

# How Do Dietary Energy Source And Protein Supply Influence Milk Yield And Composition?

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Feed formulation programs consider energy and protein as separate entities but their effects on milk component yield are highly inter-related. Milk protein yield changes in response to dietary energy source, and vice-versa, milk lactose yields can be affected by dietary protein supply. The objective of this study was to determine the effect of different dietary energy sources in combination with high and low metabolizable protein (MP) supply on milk yield and composition and dry matter intake (DMI).

Eight lactating Holstein cows were used in a 4x4 Latin square design with 21-day periods. Cows were fed four different diets: high fibre-high fat high protein (HFHP), high fibre-high fat low protein (HFLP), high starch high protein (HSHP) and high starch low protein (HSLP). All diets were balanced to supply 100% of the net energy requirement, whereas the HP and LP diets supplied 100% and 70%, respectively, of the MP requirement (NRC, 2001).

Milk yield (33.8 vs. 29.2 kg/day) and DMI (22.2 vs. 18.0 kg/day) were higher in cows fed HS diets compared to those fed HF diets, whereas neither parameter was affected MP supply. Milk protein (3.06 vs. 2.88%) and lactose (4.62 vs. 4.54%) concentrations were higher in cows fed HS than those fed HF, but milk fat concentration was higher with HF (4.45%) compared to HS (3.59%). Metabolizable protein supply affected milk protein yield, with cows fed HP diets producing 960 g/day and those fed LP producing 900 g/day. Protein supply also affected milk urea-N, which was lower for LP (7.9 mg/dL) than for HP (14.6 mg/dL). Milk urea-N was also lower for HS diets (9.4 mg/dL) than for HF diets (13.9 mg/dL). There were no interactions between energy source and MP supply on any of the measured parameters.

**Implications:** Dietary energy impacted milk yield and composition more than protein supply did. Although the diets were formulated to be equal in energy content, the cows responded more positively to a high starch diet than to a high fibre-high fat diet. The effect of protein supply was not impacted by energy source.