

Evaluation of Winter Cereals for Forage, Grain and Straw Production in Northwestern Ontario

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Introduction

- Winter cereals, grown mainly for grain production across Canada, could prove to be an alternate forage option during emergency situations, such as winter kill in alfalfa/or substitute spring barley for silage production.

Objectives

- To find out optimum time of seeding winter rye and triticale.
- To evaluate forage, grain and straw yield of winter cereals (rye, triticale and wheat) and spring barley.

Materials and Methods

- Field experiments, replicated 4 times in CRBD, were conducted during 2009 to 2012 on an Oskondoga silt loam soil at Thunder Bay, Ontario, Canada.

Treatments There were 12 treatments;

1. Winter Rye (Common # 1) seeded on August 25
2. Winter Rye (Common # 1) seeded on September 5
3. Winter Rye (Common # 1) seeded on September 15
4. Winter Rye (Common # 1) seeded on September 25
5. Winter Triticale (Luoma) seeded on August 25
6. Winter Triticale (Luoma) seeded on September 5
7. Winter Triticale (Luoma) seeded on September 15
8. Winter Triticale (Luoma) seeded on September 25
9. Winter wheat (CDC Falcon) seeded on September 5
10. Winter wheat (CDC Buteo) seeded on September 5
11. Winter Barley (McKellar) seeded on September 5
12. Spring Barley (Cyane) seeded on May 5

- All crops/plots received recommended applications of N, P and K. Buctril M (Bromoxynil - Group 6 & MCPA - Group 4) was applied to spring barley for weed control.
- Crop was harvested at early dough stage for forage and at maturity for grain and straw. Feed quality and grain N contents were determined. Results, based on pooled analysis of variance, are reported in Tables 1 & 2 and Figures 1-3.

Results

- Averaged over three years, the results revealed that highest forage dry matter yield (DMY) from winter rye (10.93 Mg ha⁻¹) and triticale (11.25 Mg ha⁻¹) were obtained with August 25 seeding.
- Forage DMY from CDC Falcon (11.81 Mg ha⁻¹) was 1.15 Mg ha⁻¹ higher than that from CDC Buteo.
- Forage DMY from winter (5.82 Mg ha⁻¹) or spring (5.55 Mg ha⁻¹) barley were similar.
- CDC Falcon recorded the highest grain yield (5.31 Mg ha⁻¹; 0.94-2.06 Mg ha⁻¹ higher than winter rye, 0.95-2.03 Mg ha⁻¹ higher than triticale and 0.60 Mg ha⁻¹ higher than CDC Buteo wheat). Grain yields from winter and spring barley were 3.98 Mg ha⁻¹ and 3.52 Mg ha⁻¹, respectively.
- Luoma, seeded on August 25/or September 5 produced the highest straw yield (10.73 Mg ha⁻¹) that was at least 2.50 Mg ha⁻¹ greater than that of rye/or wheat.
- Winter and spring barley forage equaled in protein content (12.8 %), ADF (30/29 %), NDF (45), TDN (66 %) and NEL (1.49/1.51 Mcal kg⁻¹); NEM was higher in winter barley and NEG somewhat higher in spring barley. Luoma had the highest forage protein content (12.2 %) with September 15 seeding and rye (11.0 %) with September 25 seeding.

Table 1. Forage dry matter yield, Grain yield, Straw yield and Biomass yield winter cereals and spring barley at Thunder Bay, Ontario (averaged over 2010, 2011 and 2012)

Treatments	Forage DMY (Mg ha ⁻¹)	Grain (Mg ha ⁻¹)	Straw (Mg ha ⁻¹)	Biomass (Mg ha ⁻¹)	Grain N Removal (kg ha ⁻¹)
Common # 1, Aug 25	10.93	4.20	8.01	12.21	90
Common # 1, Sep 5	10.47	4.30	8.32	12.62	91
Common # 1, Sep 15	8.38	4.37	5.86	10.24	93
Common # 1, Sep 25	6.16	3.25	5.54	8.79	75
Luoma, Aug 25	11.25	4.29	10.81	15.10	103
Luoma, Sep 5	10.62	4.36	10.79	15.09	103
Luoma, Sep 15	7.15	4.02	8.20	12.22	102
Luoma, Sep 25	7.28	3.28	7.07	10.35	77
CDC Falcon, Sep 5	11.8	5.31	7.60	12.91	118
CDC Buteo, Sep 5	10.66	4.71	8.16	12.88	105
McKellar, Sep 5	5.82	3.98	3.32	7.30	77
Cyane, May 5	5.55	3.52	4.98	8.50	86
MEAN	8.84	4.13	7.38	11.52	93
<i>LSD (0.05)</i>	<i>0.96</i>	<i>0.45</i>	<i>0.83</i>	<i>1.11</i>	<i>10</i>

