

PROGRESS REPORT
NORTH CENTRAL REGION CANOLA RESEARCH GRANT
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Title: Canola Meal in Place of Distillers Grains for Lactating Dairy Cows

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Research Objectives:

To determine the response of lactating dairy cows to diets containing canola meal as the protein supplement fed to dairy cows in place of all or portions of distillers grains with solubles (DDGS). Key responses to be measured will include dry matter intake, milk yield and composition, and amino acid uptake by the mammary gland.

Procedures:

Twelve lactating cows will be used in a replicated 4 × 4 Latin square experiment with 4-wk periods. Test diets will be:

- 1) Canola meal as the source of supplemental protein
- 2) 2/3 canola meal and 1/3 DDGS as the source of supplemental protein
- 3) 1/3 canola meal and 2/3 DDGS as the source of supplemental protein
- 4) DDGS as the source of supplemental protein

All diets will contain 27.5% of DM as corn silage, 27.5% alfalfa hay, and 45% of the respective concentrate mix containing the protein supplements and other ingredients. Corn will be the major grain ingredient used in all diets and all diets will be balanced to provide recommended nutrients for high producing dairy cows (NRC, 2001). The first 2 weeks of each period will be for adaptation to diets with experimental data collected during wk 3 and 4 of each of the 4 periods.

Parameters to be measured will include: dry matter intake, milk yield and composition, ruminal volatile fatty acids and ammonia, and amino acid uptake by the mammary gland. Individual cow feed intake of the total mixed rations will be measured using Calan feeding doors. Milk will be sampled 2 d during each of wk 3 and 4 of each

period for analysis of fat, protein, lactose, and somatic cells according to AOAC procedures (2000). During the last week of each period, blood from the coccygeal artery and subcutaneous abdominal vein will be collected into heparinized vacutainer tubes. Plasma will be analyzed for amino acids via high performance liquid chromatography. Ruminal fluid will be collected 2 to 4 h after feeding during the last week of each period via an esophageal tube fitted with a suction strainer on one day at the end of each period for analyses of volatile fatty acids (Ottenstein and Bartley, 1971) and ammonia-N (Weatherburn, 1967).

Samples of corn silage, alfalfa hay, concentrate mixes, canola meal, DDGS, and total mixed rations will be collected weekly and stored at -20°C until analysis. Samples will be composited by period for analyses of crude protein, ether extract, ash, Ca, P, and Mg according to AOAC procedures (AOAC, 2000) and for fiber fractions. Fiber analyses will include neutral detergent fiber with sodium sulfite and α -amylase (Van Soest et al., 1991), acid detergent fiber (Robertson and Van Soest, 1981), and ADL (Lowry et al., 1994) sequentially with an ANKOM fiber analyzer (ANKOM Technology Corp., Fairport, NY). Samples of canola meal will be analyzed for glucosinolates using procedures of the American Oil Chemists Society (1998).

Data will be analyzed using the MIXED procedure (Littell et al., 1996) of SAS (1999). Linear and quadratic contrasts will be evaluated to determine the optimal proportion of canola meal protein to include in diets.

Progress to Date:

The experiment will be starting during the first week of January 2007. This is slightly later than originally intended because of other experiments also being conducted in the SDSU Dairy Research and Training Facility. Cows and Calan feeding door spaces were not available until now. The animal part of the experiment will start in early January and end in early May. However, at least six months beyond that time will be required to complete lab analyses, especially amino acid analyses, and analyze the data.