

Project Identification

1. **Project Title:** Yield Response and test weight stability of Oat to Fertilizer N
2. **Project Number:** 201504418
3. **Producer Group Sponsoring the Project:**
Prairie Oat Growers Association
4. **Project Location(s):**
 - Indian Head, Yorkton, Melfort, and Redvers
5. **Project start and end dates (month & year):** May 2016 to Feb 2017
6. **Project contact person & contact details:**
Bill May, Project Manager, P.O. Box 760 Indian Head, SK, S0G 2K0
Phone: 306-665-5225 Email: william.may@agr.gc.ca

Objectives and Rationale

7. Project objectives:

Objectives:

- 1) to validate under local conditions, recent research results showing that oat requires moderate amounts of N and that test weight declines as N rate is increased.
- 2) to expose growers to new oat cultivars that may be better than cultivars currently grown in the area of the trial.
- 3) to determine if the test weight of current oat cultivars vary in the stability of their test weight as the nitrogen rate is increased.

8. Project Rationale:

Oat growers are looking for ways to increase their yield and maintain the quality of the oats they grow. Many are using high N rates with varying degrees of success. Research indicates that some cultivars have a more stable test weight than other cultivars as the nitrogen fertilizer rate is increased. In addition new cultivars are available that growers have not had a chance to see evaluated in their own area. This demonstration will help producers choose the appropriate nitrogen rate and cultivar when growing oats.

Methodology and Results

9. Methodology:

Experimental Design: 2 factors, N rate and cultivar in a RCBD design.

Plot Size: 35 x 13 feet

Reps: 3

Treatment Factors

1) Cultivars

Four cultivars (cultivars picked for each location based on two popular and two new cultivars with potential)

Four cultivars (cultivars picked for each location based on two popular and two new cultivars with potential)

Indian Head	Melfort	Redvers	Yorkton
Stride	Stride	Stride	Stride
CDC Ruffian	CDC Minstrel	Justice	CDC Dancer
CS Camden	AC Morgan	Souris	Summit
CDC Big Brown	CDC Seabiscuit	CDC Morrison	Triactor

- 2) Nitrogen Rate (kg N ha⁻¹)
- I) 40
 - II) 60
 - III) 80
 - IV) 120

Data Collection

1. Soil test: 0-6 inches, 6-24 inches, N bulked across reps, P, K, and S bulked across the test
2. Plant density
3. Lodging, (1-10, 1= upright and 10=flat)
4. grain yield
5. test weight
6. thin kernels

10. Results

The experiment was successfully carried out at all four locations Indian Head, Yorkton, Redvers and Melfort in 2014, 2015 and 2016. The only exception was at Redvers in 2014 when seeding could not be completed due to excessive soil moisture and rain. In 2014 there was no interaction among the cultivars for their response to nitrogen fertilizer at all three locations; which means that cultivars all responded in a similar manner to the application of nitrogen fertilizer. In 2015 and 2016 there were significant interactions between the cultivars and their response to N fertilizer. Plant density differed among the cultivars tested at 9 out of 11 site-years. As the nitrogen rate increased, plant density decreased at only Yorkton in 2015 and 2016 (Tables 4 and 8). In fact at Yorkton in 2015, the cultivars differed in the effect N rate had on their plant density (Table A4, Appendix 1). The plant density of all the cultivars tended to decrease as the N fertilizer rate increased but they varied in the levels that were statistically different.

In 2014, as the amount of applied N increased lodging increased, especially at Indian Head (Tables 1- 3). At Yorkton and Melfort, the lodging increased when the N rate increased from 80 to 120; however, at Indian Head there was an increase in lodging each time the N rate increased. In 2015 lodging increased as the N rate increased at Melfort and Redvers (Tables 5 and 7). Again the increase in lodging at Melfort was between 80 and 120 kg N/ha. While Redvers had lodging that was similar to the lodging observed at Indian Head in 2014 with lodging increasing every time the level of N increased. At Yorkton in 2015 lodging decreased as the N rate increased (Table 4). In addition the cultivars reacted differently to increasing N at three of the locations in 2015, Yorkton, Melfort and Redvers (Tables 4, 5 and 7). Unexpectedly lodging decreased for three of the four cultivars at Yorkton in 2015 as the N rate increased (Table A4). At Melfort in 2015 lodging was low with a very small increase in the lodging of CDC Seabiscuit and Stride as the N rate increased from 80 to 120 kg N/ha while the lodging of AC Morgan and CDC Ministrel did not change (Table A5). At Redvers very little lodging occurred in CDC Morrison while the lodging of the other three cultivars tended to increase as the N rate increased (Table A7). At Yorkton in 2015, Triactor again had the lowest level of lodging; however, Summit had the highest level of lodging among the four cultivars. The lodging in Souris was higher than the other cultivars at Redvers in 2015. At Yorkton 2014, the cultivars Summit and Triactor had lower lodging than both Stride and CDC dancer (Table 1). At Melfort in both 2014 and 2015 and Indian Head in 2014 the cultivars did not differ in lodging. At Indian

Head in 2015 stride had slightly more lodging than the other three cultivars (Table 6). In 2016 lodging increased as the N rate increased at Melfort and Redvers (Tables 9 and 11). At Yorkton lodging similar to Triactor. The lodging of Stride and CDC Dancer increased as the N rate increased.

