

Abstract W223

Effect of Grain Prep[®] surfactant on ruminal in situ degradability of flaked corn dry matter and starch

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Application of surfactants during steam-flaking of grain may increase water penetration and consequently, starch digestibility in cattle. The objectives of this study were to investigate the effect of Grain Prep[®] (GP), a saponin-based surfactant, and hot flake ageing time on ruminal degradability of DM and starch of steam-flaked corn grain.

Materials and Methods

Two experiments were conducted at commercial feed preparation facilities. Incoming corn was automatically conditioned using the Grain Prep Auto Delivery System to average moisture contents of 20 (Exp. 1) and 19% (Exp. 2). The application rate of GP was 22 mg/kg corn. Control corn was treated with water alone. To evaluate the effect of ageing on flaked corn DM and starch degradability, processed corn in Exp. 2 was incubated in insulated containers for 0, 4, 8, and 16 h, after which time the grain was cooled in ice and analyzed for in situ degradability. Three ruminally cannulated lactating dairy cows were used for the in situ trial. Flaked corn samples were incubated in the rumen for 0, 2, 4, 6, 16, and 24 h. Passage rate of 0.06/h was used to calculate effective degradability (ED). Parameters of ruminal degradability were estimated using the PROC NL MIXED procedure of SAS.

Figure 1. In situ degradability parameters of flaked corn DM and starch

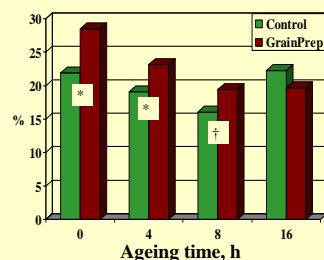
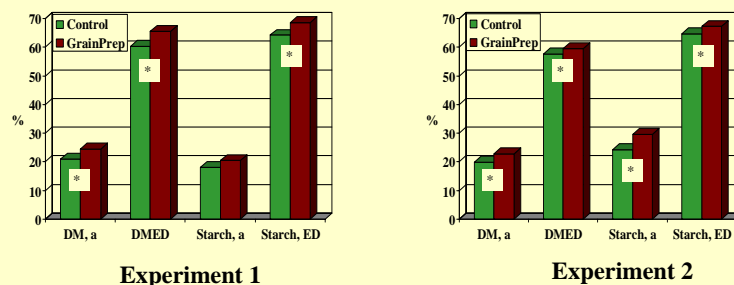


Figure 2. Effect of flake ageing on soluble corn DM. Exp. 2

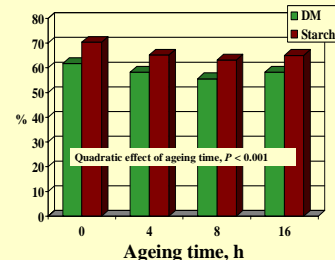


Figure 3. Effect of flake ageing on effective degradability of corn DM and starch

Results

The soluble/instantly degradable fraction of flaked corn DM and starch (fraction a) were greater ($P = 0.05$ to < 0.001 ; except starch in Exp. 1, $P = 0.290$) for GP-treated grain compared with the untreated control (Fig. 1). In Exp. 2, there was a significant ($P = 0.009$) interaction between surfactant treatment and ageing time for DM fraction a (Fig. 2). Effective degradability of DM was increased ($P < 0.001$) by GP in both experiments: by 8.6% in Exp. 1 and by 3.3% in Exp. 2. The ED of starch was also greater ($P < 0.001$) for GP-treated corn compared with the control: by 6.9% in Exp. 1 and by 3.9% in Exp. 2.

Fraction a of both DM and starch decreased ($P < 0.001$) quadratically with flake ageing time (Fig. 3). The ED of corn DM and starch also decreased ($P < 0.001$) quadratically with ageing time. Surfactant or ageing time had no effect on the potentially degradable fractions of DM and starch and its rate of degradation.

Conclusions:

Grain Prep[®] applied at 22 mg/kg increased flaked corn degradability in the rumen, primarily through increasing the soluble fractions of DM and starch. Ageing of hot flaked grain for up to 16 h decreased in a quadratic manner the solubility and ruminal degradability of corn DM and starch.