were reported. A meta-analysis was undertaken using random coefficient regression fitted as a mixed-model to determine the marginal milk production response to supplements. On average, pasture DM intake declined ($P < 0.001$; -0.28 kg/kg supplement DM) and milk, fat, and protein yield increased ($P < 0.001$; 0.64 kg, 20g, and 30g/kg supplement DM, respectively) with increased supplement use. For every kg DM supplement consumed, post-grazing residual pasture height and mass increased by 1.4 mm and 42 kg DM/ha. Associated with every 10 mm increase in post-grazing pasture height in the control treatment, marginal milk response declined ($P < 0.05$) by 9%. These results will enable farmers to use the change in post-grazing residual when feeding supplements, to estimate likely marginal milk production response to supplementary feeds.