



# Western Beef Development Centre

Division of PAMI

## COMPARISON OF SPRING-SEEDED WINTER ANNUAL CROPS FOR GRAZING

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### Introduction

The current feed grain prices (2008) are reviving interest in backgrounding beef calves and feeder cattle on pastures for longer periods to reduce grain feeding and the cost of gain. Spring-seeded winter annual crops such as winter wheat, fall rye, and winter triticale can be grazed during the growing season because they do not complete their life cycle and set seed until they are vernalized (exposed to low temperature). Annual ryegrass, either the Westerwolds ryegrass or Italian ryegrass type, will not overwinter in Saskatchewan and can provide good summer and fall grazing for calves and feeder cattle (McCartney et al. 2008).

### Study Site Description

We evaluated these five species in a head-to-head comparison from 2004 to 2006 at three sites in Saskatchewan - Swift Current, Saskatoon, and Melfort.

### Trial Management

The harvest dates of the annual crops are shown in Table 1. All the crops were seeded in late May. The cultivars used were CDC Buteo winter wheat, Prima fall rye, Bobcat winter triticale, Botrus Westerwolds ryegrass, and Italian ryegrass. We simulated grazing by clipping all species the first time when the Westerwolds ryegrass was heading, the second time when there was 25 cm (10 in) of regrowth and, where possible, for the third time in September or October prior to freeze-up. Forage yield was recorded and samples were taken for forage quality. Crude protein (CP) and total digestible nutrients (TDN) concentrations were determined at the Prairie Feed Resource Centre, University of Saskatchewan.

**Table 1.** Harvest Dates of annual crops by cut, year and location.

Location	Year	Cut 1	Cut 2	Cut 3
Swift Current	2004	20-Jul	18-Aug	23-Sep
	2005	17-Jul	01-Sep	--
	2006	19-Jul	02-Oct	--
Saskatoon	2004	29-Jul	08-Sep	--
	2005	22-Jul	11-Aug	20-Sep
	2006	27-Jul	21-Aug	03-Oct
Melfort	2004	30-Jul	17-Sep	--
	2005	27-Jul	26-Sep	--
	2006	25-Jul	15-Aug	05-Oct



## RESULTS

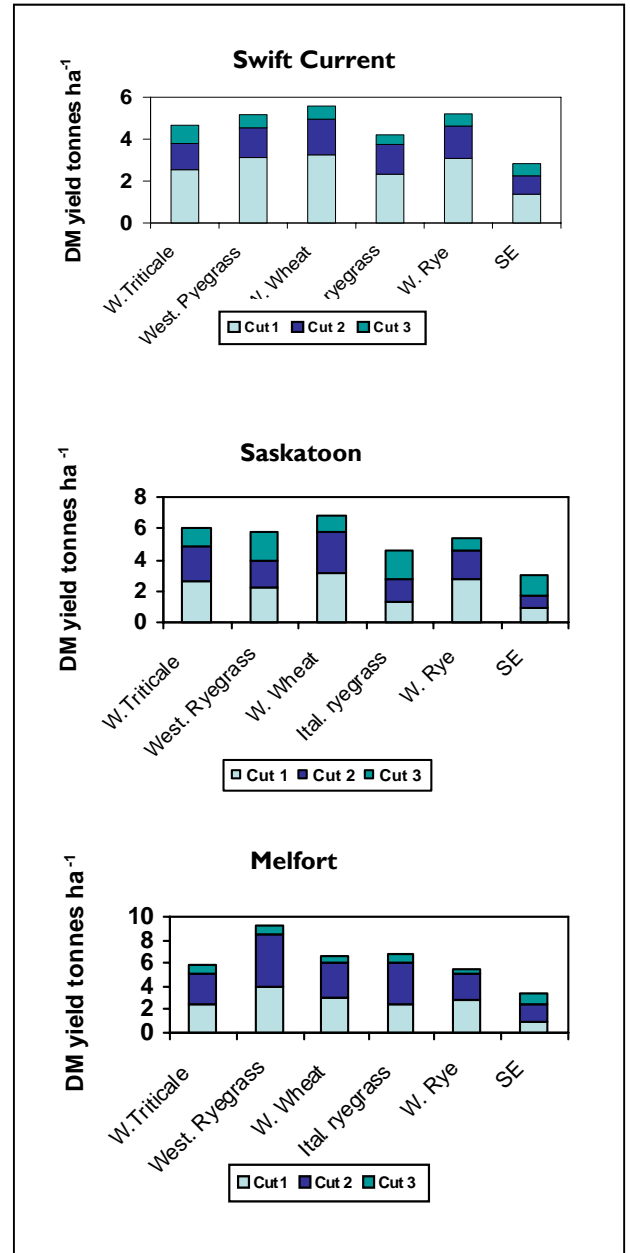
### Forage Yield

The breakdowns in yield for each location are shown in **Fig. 1**.

