Grazing Standing Corn with Sheep

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Corn grown for silage can be a very high-yielding forage crop. Corn silage harvesting is a relatively expensive operation due to the horsepower requirements and equipment involved. Recently, there has been interest in grazing corn on the stalk to avoid the costs associated with conventional harvesting and storage. This article summarizes the findings of a corn-grazing project undertaken at New Liskeard in 1999.

Methods:

Nine corn hybrids (Table 1) were planted in strips 4 rows wide by approximately 1000 ' long. The hybrids fell into two categories: i) short-season grain types (including one dwarf-type) that were reasonably well adapted to the area, and ii) grazing and silage types which were not adapted to the area due to their high heat unit requirements. Planting occurred on June 4, 1999. The row spacing was 28" with the exception of Canamaize which was planted in 14" rows. In August, a strip on one side of the field was cut to provide a open area prior to turning sheep into the corn. This removed one of the short-season grain hybrids from the trial. The field was divided into 4 paddocks (about 0.18 ha each) using electric fence and approximately 180 mature, non-lactating ewes were introduced to the field on September 10. The fencing was put up perpendicular to the rows so that sheep had access to all hybrids at the same time. Once each paddock had the majority of the leaves and ears eaten, the sheep were moved ahead to the next paddock. No back fence was used. The sheep were removed from the field on September 24, 1999.

Results:

Just before grazing started on September 10, counts were taken to estimate plant population and the average height of each hybrid was measured. Target populations of 75,000 to 80,000 plants per hectare were met or exceeded in all but one case (Table 1). The target population for Canamaize was 150,000 plants per hectare and this was slightly exceeded. Average height of hybrids ranged from 1.1 metres for Canamaize up to 2.8 metres for AG112.

Of the 180 ewes grazing the corn, a randomly selected subgroup of 20 ewes was weighed and condition scored before and after grazing the corn. These ewes gained an average of 154 grams per head per day while grazing the corn and gained 1/4 point of condition score over the two weeks on the corn (Table 2). Total weight gained extrapolated over the entire group of ewes was 547 kg of gain per ha of corn while the carrying capacity was 3,550 ewe days per hectare.

Table 1. Plant population and height of corn hybrids grazed by sheep.

Entry Name and Description	Source	Plant Population ('000 per ha)	Height (m)
39N03 - short season grain **39K72 - short season grain**	**Pioneer HiBred Ltd. Chatham, ON**	81.2 88.7	2.2 2.2
Canamaize - short season grain	**Canamaize, Minto, MB**	155.7	1.1
AG100 - grazing **AG102 - grazing** **AG112 - grazing**	**Baldridge Hybrids, Cherry Forks, OH, USA**	76.4 73.1 79.7	2.7 2.7 2.8
BH431 - silage **SD95 - silage**	**Speare Seeds, Harriston, ON**	82.1 86.8	2.5 2.6

Table 2. Livestock performance while grazing standing corn at New Liskeard.

Field size	0.71 ha
# of ewes grazing	180
Period of Stay	14 days
Start Weight (20 ewes)	75.16 kg
End Weight	77.32 kg
Total Gain per Ewe	2.16 kg
Gain/day	0.154 kg/hd/day
Starting Condition Score (1-5 scale)	2.78
Ending Condition Score " "	3.03
Change in Condition Score	increased 0.25 points per head
Weight Gain/ha	547 kg/ha
Ewe grazing days/ha	3550 ewe days/ha (1420 ewe days/acre)

Once grazing was complete and the sheep were removed from the corn field, quadrats were harvested to estimate the yield of residue left ungrazed. Within each of the four paddocks, three quadrats were taken from the grain hybrids and three quadrats from the grazing/silage hybrids. The yield of ungrazed corn was quite high, ranging from about 5,500 kg/ha to over 11,000 kg/ha (Table 3). It was assumed that more residue would be left behind with the grazing hybrids since they had much higher stalk yields. In fact, differences in residue yields were not significantly

different between the grain and grazing hybrids. Residue yields in the first paddock were about double the yields from each of the following paddocks. There are two possible explanations for this, first, the sheep were not used to grazing corn and therefore trampled more in the first paddock as compared to the other three; second, the samples from the first paddock were taken immediately following grazing while the others were taken about 3 weeks after grazing, and some decomposition of the residue may have occurred in the meantime, although this was not apparent visually. Separations of the residue showed that almost all residue was stalks.

Table 3. Corn residue (kg/ha of dry matter) left on field after grazing.

Paddock	Grain types (short, drier ears)	Grazing/silage - (tall, wet ears)
1 (first area grazed)	10,314	11,114
2	5,429	6,095
3	5,810	6,476
4 (last area grazed)	7,238	6,190

Summary and Interpretation:

There was a wide range of maturities among the 8 hybrids grown. Whole plant corn yields before grazing were not measured here but were likely very similar to yields measured in a small plot trial located nearby (see data on a separate report). Sheep grazing all hybrids for two weeks recorded reasonable weight and condition score gains. Over all hybrids, a carrying capacity of about 3,500 ewe days per hectare were recorded. Ungrazed residue was about 10 to 11 t/ha in the first paddock but was only 5 to 7 t/ha in the remaining paddocks.

Grazing corn would normally be grazed by cattle (lactating cows or stockers) but we were quite satisfied with the ability of the sheep to graze the corn. The grazing hybrids were quite immature in September, with the ears at the milk stage. Once the sheep became accustomed to the corn, they consumed the ears of the grazing hybrids entirely, leaving only stalks in the field. Choking or bloating problems did not occur. The grain hybrids had much drier ears and more cobs were left behind in that part of the field.

The large amount of residue left after grazing may be of concern. However, we did not force the sheep to clean up the field very well and we likely could have reduced the amount of residue by 50% or more by leaving the sheep longer on each paddock. If cows were grazing it is likely that they would clean up the stalks better than the sheep. Another way to assess the amount of residue is to consider that the total dry matter yields (before grazing) likely ranged from 20 to 30 t/ha (based on a small plot trial located nearby). This means that between 50% and 80% of the total corn dry matter present was consumed by the sheep. Ideally, we would like to have over 80% of the standing crop consumed in this situation.

This trial was not designed to assess animal performance between individual hybrids or between types of hybrids (ie: grain type vs grazing type). From this trial plus a nearby small plot trial (see separate report) it is clear that Canamaize has low total yields and is not likely to be a good candidate for grazing. It is also clear that the grazing types have very high total yields, but very little grain formation at this location. We would therefore expect that the grazing types would have a higher carrying capacity than the grain types but might not support high gains or milk production due to lower energy content in the diet. Assessing the relative value of conventional and grazing hybrids needs to be done within the geographic area of use since local heat unit accumulation will affect the relative performance of each type.

Given the relatively high cost of production of corn relative to perennial grass pastures, we would assume that rapidly growing animals (with a high value of gain) should be used to graze the corn (ie: growing cattle or lambs, not dry cows). If maintenance level animals (dry cows, dry ewes) were used, an exceptionally high carrying capacity would be needed to economically justify the crop. Given our small plot findings of extremely high whole plant yields but little grain from the grazing hybrids, the latter strategy may be more realistic. If rapidly gaining animals were to graze corn, one might want to use grain-type hybrids which should have higher energy levels to support rapid gains. Unfortunately, the above is only speculation as neither feed quality data nor comparative animal data is available at this time. We hope to continue this work in 2000.