Table 2. Crude protein, ADF, NDF, TDN, NEL, NEM and NEG in winter cereals and spring barley forages at Thunder Bay, Ontario (averaged over 2010, 2011 and 2012)

Treatments	Crude Protein (%)	ADF (%)	NDF (%)	TDN (%)	NEL Mcal kg ⁻¹	NEM Mcal kg ⁻¹	NEG Mcal kg ⁻¹
Common # 1, Aug 25	7.3	38	56	59	1.34	1.43	0.71
Common # 1, Sep 5	7.3	38	57	59	1.34	1.43	0.70
Common # 1, Sep 15	8.0	38	57	59	1.33	1.42	0.70
Common # 1, Sep 25	11.0	35	55	61	1.39	1.49	0.77
Luoma, Aug 25	7.1	42	60	56	1.25	1.34	0.62
Luoma, Sep 5	8.2	39	59	59	1.32	1.42	0.70
Luoma, Sep 15	12.2	40	59	58	1.31	1.40	0.68
Luoma, Sep 25	10.8	39	58	58	1.31	1.40	0.68
CDC Falcon, Sep 5	8.9	35	54	61	1.39	1.49	0.77
CDC Buteo, Sep 5	8.8	40	56	58	1.30	1.39	0.67
McKellar, Sep 5	12.8	30	45	66	1.49	1.62	0.90
Cyane, May 5	12.8	29	45	66	1.51	1.40	1.16
MEAN	9.6	37	55	60	1.36	1.43	0.75
<i>LSD (0.05)</i>	<i>4.1</i>	<i>5.2</i>	<i>6.5</i>	<i>4.1</i>	<i>0.10</i>	<i>0.20</i>	<i>0.26</i>