- **First-Cut:** At Swift Current, winter wheat produced the highest first-cut forage yield, but Westerwolds ryegrass was nearly as productive. Italian ryegrass produced the least forage yield. At Saskatoon, winter wheat produced the largest first-cut forage yield, however, winter rye and winter triticale were nearly as productive. Italian ryegrass produced the least forage yield. At Melfort, Westerwolds ryegrass produced the largest first-cut forage yield, while winter triticale produced the lowest yield.
- **Second– Cut:** Winter wheat produced the highest second-cut forage yield at Swift Current, while winter triticale produced the least. At Saskatoon, winter wheat produced the highest second-cut forage yield, while Italian ryegrass produced the least. At Melfort, Westerwolds ryegrass produced the highest second-cut forage yield, while winter rye produced the least.
- **Third Cut:** Third cut was harvested only once in three years at Swift Current and Melfort, and twice in three years at Saskatoon. Winter triticale produced the highest third-cut forage yields at Swift Current, while Italian ryegrass produced the least. Third cut forage yield was greatest for Italian ryegrass at Saskatoon, while winter rye produced the least. At Melfort, Westerwolds ryegrass produced the highest third-cut forage yield, while winter rye produced the least.

Total forage yield reflected the combined effects at each harvest. Winter wheat produced the most forage and Italian ryegrass the least at both Swift Current and Saskatoon. Italian ryegrass production may be sensitive to late-season soil water shortages that occur more frequently in the brown and dark brown soil zones. Westerwolds ryegrass produced the most total forage and winter rye the least at Melfort. Seasonality is important to beef producers who need to meet forage demands in early summer (cut 1), late summer (cut 2), and fall (cut 3).

The demand for grazing and timing will depend upon the time of calving and productivity and/or seasonality of complementary perennial pastures. These results indicate that winter wheat will provide more grazing in the brown (Swift Current) and dark brown (Saskatoon) soil zones, while Westerwolds ryegrass will be most productive in the Parkland region (Melfort).



**Figure 1.** Mean yield over three years by clip for five spring-seeded winter annual or annual crops at three locations. SE is the standard error values by cut.



## Forage Quality

Westerwolds ryegrass exhibited lower CP concentrations than the other species at all three locations (**Fig. 2**). The harvest timing was pre-set to the heading stage of Westerwolds ryegrass while the other species remained in a vegetative growth stage. Thus, the higher CP concentration of these species should be expected. Even at the lower CP concentrations observed at Melfort, 11% to 15% (**Fig. 2**), excellent pasture beef gains would be achieved. From July through September, typical perennial forage pastures in Saskatchewan would range from 6% to 11% CP concentration.

The TDN concentration of Westerwolds ryegrass was lower than the other annual crops at all three locations (**Fig. 3**).

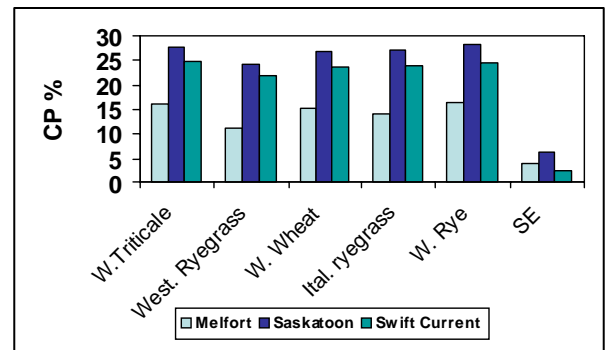
However, all species, including Westerwolds ryegrass, exhibited excellent TDN values which would support very good gains on yearling steers or heifers, or calf gains from cow calf pairs. For example, yearling steers grazing either annual ryegrass species would be expected to produce more beef per acre at Melfort, while steers grazing winter cereal crops would produce more beef per acre at Swift Current or Saskatoon (**Fig. 4**).

These results are modelled from the forage-quality data as input to Cowbytes® 4.6 software. However, the results confirm that annual ryegrasses have better potential in the Parkland region, while winter cereal crops have higher productivity in the semiarid prairie region or the brown and dark brown soil zones.

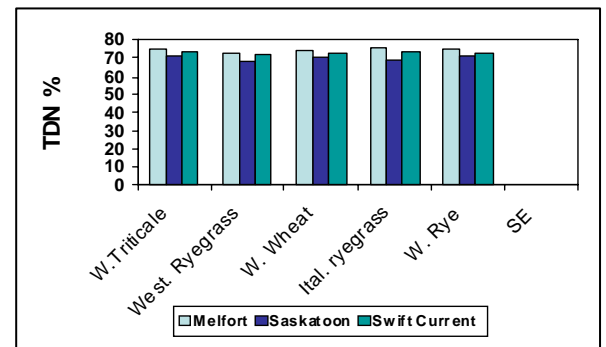
## ECONOMIC ANALYSIS

Saskatchewan Agriculture & Food's *Farm Machinery Custom and Rental Rate Guide* was used to determine operating costs in addition to the actual costs for all inputs. Revenue was calculated using Saskatchewan Agriculture & Food's ten-year average market price for annual forages and based on the actual yields collected at the various locations. Total costs varied by management strategy at each location and included land preparation inputs, such as herbicide application and fertilization. From these total cost and revenue values, a net return value was calculated for each species at each location for each of the three years. In addition, a three-year average net return was calculated for each species at each of the three locations.

