

## Evaluation of barley distillers' grains ensiled with or without molassed sugar beet pulp on feed intake and production of Holstein dairy cows

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**Introduction** Agro-industrial by-products are characteristically high in fiber and low in starch with some disparity in protein content based on source and processing method. Barley Distillers' Grains (BDG) consists largely of structural and protein remaining when extracted residues of grains used in the brewing process. Fresh BDG contain about 70%-80% moisture and can store as silage. However, there is limited research information available on improving BDG silage with readily fermentable carbohydrate. McKendrick *et al.* (2003) ensiled BDG with molassed sugar beet pulp (MSBP) very well. The aim of this experiment was to evaluate the potential of ensiled wet BDG with and without MSBP as alternative to maize silage on DM intake, milk yield and composition of dairy cattle.

**Materials and methods** Eighteen Holstein cows (7 primiparous and 11 multiparous with average of 86 d in milk) were assigned in to 3 treatments of six cows. Dairy cattle were selected according to body weight and milk yield on the week prior to the start of experiment. Treatments comprise of ensiled BDG with different level of MSBP and provided as followed: A) 40% MSBP+60% BDG (DM basis). B) 20% MSBP+80% BDG and C) 0% MSBP+100%BDG. Experimental diets contained, 40% forage (60:40 whole maize silage: Lucerne hay) and 60% concentrate. The treatments of ensiled BDG (A, B and C) were substituted with 30% (DM basis) maize silage. The experiment consisted of four periods each of 2 weeks with collection of data in the last week of each period. Throughout the experiment, cows were housed in tie stalls and fed three times daily after milking (6:00 h, 14:00 h and 22:00 h). The data were examined by analysis of variance based on completely randomized design (Repeated Measures) using SAS (9.1).

**Results** Effect of BDG ensiled with and without MSBP on DM intake, daily milk yield and composition represented in Table 1. Murdock *et al.* (1981) fed rations in which wet brewers' grains constituted 0-30 % of the ration on a dry matter (DM) basis without any significant decline in milk production. No significant differences were seen in DMI, milk yield and composition between diets. Results show that treatment C had a numerically lower DMI intake than the other treatments. These results tended to more efficient with increasing the level of MSBP in silage; however, the difference between diets is not statistically significant. Milk fat, protein and lactose yields were higher when diet B was offered. There were high significant differences between periods ( $P < 0.01$ ).

**Table 1** Effect of Barley Distillers' Grains ensiled with or without molassed sugar beet pulp on dairy cow performance

Items	Treatments			Treatment effect		Period effect
	A	B	C	s.e.m.	P	P
DMI (kg d <sup>-1</sup> )	20.90	20.00	19.20	0.88	0.41	***
Milk yield (kg d <sup>-1</sup> )	33.68	33.21	32.56	2.76	0.95	**
Milk composition (g d <sup>-1</sup> )						
fat	762.60	880.91	770.30	61.50	0.34	0.22
Protein	998.57	1061.82	1005.82	81.35	0.83	***
Lactose	1564.69	1603.33	1554.89	119.94	0.95	***

a, b, c Means in row with different superscript letter are different.

\*\*P < 0.01, \*\*\*P < 0.001.

**Conclusions** Based on effective NDF, the NRC (1989) recommends that at least 75% of total dietary NDF should come from forage. Firkins (1997) summarized the literature and determined that non forage NDF concentrations below approximately 15% depressed DMI by lactating cows. Under the circumstance of this experiment, the replacing of 30% maize silage with BDG ensiled with MSBP in the current experiment did not reduce DM intake and milk yield compared with BDG ensiled without MSBP. This may be due to the presence of readily fermentable non structural carbohydrate in diet and as well it's potential as an absorbent material in the ensiled material. Several possible explanations for this observation may be proposed. First, addition of MSBP increased the DM content of the mixture substantially which is known to increase intake. Secondly, the incorporation of MSBP with BDG improved fermentation in the silo. Further work is clearly required to establish the rumen fermentation kinetic when supplying different non structural carbohydrate in silage and diets.

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## References

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