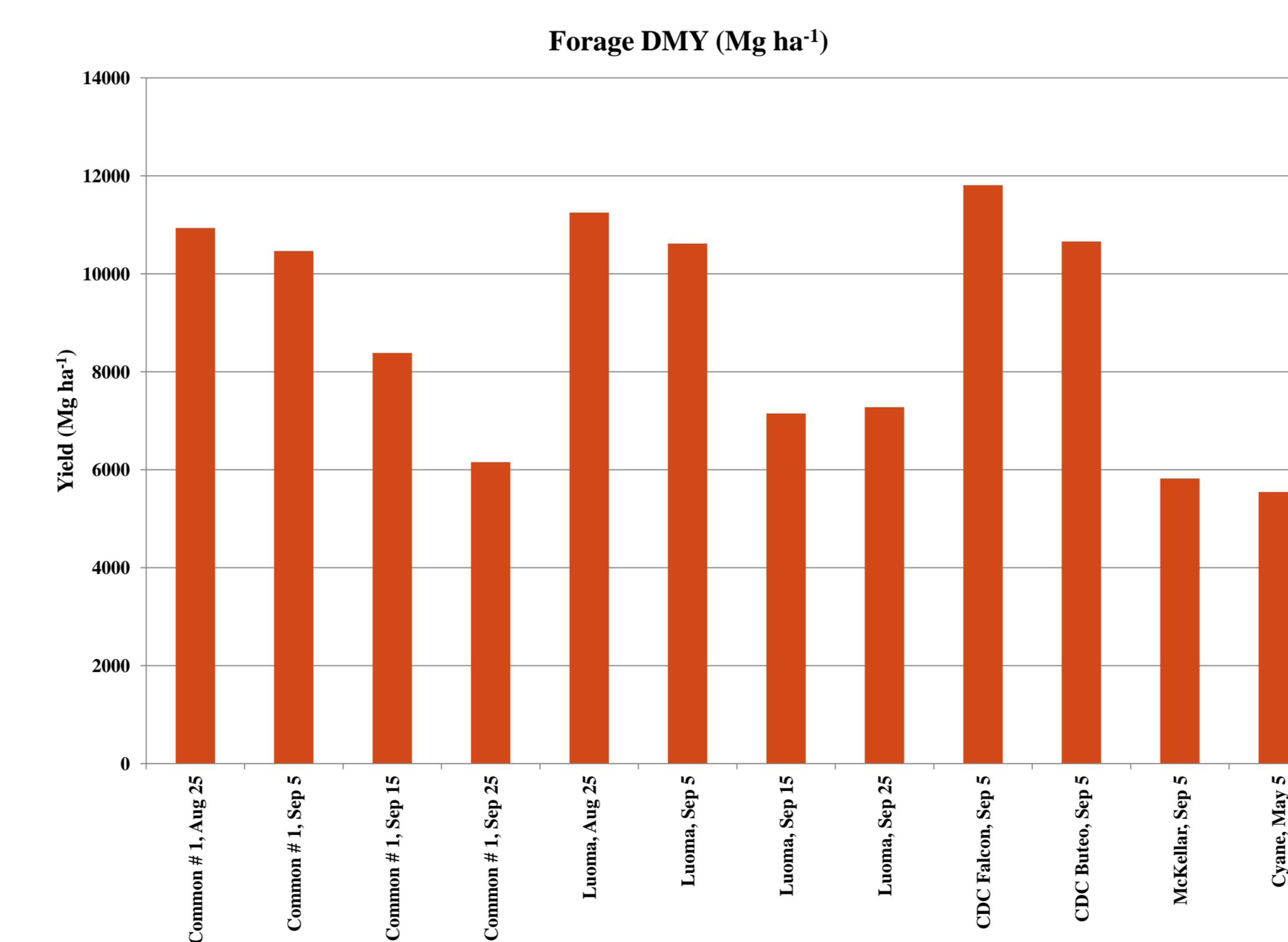


Figure 1. Forage dry matter yield of winter cereals and spring barley at Thunder Bay, Ontario (averaged over 2010, 2011 and 2012).

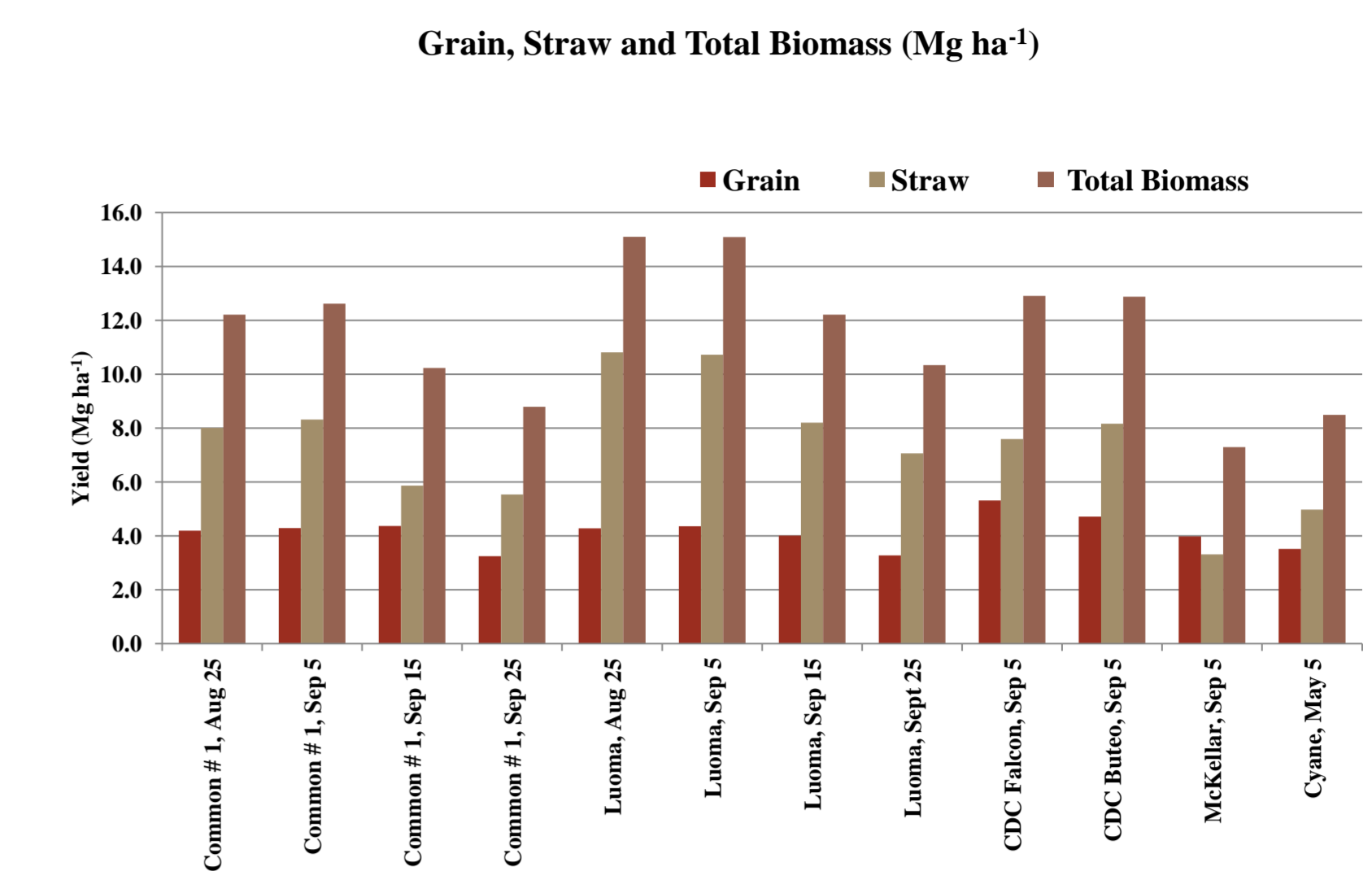


Figure 2. Grain yield, Straw yield and Total Biomass (Grain + Straw) yield of winter cereals and spring barley at Thunder Bay, Ontario (averaged over 2010, 2011 and 2012).

