

The effects of ration concentrations in protein and energy on feed intake, yields, digestibility, and production efficiency

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Intensive selection and improvements in nutritional and management techniques have markedly increased milk yields of dairy breeds worldwide and this, in turn, has increased their gross production efficiency. Although milk production was greatly increased, no essential adaptation in nutrition was made, and the cows compensated for inappropriate nutrition by increasing the feed intake up to 32 kg DM per day. The increase in DMI also increased the digesta passage through the digestive tract which might decrease the digestibility. In general, the feed efficiency increases with the increase in milk production; however, the marginal efficiency decreases with the increase in DMI. The objectives of this study were to examine a few manipulations in the diet density in energy and protein on production, digestibility, and efficiency. In the first study, we fed 42 milking cows with 3 diets: 1) low energy and protein (LDD; 1.74 NEL/DM, 16.2% crude protein), 2) Medium energy and protein (MDD; 1.78 NEL/DM, 16.5% crude protein), and 3) High energy and protein (HDD; 1.81 NEL/DM, 17.1% crude protein). The cows were housed in the individual feeding barn in Volcani Center and fed the experimental diets for 12 weeks. We did find differences in milk yields among groups and the fat and protein percentages were lower in the HDD cows. The DMI was lower in the HDD and the production efficiency and marginal efficiency for milk production were higher in the HDD cows, but not for FCM and ECM. In the second study, we fed milking cows at late lactation (225 DIM at the start of the study) with either 1) Control diet with 1.78 NEL/DM, 16.5% crude protein, and 34.3% forage, or 2) Low energy diet (LED) containing 1.75 1.78 NEL/DM, 16.5% crude protein and 41.5% forage. The milk yield and milk protein content were higher in the control cows, and the milk-fat content was higher in the LED cows. The DMI was not different between groups, and the production efficiency was higher in the LED cows only for FCM but was higher in the control group for milk production. The digestibility of all nutrients was lower in the LED cows, and we assumed that the 7.2% higher forage content in the LED cows decreased the digestibility and was the main reason for the lower milk and protein yields. The results of this study showed that further research is required to fine-tune the density of milking cows' diets to maximize the yields, but also the production efficiency of high-yielding cows.