
New Oat Improves Milk Yield and Income

Zhiyuan Niu, D. A. Christensen, B. G. Rossnagel and Peiqiang Yu*
College of Agriculture and Bioresources, University of Saskatchewan,
Saskatoon, SK S7N 5A8 (* Email: peiqiang.yu@usask.ca)

Researchers at the University of Saskatchewan have recently developed a new variety of feed oat, CDC SO-I. Scientists conducted studies to shed light on its effect on cow performance when included as a concentrate in dairy rations. The results indicate that CDC SO-I oat was more profitable than barley as a concentrate in dairy rations in Western Canada.

The new CDC SO-I oat was developed by the Crop Development Centre, University of Saskatchewan, Saskatchewan, with some unique characteristics. It has higher oil content and a more digestible hull compared to conventional oat varieties. Higher oil content of this variety increases the energy density for dairy rations. Oat hulls of this variety are more digestible in the rumen and can provide more energy for animals.

Oat grain can provide an economical feed alternative to barley. According to the data by Saskatchewan Agriculture and Food, oat yield was 10-20% greater than barley per acre, and priced 10-20% lower than feed barley per bushel. Thus, in order to reduce feed cost in the dairy industry, including oat grain in dairy rations as a feed concentrate would be a good alternative to barley provided that oat-fed cows maintained equivalent or greater levels of milk production relative to those fed barley-based rations.

Nutrient degradability of CDC SO-I oat was evaluated using the nylon bag technique by incubating oat samples in the rumen for 48 hours. The animals used in the experiment were 2 ruminally cannulated dry dairy cows housed in a free stall barn at the University of Saskatchewan, Saskatoon, SK. The objective of the study was to determine the effect of micronization of oat on its degradability of dry matter, crude protein, starch and fibre. Micronization is a dry heat treatment in which internal kernel temperature of treated

materials is raised to 90 to 100°C, typically for 1 min, and used primarily to modify the digestion patterns of nutrients of treated materials. The results showed that micronization of CDC SO-I oat increased starch degradability, decreased crude protein degradability, but did not have significant effects on degradability of dry matter (DM), neutral detergent fibre (NDF) or acid detergent fibre (ADF). Decreased crude protein degradability indicates that the micronized oat can provide more protein to the small intestine, which improves the efficiency of crude protein utilization in animals (Table 1). This kind of information is used in ration formulation programs such as CPM Dairy.

Table 1. Effect of micronization on nutrient degradability of CDC SO-I oat

| Treatment | ----- In situ degradability (%) ----- | | | | |
|----------------|---------------------------------------|------|--------|------|------|
| | DM | CP | Starch | NDF | ADF |
| Raw oat | 71.7 | 82.6 | 93.8 | 41.5 | 32.6 |
| Micronized oat | 72.8 | 73.3 | 98.3 | 38.5 | 34.4 |
| Change | 1.1 | -9.3 | 4.5 | -3 | 1.8 |

Recently, CDC SO-I oat treated with micronization or not was incorporated into dairy rations. In order to test its effectiveness and feasibility as a concentrate source for dairy rations, a barley-based ration was also included in the study since barley is the commonly used cereal feed grain in Western Canada. Replacement of barley with oat potentially increased yields of milk, fat-corrected milk and fat. When micronized oat was fed, milk fat yield (kg/day) increased by 12% over the barley control. Oat grain did not have a significant effect on other milk characteristics such as fat, CP, lactose and MUN compositions. When calculating milk income based on June 2009 component prices, feeding oat grain to dairy cows could generate \$0.82 to 1.13 more income per cow per day than feeding barley (Table 2).

Table 2. Effect of CDC SO-I oat on milk production and income

| | Barley control | Raw oat | Micronized oat |
|--|----------------|---------|----------------|
| Milk Yield | | | |
| Milk, kg/d | 34.94 | 36.20 | 35.85 |
| FCM (3.5%), kg/d | 33.98 | 35.97 | 36.63 |
| CP, kg/d | 1.17 | 1.19 | 1.19 |
| Fat, kg/d | 1.16 | 1.25 | 1.30 |
| Lactose, kg/d | 1.53 | 1.59 | 1.56 |
| Milk composition | | | |
| Fat % | 3.49 | 3.53 | 3.64 |
| CP, % | 3.41 | 3.32 | 3.37 |
| Lactose, % | 4.37 | 4.38 | 4.35 |
| MUN (mg/dl) | 6.33 | 6.86 | 6.98 |
| SCC | 65.00 | 66.00 | 94.50 |
| Milk income based on June 2009 component prices | | | |
| Milk revenue, \$/d | 25.41 | 26.23 | 26.54 |
| Fat revenue, \$/kg | 20.84 | 20.52 | 20.34 |
| Daily advantage over barley, \$ | | 0.82 | 1.13 |

In conclusion, in order to reduce feed costs, the new CDC SO-I oat variety could be used as a concentrate in dairy rations because of its lower cost than barley. Most importantly, feeding oat grain to dairy cows can potentially improve milk production of dairy herds, and therefore increase income of dairy farmers.