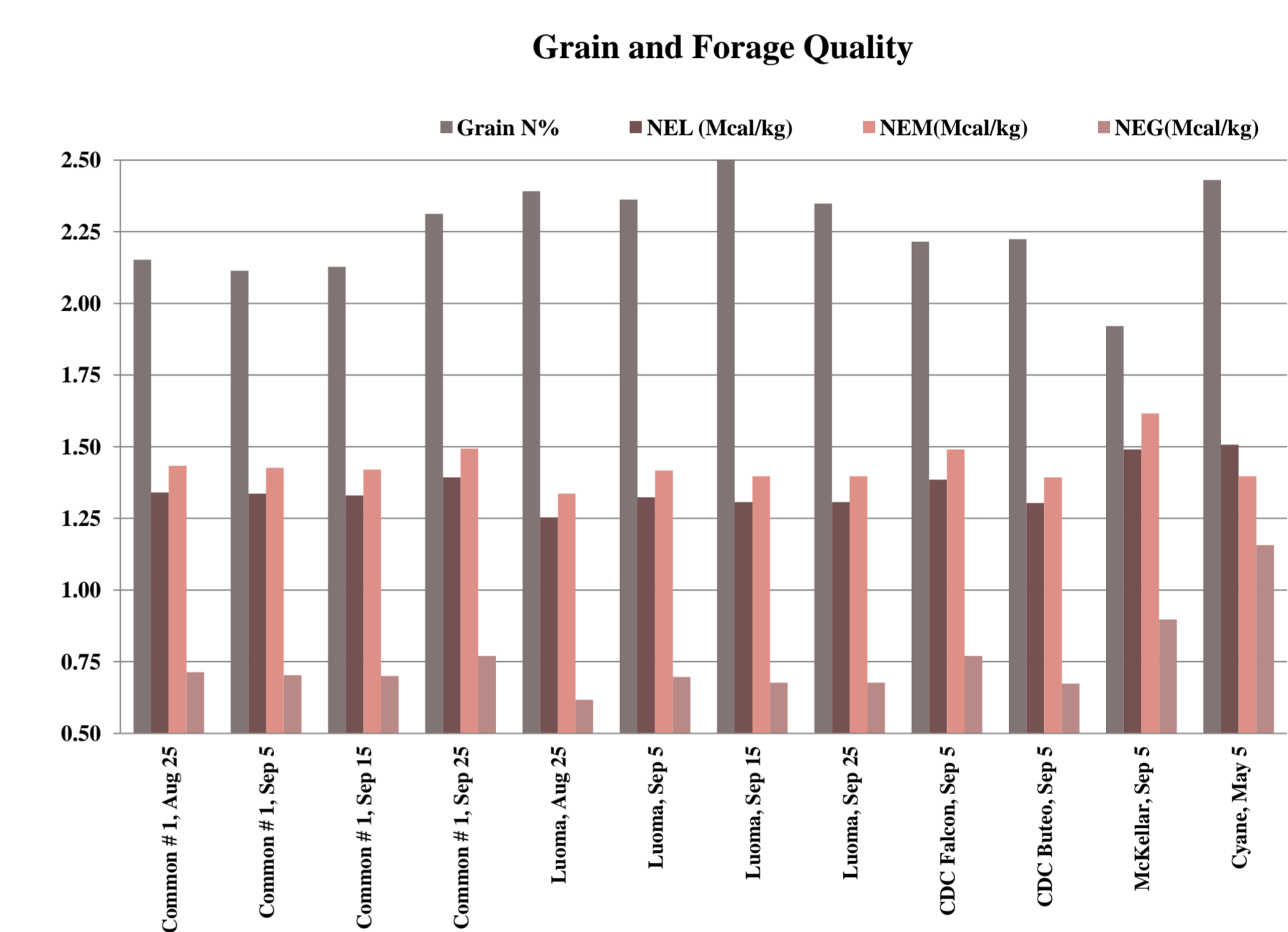


Figure 3. Grain N %, NEL, NEM and NEG in winter cereals and spring barley at Thunder Bay, Ontario (averaged over 2010, 2011 and 2012).

Conclusions

- August 25-September 5 proved to be the best time for seeding winter rye and triticale.
- Winter cereals, especially triticale and barley, could be a better option for forage production than spring barley in northwestern Ontario!

Acknowledgements

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