In all eleven site-years (a location in a specific year) trials conducted over the three years, grain yield increased as the N rate increased. At three site years, Indian Head 2014 and Redvers 2015 and 2015 only 60 kg N/ha was needed to maximize yield (Tables 3, 7 and 11). Two site years, Indian Head 2015 and Yorkton 2016, required 80 kg N/ha to maximize yield (Tables 6 and 8). At six site years, Yorkton in 2014 and 2015, Melfort in 2014, 2015, and 2016 and Indian Head in 2016, 120 kg N/ha was required to maximize yield (Tables 1, 2, 4, 5, 9 and 10). At Indian Head in 2014 and Redvers in 2015, the cultivars did not differ in their grain yield (Tables 3 and 7). At Indian Head in 2015, Stride had a grain yield that was below the other three cultivars (Table 6) while in 2016 both Stride and CDC Ruffian had a lower yield than CDC Big Brown. At Yorkton, Triactor had the highest grain yield in all three years (Tables 2, 4 and 8). In 2014 CDC Dancer had a higher yield than Summit and Stride; however, in 2015 and 2016 CDC dancer had the lowest yield at Yorkton. At Melfort, AC Morgan had the highest yield of all the cultivars in all years (Tables 2, 5, and 9). In 2014 at Melfort that other cultivars had similar grain yields while in 2015 CDC Seabiscuit out yielded CDC Minstrel and Stride and CDC Minstrel out yielded Stride. In 2016, CDC Seabiscuit had a yield that was lower than CDC Minstrel. At Yorkton in 2016 the yield of all the cultivars increased as the N rate increased except for CDC Dancer (Table A8).

In 2014 the test weight of the cultivars did not vary in their response to the addition of N fertilizer. The test weight of the cultivars differed in their response to the addition of N fertilizer at 2 out of 4 locations in 2015 and 1 out of 4 locations in 2016. The test weight declined as the N rate increased at Indian Head in 2014 and 2015, Yorkton in 2014 and 2016, Melfort in 2015 and 2016 and Redvers in 2015 and 2016 but not at Melfort in 2014, Yorkton in 2015 and Indian Head in 2016 (Tables 1-11). The decrease in test weight was small at Yorkton in 2014 (from 259 to 253 g/0.5L) and Indian Head in 2015 (from 253 to 250 g/0.5L) as the N rate increased from 40 to 120 kg N/ha. At Indian Head in 2014 there was a larger decrease in test weight, from 264 to 246 g/0.5L as the N rate was increased from 40 to 120 kg N/ha. At Melfort in 2015 there was a large decrease in the test weight of CDC Seabiscuit as the N rate increased (Table A5). In addition the test weight of Stride decreased as the N rate increased while the test weight of AC Morgan and CDC Minstrel had decreases of less than 4 g/0.5L. At Redvers in 2015 the test weight of all the cultivars except Souris declined as the N rate increased (Table A7). The decrease in test weight as the N rate increased was greater than 10 g/0.5L for both Leggett and Stride. At Redvers in 2016 the test weight of Souris and Stride both decreased as the N rate increased. (Table A11)

Over the two years the effect increasing of N fertilizer was consistent on plump seed but not thin seed and groat yield. The percentage of plump seed tended to decrease as the N rate increased (Tables 1-7)

Table 1: Effect of Cultivar and Nitrogen Rate on Oat Yield and Development at Yorkton in 2014

	Plant Density Plants/m ²	Lodging 1-10	Yield Kg/ha	Test weight g/0.5L	Plump seed %	Thin Seed %	Groat Yield %
Cultivar							
Stride	272.7 a	4.2 b	5960.9 c	266.0 a	96 ab	0.5 B	72.9 c
CDC Dancer	271.4 a	5.6 a	6512.6 b	257.0 c	96 bc	0.7 B	75.6 a
Summit	269.0 a	2.6 c	6194.8 c	260.8 b	96 a	0.6 B	74.5 b
Triactor	253.8 a	2.9 c	7049.3 a	242.4 d	95 c	1.3 A	72.4 c
Nitrogen Rate (kg/ha)							
40	268.5 a	3.5 b	5741.6 c	259.2 a	97 a	0.6 A	73.9 a
60	268.2 a	3.4 b	6309.8 b	257.6 ab	96 b	0.8 A	73.9 a
80	268.8 a	3.7 b	6642.0 b	256.6 b	96 bc	0.8 A	73.9 a
120	261.3 a	4.8 a	7024.2 a	252.8 c	95 c	0.9 A	73.8 a

