



Western Beef Development Centre

EXTENDING THE GRAZING SEASON WITH TURNIPS

Introduction

Extending the grazing season into fall and winter can potentially reduce cow costs per day. Turnips (*Brassica rapa*) are one of the many crops being evaluated in Saskatchewan to potentially provide extended grazing, beginning in late August and often continuing into the winter period. Turnips have been fed to livestock in other parts of the world for over six hundred years and have been used for grazing for over twenty years. As well, turnips are cheap to plant since the seed can cost less than ten dollars per acre.

Stubble turnip varieties have been developed specifically for grazing. These varieties come from the same family as Polish canola and can be direct seeded using conventional equipment. Most have green leafy tops with a white fleshy bulb, which has a purple crown and produces a softer flesh which is very palatable to cattle. Turnips can also work well as supplemental forage. The leafy green tops grow about 75 centimetres tall and have good protein and energy levels. The bulbs are high in energy and dry matter measures between 10 to 12 percent. There are two types of turnips generally available; the bulb type, Marco or Cyvasto-R, which are used for grazing, and the leafy hybrid, Tyfon, which is used for silage.

Seedbed preparation and planting of turnip seed can be done by either preparation of a full seedbed or simply by planting the crop no-till. Suggested seeding rates are 4 to 6 pounds per acre, depending on the soil and moisture levels. Turnips can be seeded from mid-May to late June using similar equipment for seeding canola. Early weed control is essential as turnips do poorly if weeds get ahead of them.

Grazing Management

Cattle can start grazing within 60 to 90 days after seeding and under proper management a second grazing is possible when the tops grow back. The tops grow quickly and are ready for fall grazing when other pastures are finished. Beef cows can successfully graze turnips but the animals need to be supplemented with hay or straw for added fibre to reduce any potential health problems. Turnips may contain glucosinolates, and if fed too excess, may affect the thyroid or cause anemia. This risk is higher among young animals and turnips are not recommended for lactating dairy cows because the milk may develop an off-flavour. Previous small plot trials found problems with nitrate levels in turnips. Therefore it is recommended to test the turnips

before turning out livestock to prevent toxicity problems. Turnips are a very high energy crop therefore they need to be controlled grazed. Turning cattle into this crop is almost like putting livestock on a high-grain ration so attention should be paid not to founder animals.

Objectives

A grazing demonstration was conducted on a ten-acre field at the Termuende Research Farm near Lanigan, Saskatchewan. The objectives of this trial were to evaluate crop production, crop quality and animal performance when grazing turnips during the late summer and fall of 2003.

Field and Seeding Management

Soil samples taken at the study site indicated available nitrogen (N) levels of 40 lb/acre, phosphorous (P_2O_5) at 65 lb/acre, potassium (K_2O) at 1200 lb/acre, and sulfur (S) levels of 96 lb/acre. No additional fertilizer was applied as the field had received adequate manure the previous year. Roundup Transorb was sprayed June 16th, post-seeding at a rate of 0.34 liter per acre, to control weed populations. Good control was observed for green foxtail, lambs quarters and round-leafed mallow seedlings.

Prior to seeding the field was cultivated in late May using heavy harrows. Turnip varieties seeded were **Civasto-R**, an open pollinated turnip, and **Tyfon hybrid**, a turnip/Chinese cabbage (Figure 1).



Figure 1. Left - Tyfon Right - Civasto-R

Five acres of each variety (Tyfon and Civasto-R) were seeded in early June at five pounds per acre with a Morris M-10 double disc press drill at six inch row spacing. The drill was equipped with double disc openers with depth wings followed by steel packers. At the time of seeding, the top 1" of soil was dry, however good moisture was noted below the seed.

Weed control is essentially the same as a canola crop. In early July, some millet, lambsquarters and wild oats were observed. On July 15th, the field was sprayed with Fusion, at a rate of 0.32 litres per acre, to control wild oats and green foxtail. Subsequent observations in late July also indicated flea beetle damage was readily apparent.