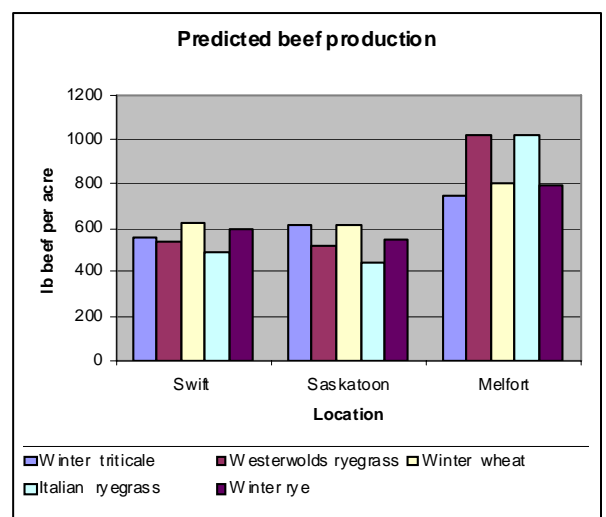
The economic results of the grazing potential at all three locations are reported in **Table 2** (see next page). All five species realized a positive net return per acre at the Swift Current site over three years, but in 2006, all five species experienced a negative net return per acre as yield was reduced by high temperatures. The three-year average net return per acre for these five species in a



**Figure 2.** Mean crude protein (CP) concentration of five annual forages over two or three cuts per year and over three years at three locations.



**Figure 3.** Mean total digestible nutrients (TDN) of five annual crops averaged over two or three cuts per year and three years at three locations.



**Figure 4.** Predicted total livestock production from five annual crops grown for summer pasture at three locations. Predictions from Cowbytes® 4.6 software.



grazing system ranged between \$8.64 per acre to \$25.68 per acre, with Italian ryegrass realizing the lowest net return per acre and winter wheat attaining the highest. The economic potential at Saskatoon indicated that all species realized a positive net return in all three years at the Saskatoon location. The only exception was Italian ryegrass in 2004, which ended the grazing season with a net loss of \$17.53. Three-year average net returns ranged from \$25.87 per acre to \$55.37 per acre. Similar to the results at Swift Current, Italian ryegrass saw the lowest net return per acre while winter wheat realized the highest. At Melfort, there were positive net returns on all five forage species for each of the three years. All five species realized the largest net returns per acre at the Melfort location. The three-year average net return ranged between \$56.42 per acre and \$81.45 per acre. In contrast to the other two locations, winter triticale resulted in the lowest average net return per acre, while Westerwolds ryegrass had the largest average net return over the three grazing seasons.

**Table 2.** Average economic net returns to five annual forage crops harvested for simulated grazing for three years at three locations.

Species	Swift Current	Saskatoon	Melfort
Winter wheat	\$25.68	\$55.37	\$69.53
Winter triticale	\$13.13	\$42.25	\$56.42
Winter rye	\$21.64	\$36.05	\$61.11
Westerwolds ryegrass	\$20.84	\$40.94	\$81.45
Italian ryegrass	\$8.64	\$25.87	\$67.60

From an economic perspective, all five species have potential for producers to realize positive net returns when utilized in a grazing system at all three locations across Saskatchewan. The above data shows that Winter Wheat realized the highest net returns per acre when used in a grazing system for both the Swift Current and Saskatoon locations, whereas Westerwolds ryegrass resulted in the highest net return per acre in a grazing system at Melfort. While this information begins to shed light on the potential economic returns of the five species of winter annuals and forages examined when managed under a grazing system, it is essential that producers consider their own costs and potential returns prior to deciding to utilize any of these species within their grazing rotation.

## CONCLUSIONS

1. Westerwolds ryegrass produced the highest total pasture forage yield in the Parkland while winter wheat was most productive in the drier prairie region.
2. Quality of all five species was excellent for summer and fall grazing.
3. Winter wheat was the most profitable annual crop for grazing, but was followed closely by Westerwolds ryegrass. The least profitable annual crop was Italian ryegrass.

## ACKNOWLEDGEMENTS

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## REFERENCES

McCartney D.H., Lardner H.A., and Stevenson, F.C. 2008. Economics of backgrounding calves on Italian ryegrass (*Lolium multiflorum*) pastures in the Aspen Parkland. *Can. J. Anim. Sci.* 88:19-28.

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