



Cereal Silages

2. Production responses

The first article in this series reported the effects of crop maturity on nutrient values and crop yields for barley, oat and triticale silages grown at the University of Alberta Research Centre. This article describes the production responses observed when these silages were fed to lactating cows as the sole forage in a total mixed ration (TMR). Because many producers consider alfalfa to be superior to cereal silages for lactation, we also included an alfalfa silage-based TMR for comparison. Ration crude protein and fibre levels are shown in table 1.

Early lactation cows were fed a TMR based on equal proportions of the 4 silages from calving until 28 to 34 days in milk (DIM). They were then divided into 4 equivalent groups and for the next 12 weeks each group was offered a TMR containing one of the 4 silages as the sole forage.

Mid lactation cows were also fed the mixed silage ration for 3 weeks starting at 116 to 166 DIM. They were then allocated to one of the 4 test rations for the following 12 weeks.

Feed intake

Table 1 summarizes the results of our feeding trials. Although not statistically significant from intakes of the barley or triticale rations, intake was

TMR SILAGE	DM %	CP -----	ADF % of DM	NDF -----
ALFALFA	62.6	21.3	21.1	32.2
BARLEY	55.9	17.8	18.9	35.4
OATS	53.9	17.7	19.5	37.9
TRITICAL E	47.1	17.3	19.7	36.5

Table 1 : Dry matter (DM), crude protein (CP), acid detergent fibre (ADF) and neutral detergent fibre (NDF) levels in total mixed rations (TMRs) fed to lactating cows.

highest for the alfalfa-based TMR in both early and mid lactation. This was likely due to the higher dry matter and crude protein and lower NDF levels of the alfalfa-based TMR (table 1). Consumption of the oat silage TMR was lower than that of the other rations in both stages of lactation. This can also be explained by the higher NDF content of the oat silage TMR.

Figure 1 demonstrates the close relationship between dry matter intake (DMI) and ration NDF level. In early lactation cows, each percentage point increase in ration NDF reduced DMI by 0.95 kg/day. In mid lactation, DMI was reduced by 0.38 kg/day for each percentage point increase in ration NDF.

PRODUCTION MEASURE	EARLY LACTATION				MID LACTATION			
	ALF	BAR	OAT	TRIT	ALF	BAR	OAT	TRI
DM INTAKE, kg/day	22.1 ^a	19.8 ^{ab}	17.1 ^b	18.6 ^{ab}	19.5	19.0	17.7	17.8
MILK YIELD, kg/day	34.0	31.2	29.6	29.4	22.1	23.3	22.9	20.9
MILK FAT, %	3.38	3.43	3.38	3.81	3.83	3.83	3.80	3.99
MILK PROTEIN, %	3.04 ^{ab}	3.14 ^{ab}	2.92 ^b	3.21 ^a	3.40	3.40	3.37	3.49
MILK LACTOSE, %	4.74	4.09	4.82	4.77	4.66 ^b	4.93 ^a	4.75 ^b	4.65 ^b
EC MILK, kg/day	32.4	30.1	28.9	31.7	23.0	24.7	23.9	22.0
BW CHANGE, g/day	243	359	-172	-49	478	613	207	350

Table 2 : Production responses to total mixed rations based on alfalfa, barley, oat or triticale silages. DM : dry matter, BW : body weight. Energy-corrected milk (EC MILK) is MILK YIELD corrected to the energy content of milk containing 3.5% fat, 3.2% protein and 4.75% lactose (see Prairie DHI Monthly Herd Summary User Guide pages 16-18). Within each stage of lactation, values in the same row with different superscripts are statistically different. For an explanation of statistical significance, refer to article 1F2 page 2.

