NUTRITIVE POTENTIAL OF MULTITILLERING CORN COMPARED WITH NONTILLERING CORN FOR SILAGE

Corn (Zea mays L.) hybrids have been bred primarily for grain production. Generally the ideal corn plant is considered to be one with a single stalk and a grain-to-stalk ratio approaching 1:1 (Matsushima 1971; Nicholson 1971). For many years grain hybrids have been recommended for ensiling (White et al. 1924; Nevens 1933; Matsushima 1971) on the assumption that grain content in silage is the main factor determining the energy value for feeding livestock. The validity of this assumption was questioned by Hemken et al. (1971) when they found no significant differences in digestibility or milk production in cattle fed corn hybrids with highly different grain-to-stalk ratios. They concluded that corn hybrids for silage should be selected on the basis of dry matter yield rather than grain content.

Recently a number of experimental multitillering corn hybrids have been developed at the Canada Department of Agriculture Research Station, Ottawa, Ontario. These hybrids are capable, under irrigated conditions in western Canada, of yielding more dry matter than the recommended single-stalked plants. One of the Ottawa hybrids has been licensed as Stewarts Multi-T and is now available to growers.

Multitillering hybrids have a low grain-to-stalk ratio. Consequently, the question arises as to how they compare in nutritional quality to single-stalked plants. A study was conducted in 1971 to compare some of the factors that contribute to the nutritional potential of silage of these two types of hybrid corn. An attempt was also made to determine whether differences existed in the nature of fiber in the stover.

Hybrids of the two types of corn were grown in silage yield trials at Taber, Medicine Hat, and Lethbridge in southern Alberta. At Taber and Medicine Hat a non-tillering hybrid (Idahybrid 216) and four tillering (OX403, 404, 383, and 377) hybrids were grown in rows 10 m long and 75 cm wide. The corn was harvested in the well-dented stage with a forage harvester. A 5-kg sample of the chopped material was removed from each row and was dried and ground. At Lethbridge, ears were removed from one tillering (Stewarts Multi-T) and one nontillering (United 106) hybrid and the stover was chopped into 3-cm pieces. Some of the pieces were preserved by canning to retain the fiber strands, the rest were oven-dried and ground. Samples were obtained from each of four replicates of each hybrid in the trial.

The ground samples were analyzed for crude protein (CP), acid detergent fiber (ADF), lignin (Van Soest 1963), Ca (Kessler and Wolfman 1964), P (Ward and Johnston 1960), K (using an autoanalyzer with a flame photometer), and in vitro digestibility of dry matter (IVDM) by the Troelsen method (1969). Fiber in the canned stover samples was digested (Rowe and Bonney 1936) using three solutions: 50% NaOH, acid detergent (AD) (Van Soest 1963), and neutral detergent (ND) (Van Soest 1967). Following digestion, the samples were observed under a dissecting microscope and the fiber strands were examined (Kaldy 1966), oven-dried, and weighed.

Whole-Plant Samples
There were no significant interactions between hybrids and locations, therefore a combined analysis of variance was carried out over the two sites (Taber and Medicine Hat). There were no significant differences in the contents of ADF, Ca, P, or Ca:P ratios (Table 1). There was no significant difference in the CP and IVDM of Idahybrid 216 and the multitillering corns, although there were differences within the latter group of hybrids. Lignin and K content of Idahybrid 216 tended to be lower than that of the multitillering plants.

Stover
No marked differences were noticed in the appearance of the fiber in the samples. The ADF method of fiber analysis indicated a difference in percentage fiber content between the two types of corn in the canned samples, but the other methods of analysis did not (Table 2). There were no significant differences in the constituents of the dried samples.

Table 1. Composition and in vitro digestion (% of DM) of whole-plant samples of four tillering and one nontillering corn hybrid grown at Taber and Medicine Hat

<table>
<thead>
<tr>
<th>Composition and Digestion Parameters</th>
<th>Tillering</th>
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</tr>
</thead>
<tbody>
<tr>
<td>DM</td>
<td>CP</td>
<td>ADF</td>
<td>Lignin</td>
<td>IVDM</td>
<td>Ca</td>
<td>P</td>
<td>Ca:P ratio</td>
<td>K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OX403</td>
<td>26.5</td>
<td>7.7 b*</td>
<td>30.1 a</td>
<td>3.7 a</td>
<td>61.2 b</td>
<td>0.27 c</td>
<td>0.23 a</td>
<td>1.27 a</td>
<td>1.7 bc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OX404</td>
<td>27.1</td>
<td>7.7 b</td>
<td>28.9 a</td>
<td>3.0 bc</td>
<td>60.0 b</td>
<td>0.27 c</td>
<td>0.24 a</td>
<td>1.19 a</td>
<td>1.6 c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OX383</td>
<td>28.2</td>
<td>8.6 a</td>
<td>30.5 a</td>
<td>3.3 ab</td>
<td>62.8 a</td>
<td>0.31 a</td>
<td>0.25 a</td>
<td>1.25 a</td>
<td>2.0 a</td>
<td></td>
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</tr>
<tr>
<td>OX377</td>
<td>29.4</td>
<td>8.8 a</td>
<td>29.2 a</td>
<td>3.5 a</td>
<td>60.8 b</td>
<td>0.29 b</td>
<td>0.20 a</td>
<td>1.11 a</td>
<td>1.9 ab</td>
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</tbody>
</table>

Nontillering

Idahybrid 216 | 30.0 | 8.1 b | 28.3 a | 3.0 bc | 62.5 b | 0.29 b | 0.25 a | 1.13 a | 1.5 c |

*Figures within each column followed by the same letter are not significantly different at P = 0.05 according to Duncan’s multiple range test.

Table 2. Composition (% of DM) of stover from tillering and single stalk corn hybrid grown at Lethbridge

<table>
<thead>
<tr>
<th>% of dried sample</th>
<th>Fiber in canned sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP</td>
<td>ADF</td>
</tr>
<tr>
<td>Tillering Stewarts Multi-T</td>
<td>6.3 a</td>
</tr>
<tr>
<td>Nontillering United 106</td>
<td>6.9 a</td>
</tr>
</tbody>
</table>

*Figures within each column followed by the same letter are not significantly different at P = 0.05 according to Duncan’s multiple range test.

The data suggest that there is no clear difference in nutritive value between nontillering and multitillering hybrids. To supplement our findings, hybrids of the two types of corn will be ensiled and their nutritional values will be assessed in feeding trials.

Seed of the tillering corn hybrids was provided by Dr. L. S. Donovan, Agriculture Canada Research Station, Ottawa, Ontario.


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