Table 2. Yield response and test weight stability of oat to fertilizer N at Melfort in 2014

	Plant Density /m ²	Lodge Belgian 0-5	Grain yield kg/ha	Grain yield bu/ac	Test Wt g/0.5 L	Plump %	Thin %	TKW g/1000 k
Cultivar								
Stride	284.8 b	0.2 a	6714.3 b	175.8 b	282.89 a	88.216 A	2.288 a	32.7 d
CDC Minstrel	328.3 a	0 a	6874.6 b	180 b	276.31 ab	90.388 A	2.368 a	36.11 c
AC Morgan	295.6 b	0 a	7496.6 a	196.3 a	273.86 b	90.244 A	1.203 b	37.36 b
CDC Seabiscuit	277.8 b	0.3 a	6819.1 b	178.6 b	264.92 c	90.475 A	1.611 b	39.48 a
Nitrogen Rate								
40 kg/ha	294.7 a	0.05 b	6575.5 d	172.2 d	276.29 a	90.716 A	1.834 a	36.83 a
60 kg/ha	293.4 a	0.05 b	6850.6 c	179.4 c	275.44 a	90.635 A	1.936 a	36.93 a
80 kg/ha	305.3 a	0.05 b	7103.9 b	186 b	272.04 a	89.113 B	1.866 a	36 b
120 kg/ha	292.9 a	0.35 a	7374.6 a	193.1 a	274.2 a	88.859 B	1.833 a	35.9 b

Table 3. Yield response and test weight stability of oat to fertilizer N at Indian Head

	Plant Density /m ²	Lodge (1-10)	Grain yield kg/ha	Test Wt g/0.5 L	Plump seed %	Thin Seed %	Groat yield %	Wild Oat g/50g
Cultivar								
Stride	241 a	6.8 a	3726.8 a	261.9 a	80 b	2.2 a	70 bc	0.252 a
Pinnacle	222 a	6.6 a	4028.7 a	248.29 c	93 a	1.2 b	71 b	0.264 a
CDC Orrin	229 a	6.6 a	4125.3 a	256.08 b	93 a	1.4 b	70 c	0.25 a
CDC Big Br	229 a	5.8 a	4038.7 a	260.52 ab	91 a	2.6 a	73 a	0.216 a
Nitrogen Rate (kg/ha)								
40 kg/ha	229 a	3.8 d	3426.4 b	264.31 a	92 a	1.5 b	72 a	0.26 a
60 kg/ha	231 a	5.8 c	4144.7 a	261.07 a	91 a	1.5 b	71 b	0.191 a
80 kg/ha	234 a	7.4 b	4051.8 a	255.62 b	90 a	1.8 b	71 c	0.313 a
120 kg/ha	227 a	8.8 a	4296.6 a	245.79 c	85 b	2.6 a	70 d	0.219 a

Table 4. Yield response and test weight stability of oat to fertilizer N at Yorkton in 2015

	Plant Density /m ²	Lodging 0-10	Grain yield kg/ha	Grain yield bu/ac	Test Wt g/0.5 L	Plump %	Thin %	Groat Yield %
Cultivar								
Stride	184.9 c	4.3 b	4446.1 b	115.6 b	259.1 b	89.9 b	1.8 bc	73.6 c
CDC Dancer	212.0 ab	3.8 b	4165.5 c	108.3 c	268.3 a	91.7 a	1.6 c	82.4 a
Summit	219.6 a	5.2 a	4362.1 b	113.4 b	261.5 ab	91.4 a	1.9 ab	80.2 b
Triactor	199.6 bc	2.8 c	5168.6 a	134.4 a	241.0 c	89.4 b	2.1 a	72.6 d
Nitrogen Rate								
40 kg/ha	218.0 a	4.2 ab	3744.7 d	97.4 d	257.9 a	91.1 a	1.7 a	76.9 b
60 kg/ha	215.1 a	4.6 a	4273.9 c	111.1 c	256.5 a	91.2 a	1.8 a	77.0 b
80 kg/ha	196.8 b	3.8 bc	4686.4 b	121.9 b	262.6 a	90.2 b	2.0 a	77.2 b
120 kg/ha	186.3 b	3.4 c	5437.1 a	141.4 a	252.9 a	89.8 b	1.8 a	77.8 a
Interaction p value	0.0183	0.0008						

Table 5. Yield response and test weight stability of oat to fertilizer N at Melfort in 2015