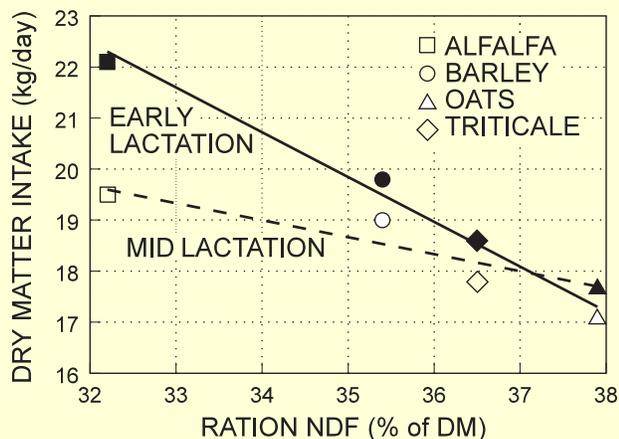


Figure 1 : Dry matter intake decreases with increasing ration NDF (neutral detergent fibre). This effect is more pronounced in early lactation.

Milk yields and milk composition

Early lactation cows fed the alfalfa-based TMR had numerically higher milk yields than cows fed cereal silages. However, this difference was not statistically significant because of the large variation in milk yields between cows. In a previous trial, early lactation cows fed an alfalfa silage-based diet also produced an insignificant 0.1 to 1.5 kg more milk than cows fed cereal silage-based rations. In mid lactation cows, milk yield on the barley silage ration was highest but, again, differences among diets were not significant.

In this study, triticale silage produced the lowest milk yields and the highest fat tests in both early and mid lactation. However, in the previous trial mentioned above, the fat test of early lactation cows fed triticale silage was the lowest of the four test groups. This confirms the lack of significance of any fat test differences among cows fed these four silages.

Milk protein content was also highest for both early and mid lactation cows fed triticale silage, confirming the response seen in the previous trial. In both trials, protein tests from early lactation cows fed triticale were significantly higher than those from cows on oat silage but not different from those fed alfalfa or barley silages.

Barley silage produced the lowest milk lactose content in early lactation and the highest in mid lactation. Although none of the early lactation differences in milk lactose level were significant, the mid lactation level for cows fed barley silage was significantly higher than for the other forages.

Energy-corrected milk represents actual milk production converted to an equivalent amount of milk containing 3.5% fat, 3.2% protein and 4.75% lactose. The results of this trial demonstrated no significant differences in energy-corrected milk production among silages in either early or mid lactation cows.

Body weight

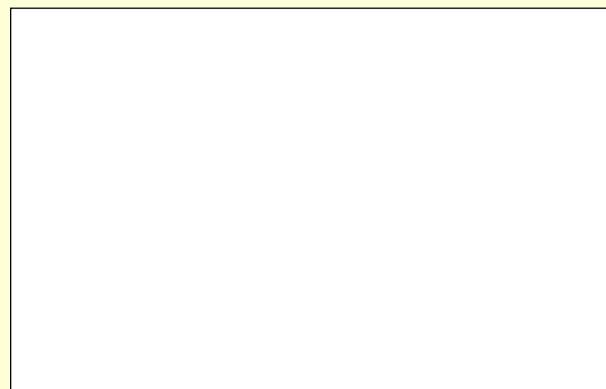
In early lactation, cows fed alfalfa and barley silages gained weight while those fed oat or triticale silages lost weight. This is probably a result of lower dry matter intakes of the diets containing oat and triticale silages. And, in turn, these lower intakes reflect the significant effect of ration NDF on DMI in early lactation (figure 1).

Mid lactation cows gained weight on all four diets although gains by cows on the oat and triticale diets were numerically lower. Figure 1 shows that ration NDF has less effect on DMI in mid lactation.

Conclusions

The results of this trial confirm the practical experience of dairy producers who routinely feed cereal silages to lactating cows. Cereal silages included in both early and mid lactation diets can support levels of production similar to those realized with alfalfa silage.

In early lactation, high ration NDF levels can reduce dry matter intake at the expense of body weight. As observed in the previous article in this series, harvesting of cereal silages at the soft dough stage results in high yields and an optimum balance of nutrients. NDF level at this stage is also lower than at any time during the preceding three weeks.



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