



## Determining the optimal ratio of canola meal to corn distillers dried grain protein as the primary supplemental protein for high producing dairy cows

N. Swanepoel<sup>1,2</sup>, P.H. Robinson<sup>1</sup>, L.J. Erasmus<sup>2</sup>

<sup>1</sup>University of California, Davis, USA

<sup>2</sup>University of Pretoria, South Africa

Protein nutrition is critical to high production efficiency of lactating dairy cows as it impacts their performance and our environment. Use of canola meal (CM) and dried corn distillers grains (DDGS) as major supplemental protein sources is currently very high in California dairy rations. Although limited data is available on the optimal ratio of supplemental CM and DDGS protein in lactation rations, a recent meta-analysis suggests that higher proportions of CM in the ration improve milk and protein yields (Huhtanen et al. 2012; CJAS 91: 529-543). The objective of our study was to determine the optimal ratio of CM to DDGS protein as the primary supplemental crude protein (CP) source for high producing dairy cows by feeding combinations of CM and a high CP/low oil DDGS (HPDDGS). The experiment was a 4 x 4 Latin square crossover with 28 d periods using four pens of ~320 high producing cows (i.e., those cows which had cleared the fresh pen but were not yet confirmed pregnant) per pen which were fed the same ration based on alfalfa hay, wheat and corn silages, almond hulls, corn grain, cracked pima cottonseed and a mineral premix with 17% CP, 33% neutral detergent fiber, 22.6% starch and 5.4% fat (all dry matter (DM) basis). The treatments were created by varying the CM and/or HPDDGS added on DM basis to the total ration to be: (1) 20% CM 0% HPDDGS (100% CM), (2) 13.5% CM 6.5% HPDDGS (67% CM), (3) 6.5% CM 13.5% HPDDGS (33% CM), (4) 0% CM 20% HPDDGS (0% CM). Dry matter intake was not affected (avg: 24.4 kg/d) by the CM/HPDDGS ratio in the ration. However, production of milk increased at a decreasing rate (44.9, 47.4, 47.9, 47.4 kg/d for the 0%,

33%, 67%, 100% CM treatments respectively;  $P < 0.01$ ) with a higher CM/DDGS ratio. True protein (TP; avg: 1.37 kg/d) and lactose (avg: 2.24 kg/d) yield, as well as milk energy output (avg: 31.9 Mcal/d) also showed the same quadratic and linear response ( $P < 0.01$ ). Maximum values for milk and TP yield were at ~67% CM while lactose and milk energy were maximized at ~60% CM. Milk fat yield (avg: 1.61 kg/d) and TP % (avg: 2.93) responded quadratically ( $P < 0.01$ ), with peaks at ~60% CM. Milk fat % (avg: 3.44) and milk energy density (avg: 0.68 Mcal/kg) had a linear decrease ( $P < 0.01$ ) with the lowest values at the 100% CM inclusion. Body condition score (BCS) change responded quadratically (0.001, 0.034, 0.08, 0.029 units/28 d for the 0%, 33%, 67%, 100% CM treatments respectively;  $P = 0.01$ ), with the highest BCS gain at ~60% CM inclusion. Overall, results suggest that the optimum ratio of CM to DDGS protein in this contemporary California dairy ration was ~60% CM of total CP, or ~12% of ration DM. The reduction in performance at the highest and lowest inclusion of CM/HPDDGS could be indicative of an imbalance in the dietary ruminally degraded (RDP) to ruminally undegraded (RUP) CP ratio, thereby negatively affecting rumen function, and/or an imbalance in amino acids available to support production.

### KEYWORDS

Distillers dried grains

Low corn oil

Nitrogen efficiency

Contact your feed supplier about complementing your herd's ration with a balanced, efficient source of protein: canola meal.