	Plant Density /m ²	Lodging 0-10	Grain yield kg/ha	Grain yield bu/ac	Test Wt g/0.5 L	Plump %	Thin %	Groat Yield %
Cultivar								
Stride	205.3 c	1.1 a	4923.4 d	128.0 d	254.2 a	89.3 C	1.8 a	71.4 c
CDC Minstrel	233.8 ab	1.0 a	5252.5 c	136.6 c	241.1 c	97.8 A	1.1 b	73.0 b
AC Morgan	245.1 a	1.0 a	5831.4 a	151.6 a	246.7 b	95.2 B	0.9 b	70.4 d
CDC Seabiscuit	214.3 bc	1.3 a	5544.2 b	144.2 b	232.1 d	95.3 B	1.5 a	74.0 a
Nitrogen Rate								
40 kg/ha	224.6 a	1.0 b	4549.9 d	118.3 d	246.9 a	95.4 A	1.1 a	71.9 a
60 kg/ha	220.6 a	1.0 b	5111.9 c	132.9 c	245.0 ab	94.7 ab	1.2 a	72.0 a
80 kg/ha	230.7 a	1.0 b	5631.2 b	146.4 b	242.8 b	94.1 B	1.5 a	72.2 a
120 kg/ha	222.5 a	1.4 a	6258.4 a	162.7 a	239.3 c	94.9 ab	1.3 a	72.6 a
Interaction p value		0.051			0.012			

Table 6. Yield response and test weight stability of oat to fertilizer N at Indian Head in 2015

	Plant		Lodging	Grain yield		Grain yield	Test Wt	Plump		Thin	Groat Yield				
	Density		1-10	kg/ha		bu/ac	g/0.5 L	%		%		%			
	/m2														
Cultivar															
Stride	201.26	b	1.9	a	3649.6	b	96	254.614	b	87.6	C	1.42	a	72.13	b
CDC Ruffian	213.56	b	1.3	b	4253.19	a	111	248.414	c	96.53	A	0.54	c	74.77	a
CS Camden	209.77	b	1	b	4520.38	a	118	246.309	c	93.84	B	0.86	b	71.94	b
CDC Big Brown	250.47	a	1.3	b	4400.69	a	115	260.498	a	96.94	A	0.86	b	75.12	a
Nitrogen Rate															
40 kg/ha	227.3	a	1.1	a	3651.41	c	96	253.24	a	93.35	A	0.95	a	72.75	b
60 kg/ha	234.58	a	1.4	a	4118.68	b	108	253.991	a	93.08	A	0.96	a	73.17	b
80 kg/ha	219.3	a	1.3	a	4503.69	a	118	252.338	ab	93.94	A	1.01	a	73.94	a
120 kg/ha	193.88	a	1.6	a	4550.08	a	119	250.266	b	94.54	A	0.76	a	74.11	a

Table 7. Yield response and test weight stability of oat to fertilizer N at Redvers in 2015

	Plant		Lodging	Grain yield		Grain yield	Test Wt	Plump		Thin	Groat Yield				
	Density		1-10	kg/ha		bu/ac	g/0.5 L	%		%		%			
	/m2														
Cultivar															
Stride	163	c	1.6	b	4416.6	a	115.7	248.5	a	64.1	b	4.7	b	68.9	c
Leggett	247	b	2	b	4542.3	a	118.9	244.6	b	77.1	a	3.9	b	70.1	ab
Souris	278	a	4.7	a	4490.5	a	117.6	236.0	c	64.2	b	8.6	a	70.7	a
CDC Morrison	261	ab	1.1	c	4602.8	a	120.5	247.5	a	72.3	a	4.0	b	69.5	bc
Nitrogen Rate															
40 kg/ha	231.8	a	1.4	c	4154.4	b	108.8	248.9	a	77.4	a	3.4	b	69.7	a
60 kg/ha	237.8	a	1.7	bc	4466.0	a	116.9	244.6	b	67.2	b	6.0	a	69.4	a
80 kg/ha	238.1	a	2.2	b	4667.6	a	122.2	243.9	b	66.0	b	5.9	a	70.0	a
120 kg/ha	241.4	a	3.3	a	4764.2	a	124.8	239.2	c	67.3	b	5.3	a	70.1	a
Interaction p value			0.006					0.09							

Table 8. Yield response and test weight stability of oat to fertilizer N at Yorkton in 2016

