

# Saskatchewan Corn Cultivars for Grazing and Silage: Relationship between Crop Heat Units and Nutritional Value

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Two studies were conducted to investigate how Saskatchewan corn (*Zea mays*) varieties are affected by Crop Heat units (CHU) in relation to DM (dry matter) yield, nutrient profile and composition. Newly introduced corn grown in Saskatchewan is known as cool season corn, and is different from warm season corn varieties commonly found in USA. Seven different farm locations or farms from Saskatchewan farm-zones were selected for corn silage sample collection in 2010. Variety differences (n=24) were investigated in replicated plots at a single location, Outlook research station in 2011. Samples were analyzed for major nutrients used in estimating silage energy and protein. FT/IR (fourier transform infra red) spectroscopic technique is applied to understand and differentiate molecular structural components in silage.

In 2010 study results, except two cultivars all others achieved their CHU. A linear and quadratic relationship ( $p < 0.05$ ) with some nutrients [crude protein (CP),  $8.1 \pm 1.3$ ,  $r = 0.56$ ; neutral detergent fibre (NDF),  $56.3 \pm 3.5$ ,  $r = -0.54$ ; acid detergent fibre (ADF),  $33.6 \pm 2.3$ ,  $r = -0.71$ ; neutral detergent insoluble crude protein (NDICP),  $1.6 \pm 0.4$ ,  $r = -0.66$ ; soluble crude protein (SCP),  $4.2 \pm 1.3$ ,  $r = 0.61$ ], estimates [protein fractions (PB1,  $1.3 \pm 0.4$ ,  $r = 0.54$ ; PB3,  $1.5 \pm 0.4$ ,  $r = -0.740$ ), and carbohydrate fractions (CB2,  $45.1 \pm 2.8$ ,  $r = -0.65$ ; CB3,  $13.9 \pm 0.9$ ,  $r = -0.54$ )] and intestinal availability (ruminally degraded protein,  $6.6 \pm 1.2$ ,  $r = 0.59$ ; rdPB1,  $1.1 \pm 0.3$ ,  $r = 0.54$ ; rdPB3,  $0.9 \pm 0.3$ ,  $r = -0.74$ ; ruminally degraded carbohydrate,  $50.1 \pm 2.9$ ,  $r = -0.65$ ; rdCB2,  $39.9 \pm 2.5$ ,  $r = -0.65$ ; rdCB3,  $8.9 \pm 0.6$ ,  $r = -0.54$ ) were found. Molecular spectral data found neither difference among silages nor correlation with CHU. However, CHU correlated ( $r = -0.4$ ,  $p < 0.05$ ) with intensities ratio of carbohydrate to amide I. Cultivars reached target CHU were found to be optimal in nutrient and energy synchronization aspect.

All Outlook cultivars except three reached their target CHU, and they were harvested at 2161 CHU because of deteriorating weather. Higher (15.7 T) DM yield per acre was found in Pioneer 7443R cultivar. However, better degradability (52.2 %), TDN (70.2 %), estimated milk yield (1060 kg per T of DM silage) was found in Pioneer P7213R. Cool corn cultivars were grown well in Saskatchewan, and corn silages were nutritionally acceptable for cattle, however, care must be taken in selecting corn cultivars for crop production area. Further animal-feeding and production trials are warranted to investigate on-farm applicability and productivity.