Livestock Management

Ten cow-calf pairs grazed each turnip field and managed to maintain similar forage availability in both fields. At the beginning of the trial, cows were weighed (average wt. 1350 lb) and randomly assigned to either field according to body weights. Grazing began on September 12, 2003 when crop height was 10” to 12” and ended on October 2, 2003 for a total of twenty-two grazing days. Initial stocking rate was set at ten cow-calf pairs per field (five acres) however; additional animals were added after fourteen days to utilize the remaining crop. Fields were managed to obtain at least three weeks of grazing. Animals remained on each variety until the plant tops were grazed off and the majority of plant tubers were consumed. Due to elevated nitrate levels in both turnip varieties, barley straw was fed *ad libitum* for the duration of the trial and animals were monitored daily. The high levels of nitrates in the crop were of concern however, no cases of nitrate toxicity were observed during the study.

Results

The yield of both varieties was determined in early September. The Civasto-R variety produced 30% more than the Tyfon variety. Forage quality (dry matter basis) indicated protein and energy levels to be more than adequate for beef cows. It should be noted that the tubers were generally of higher quality than the tops. Therefore managing cattle to utilize all of the turnip plant should be a priority. However, due to the high moisture content (90%) of the turnips, daily intake of the crop was a concern.

Table 1. Yield and quality of grazing turnip varieties

| | Yield (T/ac) ¹ | CP (%) | TDN (%) | ADF (%) | Nitrate (%) |
|------------------|---------------------------|--------|---------|---------|-------------|
| Tyfon | | | | | |
| Tops | 7.3 | 18 | 69 | 27.2 | 2.88 |
| Tubers | - | 19 | 71 | 26.0 | 3.99 |
| Civasto-R | | | | | |
| Tops | 9.5 | 24 | 76 | 21.7 | 1.98 |
| Tubers | - | 22 | 80 | 17.5 | 2.55 |

¹wet yield (tops+tubers); CP=crude protein; TDN=total digestible nutrients; ADF=acid detergent fibre

Input costs (Table 2) are calculated according to custom application and equipment rental rates. Total costs include field, equipment, seed, and land costs. It is important to note that costs will vary for each operation and need to be calculated according to each producer’s individual situation. The grazing costs for each animal per day were calculated by dividing total cost/acre by number of animal grazing days. The costs per animal unit day were slightly more for animals grazing the Tyfon field as seed costs were higher for this variety.

Table 2. Input costs (\$/acre)

| | Civasto-R | Tyfon |
|-------------------|------------------|---------------|
| Field Preparation | 6.00 | 6.00 |
| Herbicide | 20.00 | 20.00 |
| Custom Spraying | 4.00 | 4.00 |
| Supplemented Feed | 5.00 | 5.00 |
| Fencing/Water | 2.50 | 2.50 |
| Seeding | 12.50 | 12.50 |
| Seed | 17.00 | 26.65 |
| Labor/Equipment | 32.50 | 32.50 |
| Land Usage Cost | 25.00 | 25.00 |
| TOTAL | 124.50 | 134.15 |

Animal Performance

Cow numbers have been presented as Animal Units (1 AU = a 1000 lb cow) to account for differences in cow weights between groups. There were a total of 73 animal grazing days for both groups as all the animals were removed at the same time. Cow gains were similar between the two groups (Table 3) however, calves grazing the Civasto-R variety gained 1.5 lb more per day than the calves on the Tyfon field. Costs per AU/day were well over the \$1.00 per day and higher than \$0.80/day to swath graze barley.

Table 3. Performance of cow-calf pairs grazing turnips

| | ADG¹ | Total Gain (lb) | \$/AU²/day |
|------------------|------------------------|------------------------|------------------------------|
| Tyfon | | | |
| Cows | 2.3 | 48 | 1.83 |
| Calves | 2.1 | 43 | |
| Civasto-R | | | |
| Cows | 2.5 | 52 | 1.71 |
| Calves | 3.6 | 76 | |

¹ADG=average daily gain; ²=animal unit

Conclusions

Crop yield was affected by extremely hot weather and lack of moisture in late July and August 2003. The high nitrate levels of both turnip varieties also warranted very close observation of the animals allocated to the grazing trial. Both groups of cow-calf pairs received supplemental feed as a fibre source for the duration of the study. Initially, animal acceptance of the crop was good, however after fifteen days utilization of the turnips was observed to decrease significantly. Finally, the evaluation of turnips as a grazing crop was marginal due to dry conditions in August, high nitrate levels, the reluctance of cows to fully utilize the crop, and greater than \$1.00 per day grazing costs.

Reference

1. Grueneberg, A. 2003. Turnips for grazing factsheet. Prairie Seeds Inc. Nisku AB.