Description	Plant Density	Lodge	Grain yield	Grain yield	Test Wt
Rating Unit	/m ²	1-10	kg/ha	bu/acre	g/0.5 L
Cultivar					
Stride	296.6 ab	2.44 b	3738.1 b	97.9 b	257.2 a
CDC Dancer	267.8 b	3.24 a	3179 c	83.2 c	246.4 c
Summit	311.8 a	1.27 c	4032.3 a	105.6 a	252.1 b
Triactor	266.6 b	1.27 c	4027.4 a	105.5 a	240.2 d
Nitrogen Rate (kg/ha)					
40 kg/ha	292.3 a	1.52 b	3426.9 b	89.7 b	254 a
60 kg/ha	309.7 a	1.42 b	3490.7 b	91.4 b	253.4 a
80 kg/ha	281.7 ab	2.23 a	4069.4 a	106.6 a	246.4 b
120 kg/ha	259.1 b	2.83 a	3989.8 a	104.5 a	242.1 c
Interaction p value		0.0284	0.0168	0.0168	

Table 9. Yield response and test weight stability of oat to fertilizer N at Melfort in 2016

Description	Plant Density	Lodge	Grain yield	Grain yield	Test Wt
Rating Unit	/m ²	Belgium (0-5)	kg/ha	bu/acre	g/0.5 L
Cultivar					
Stride	220.02 ab	3.26 a	7257.65 bc	190 bc	249.98 a
Minstrel	211.61 b	1.36 b	7454.44 ab	195.2 ab	234.45 b
AC Morgan	234.38 a	0.25 c	7638.15 a	200 a	251.08 a
Seabiscuit	207.1 b	2.89 a	7153.18 c	187.3 c	235.96 b
Nitrogen Rate (kg/ha)					
40 kg/ha	217.25 ab	0.54 c	7177.41 b	187.9 b	247.64 a
60 kg/ha	206.08 b	2.02 b	7377.46 ab	193.2 ab	242.81 b
80 kg/ha	234.38 a	1.34 bc	7352.95 ab	192.5 ab	242.98 b
120 kg/ha	215.41 b	3.44 a	7595.59 a	198.9 a	238.03 c
Interaction p value					

Table 10. Yield response and test weight stability of oat to fertilizer N at Indian Head in 2016

Description Rating Unit	Plant Density /m ²	Lodge 1-10	Grain yield kg/ha	Grain yield bu/acre	Test Wt g/0.5 L					
Cultivar										
Stride	245.65	b	3.9	a	4136.2	b	108.3	b	261.386	A
CDC Ruffian	247.6	b	2.8	b	4221.5	b	110.5	b	247.546	D
CS Camden	301.84	a	2.8	b	4262.1	ab	111.6	ab	252.308	C
CDC Big Brown	184.65	c	2.3	c	4426.1	a	115.9	a	256.83	B
Nitrogen Rate (kg/ha)										
40 kg/ha	241.24	a	2.6	b	3460.6	d	90.6	d	254.179	A
60 kg/ha	242.88	a	2.8	b	4058.7	c	106.3	c	255.519	A
80 kg/ha	241.86	a	3.4	a	4436	b	116.2	b	254.542	A
120 kg/ha	253.75	a	3	b	5090.8	a	133.3	a	253.83	A

Table 11. Yield response and test weight stability of oat to fertilizer N at Redvers in 2016

Description Rating Unit	Plant Density /m ²	Lodge (1-10)	Grain yield kg/ha	Grain yield bu/acre	Test Wt g/0.5 L					
Cultivar										
Stride	216.64	a	4.94	b	5848.8	b	153.2	b	245.83	a
Justice	204.33	a	6.56	a	6459	a	169.1	a	249.61	a
Souris	212.43	a	5.31	b	6266	a	164.1	a	238.72	b
CDC Morrison	222.07	a	2	c	5178.9	c	135.6	c	232.39	c
Nitrogen Rate (kg/ha)										
40 kg/ha	218.69	a	3.66	c	5589.3	b	146.4	b	246.33	a
60 kg/ha	211.82	a	4.5	b	5987.5	a	156.8	a	243.21	ab
80 kg/ha	211.82	a	5.16	ab	6051.9	a	158.5	a	239.13	bc
120 kg/ha	213.15	a	5.5	a	6124	a	160.4	a	237.88	c
Interaction p value					0.0478		0.0478		0.0106	

11. Conclusions and Recommendation

Grain yield increased as the N rate increased at all 11 site-years with grain yield maximized at the highest N rate at 6 site years. There does not appear to be a strong correlation between cultivars with high yield potential and a low test weight. There does appear to be a relationship between lodging increasing as N rates increased and test weight decreasing. A combined analysis is now required to further investigate this relationship. In addition the combined analysis will let us look at the cultivars overall stability in test weight as the N rate increases.

12. Acknowledgements

- ADOPT Signs were posted at the various trial locations
- Data posted on web sites and annual reports
- Plots toured at the locations

Abstract

13. Abstract/Summary

Oat growers are looking for ways to increase their yield and maintain the quality of the oats they grow. Many are using high N rates with varying degrees of success. Research indicates that some cultivars have a more stable test weight than other cultivars as the nitrogen fertilizer rate is increased. In addition new cultivars are available that growers have not had a chance to see evaluated in their own area. The demonstration consisted of four cultivars and four nitrogen rates in an RCBD with four replications at Indian Head, Yorkton, Melfort and Redvers in 2014 and 2015. The experiment was successfully carried out at three locations in 2014, Indian Head, Yorkton and Melfort and all locations in 2015. In 2014 seeding could not be completed due to excessive soil moisture and rain at Redvers. In 2014 there was no interaction among the cultivars for their response to nitrogen fertilizer at all three locations. This indicates that the cultivars all responded in a similar manner to the application of nitrogen fertilizer. However both 2015 and 2016 at 2 out of 4 locations there was an interaction between the cultivars and their response to applied N. In general, as the amount of applied N increased lodging increased. In all eleven site-years (a location in a specific year) trials conducted over the three years, grain yield increased as the N rate increased. At three site years, Indian Head 2014 and Redvers 2015 and 2015 only 60 kg N/ha was needed to maximize yield (Tables 3, 7 and 11). Two site years, Indian Head 2015 and Yorkton 2016, required 80 kg N/ha to maximize yield (Tables 6 and 8). At six site years, Yorkton in 2014 and 2015, Melfort in 2014, 2015, and 2016 and Indian Head in 2016, 120 kg N/ha was required to maximize yield (Tables 1, 2, 4, 5, 9 and 10). The test weight of the cultivars differed in their response to the addition of N fertilizer at 2 out of 4 locations in 2015 and 1 out of 4 locations in 2016. The test weight declined as the N rate increased at Indian Head in 2014 and 2015, Yorkton in 2014 and 2016, Melfort in 2015 and 2016 and Redvers in 2015 and 2016 but not at Melfort in 2014, Yorkton in 2015 and Indian Head in 2016 (Tables 1-11). There does not appear to be a strong correlation between cultivars with high yield potential and a low test weight. There does appear to be a relationship

between lodging increasing as N rates increased and test weight decreasing. A combined analysis is now required to further investigate this relationship. In addition the combined analysis will let us look at the cultivars overall stability in test weight as the N rate increases.

14. The trials were shown during field days over the three years at, Indian Head (630 people), at Yorkton (180 people), at Melfort (350 people) and at Redvers in 2015 (80 people).

The results will be posted on the websites of the participating organizations.

Finances

15. Expenditure Statement

- You must provide an **expenditure statement** showing how ADOPT funds were used.
- Expenditures must be reported using the budget categories shown in Appendix B of your contract.
- **We recommend that you report your expenditures using the Excel spreadsheet we have developed for this purpose (ADOPT Expenditure Statement.xls). That spreadsheet is available from the Research Branch Project Manager or the Evaluation Coordinator.**
- **Note that the ADOPT contract requires you to retain all receipts and financial records relating to the project for at least six years after the project is completed.**

	Year 1 (\$)	Year 2 (\$)	Year 3 (\$)	Total (\$)
Salaries & Benefits				
Students				
Postdoctoral / Research Associates				
Technical / Professional Assistants				
Consultant Fees / Contractual Services	\$30,070			\$30,070
Rental Costs				
Materials & Supplies				
Project Travel				
Field Work				
Collaborations / consultations				
Other				
Field Day				
Administration				
Miscellaneous				
Total	\$30,070			\$30,070

Appendix 1: N rate – Cultivar Interactions

Table A1: N rate and cultivar interactions on Oat Yield at Yorkton in 2014

Description		Plant Density	Lodging		Yield		Test Wt		Wild Oat		Plump Seed		Thin Seed		Groats Yield		
Rating Unit		/m ²	1-10		Kg/ha		g/0.5L		g/50g		%		%		%		
Cultivar	N Rate																
CDC Dancer	40 kg/ha	252.95	a	5.3	b	6244.1	bc	258.40	de	0.00	a	96	abc	0.7	c	75.7	ab
CDC Dancer	60 kg/ha	277.56	a	4.0	bc	6387.4	bc	261.09	cde	0.04	a	96	abc	0.6	c	75.8	ab
CDC Dancer	80 kg/ha	275.84	a	5.3	b	6565.7	bc	257.37	e	0.00	a	96	bc	0.5	c	76.3	a
CDC Dancer	120 kg/ha	279.28	a	8.0	a	6853.3	b	251.07	f	0.00	a	95	c	0.9	bc	74.7	b
Stride	40 kg/ha	283.46	a	3.3	bc	5027.0	d	268.87	a	0.00	a	97	a	0.4	c	73.2	cd
Stride	60 kg/ha	274.11	a	4.3	bc	5908.1	c	266.60	ab	0.00	a	96	abc	0.5	c	73.1	d
Stride	80 kg/ha	275.84	a	4.0	bc	6238.0	bc	265.15	abc	0.00	a	96	bc	0.6	c	72.3	d
Stride	120 kg/ha	257.38	a	5.3	b	6670.3	bc	263.35	bcd	0.00	a	95	bc	0.5	c	72.9	d
Summit	40 kg/ha	285.19	a	2.5	c	5301.4	d	263.67	bcd	0.01	a	97	ab	0.4	c	74.3	bc
Summit	60 kg/ha	266.49	a	2.3	c	5956.1	c	261.18	cde	0.01	a	96	abc	0.6	c	74.4	bc
Summit	80 kg/ha	274.11	a	3.0	bc	6702.1	bc	260.97	cde	0.00	a	96	abc	0.7	c	74.5	b
Summit	120 kg/ha	250.25	a	2.8	bc	6819.5	b	257.46	e	0.00	a	96	abc	0.7	c	74.9	b
Triactor	40 kg/ha	252.46	a	3.0	bc	6393.7	bc	245.72	g	0.00	a	96	abc	0.8	bc	72.3	d
Triactor	60 kg/ha	254.68	a	3.3	bc	6987.5	b	241.57	gh	0.01	a	95	bc	1.5	a	72.3	d
Triactor	80 kg/ha	249.51	a	2.5	c	7062.2	b	242.94	gh	0.00	a	95	c	1.3	ab	72.5	d
Triactor	120 kg/ha	258.37	a	3.0	bc	7753.6	a	239.26	h	0.00	a	95	c	1.7	a	72.6	d
LSD P=.05		34.02		1.50		534.98		3.653		0.030		1.0		0.4		0.98	
CV		8.92		27.34		5.82		1.0		0.69		0.71		36.66		0.92	
Treatment Prob(F)		0.3481		0.0001		0.0001		0.0001		0.5521		0.0001		0.0001		0.0001	

Table A2: N rate and cultivar interaction on Oat Yield at Melfort in 2014

Description		Plant Density	Lodge Belgian	Grain Yield		Grain Yield		Test Wt	Plump		Thin		TKW				
Rating Unit		/m2	0-5	Kg/ha		Bu/ac		g/0.5L	%		%		g/1000g				
Cultivar	N Rate																
AC Morgan	40 kg/ha	292	a	0	b	7100.5	b-e	185.9	b-e	280.0	abc	90.4	abc	1.31	bc	36.9	cde
AC Morgan	60 kg/ha	298	a	0	b	7204.3	bcd	188.7	bcd	277.0	abc	90.7	abc	1.26	bc	37.9	bc
AC Morgan	80 kg/ha	291	a	0	b	7654.3	ab	200.4	ab	269.8	abc	89.7	abc	1.05	c	37.2	cde
AC Morgan	120 kg/ha	301	a	0	b	8027.3	a	210.2	a	268.6	abc	90.1	abc	1.19	bc	37.5	cd
CDC Minstrel	40 kg/ha	317	a	0	b	6404.0	f	167.7	f	282.0	a	91.9	a	2.23	abc	37.0	cde
CDC Minstrel	60 kg/ha	342	a	0	b	6713.3	c-f	175.8	c-f	279.4	a	90.2	abc	2.99	a	37.0	cde
CDC Minstrel	80 kg/ha	340	a	0	b	7024.0	c-f	183.9	c-f	266.2	a	90.5	abc	2.36	abc	35.0	e
CDC Minstrel	120 kg/ha	314	a	0	b	7357.0	bc	192.7	bc	264.0	a	89.0	abc	1.9	abc	35.5	de
CDC Seabiscuit	40 kg/ha	297	a	0.2	ab	6443.8	ef	168.7	ef	262.1	bc	91.6	ab	1.37	bc	40.7	a
CDC Seabiscuit	60 kg/ha	256	a	0.2	ab	6653.8	def	174.2	def	270.1	abc	90.7	abc	1.71	abc	39.9	a
CDC Seabiscuit	80 kg/ha	280	a	0.2	ab	6995.8	c-f	183.2	c-f	260.6	c	90.3	abc	1.53	bc	39.5	ab
CDC Seabiscuit	120 kg/ha	276.8	a	0.6	ab	7183.3	bcd	188.1	bcd	266.8	abc	89.3	abc	1.83	abc	37.8	bc
Stride	40 kg/ha	272	a	0	b	6353.8	f	166.4	f	285.0	a	88.9	abc	2.43	ab	32.8	f
Stride	60 kg/ha	277	a	0	b	6831.0	c-f	178.9	c-f	280.2	abc	90.9	ab	1.79	abc	32.9	f
Stride	80 kg/ha	309	a	0	b	6741.8	c-f	176.5	c-f	284.4	ab	86.1	c	2.53	ab	32.4	f
Stride	120 kg/ha	280	a	0.8	a	6930.8	c-f	181.5	c-f	281.9	abc	87.0	bc	2.40	abc	32.8	f
LSD P=.05		49.77		0.444		417.7		10.9		12.7		2.7		0.78		1.5	
CV		11.74		248.3		4.19		4.19		3.25		2.09		29.38		2.84	
Treatment Prob(F)		0.0577		0.0117		0.0001		0.0001		0.0032		0.0056		0.0001		0.0001	

Table A3: N rate and cultivar interactions on Oat Yield at Indian Head in 2014

Description		Plant Density	Lodge	Grain Yield		Test Wt	Wild Oat	Plump Seed	Thin Seed	Groats Yield							
Rating Unit		/m2	1-10	Kg/ha		g/0.5L	g/50g	%	%	%							
Cultivar	N Rate																
CDC Big Brown	40 kg/ha	243.60	a	2.3	f	3330.3	b	268.3	ab	0.19	a	93	a	2.2	bc	75.2	a
CDC Big Brown	60 kg/ha	233.76	a	5.5	b-f	4165.0	ab	262.8	abc	0.29	a	92	a	2.2	bc	72.5	b
CDC Big Brown	80 kg/ha	228.84	a	7.3	a-d	4486.8	ab	260.7	a-d	0.11	a	92	a	2.3	bc	72.3	bc
CDC Big Brown	120 kg/ha	209.56	a	8.0	abc	4172.8	ab	250.3	de	0.13	a	87	ab	3.6	a	70.8	b-f
CDC Orrin	40 kg/ha	237.04	a	5.0	c-f	3355.2	b	261.1	abc	0.34	a	94	a	1.2	cd	70.2	c-f
CDC Orrin	60 kg/ha	229.25	a	5.5	b-f	4224.8	ab	260.3	a-d	0.16	a	95	a	0.9	cd	69.9	def
CDC Orrin	80 kg/ha	225.15	a	6.8	a-e	4133.9	ab	256.0	cde	0.20	a	93	a	1.5	cd	70.1	c-f
CDC Orrin	120 kg/ha	223.51	a	9.0	ab	4787.5	a	246.9	e	0.04	a	92	a	2.0	bcd	69.0	f
Pinnacle	40 kg/ha	210.79	a	3.5	ef	3614.8	ab	258.8	a-d	0.10	a	94	a	0.9	cd	72.1	bcd
Pinnacle	60 kg/ha	218.59	a	5.5	b-f	4440.1	ab	253.3	cde	0.08	a	95	a	0.7	d	71.5	b-e
Pinnacle	80 kg/ha	232.94	a	7.5	a-d	3808.8	ab	247.9	e	0.49	a	92	a	1.2	cd	69.5	ef
Pinnacle	120 kg/ha	225.15	a	10.0	a	4251.3	ab	233.2	f	0.16	a	89	a	2.0	bcd	69.0	f
Stride	40 kg/ha	222.69	a	4.3	def	3405.4	b	269.1	a	0.15	a	87	ab	1.6	cd	71.2	b-f
Stride	60 kg/ha	241.96	a	6.8	a-e	3749.1	ab	267.8	ab	0.08	a	81	b	2.0	bcd	71.0	b-f
Stride	80 kg/ha	248.93	a	8.0	abc	3777.7	ab	257.9	bcd	0.22	a	81	b	2.3	bc	70.2	c-f
Stride	120 kg/ha	251.39	a	8.3	abc	3974.9	ab	252.8	cde	0.31	a	72	c	3.0	ab	69.4	ef
LSD P=.05		13.9		2.2		760.3		6.6		1.61		5		0.8		1.4	
CV		9.81		23.46		13.37		1.81		46.96		4.0		31.89		1.37	
Prob(F)		0.3123		0.0001		0.0070		0.0001		0.0818		0.0001		0.0001		0.0001	

Table A4: N rate and cultivar interactions on Oat Yield at Yorkton in 2015

Description		Plant Density	Lodging	Yield		Yield		Test Wt	Plump Seed	Thin Seed	Groat Yield						
Rating Unit		/m ²	1-10	Kg/ha		Bu/ac		g/0.5L	%	%	%						
Cultivar	N Rate																
CDC Dancer	40 kg/ha	214.0	bcd	4.5	b-e	3484.5	h	90.6	h	262.7	b	92.8	a	1.7	b-e	82.1	ab
CDC Dancer	60 kg/ha	229.8	abc	4.9	a-d	4021.6	fg	104.6	fg	264.7	b	92.4	ab	1.6	de	82.5	a
CDC Dancer	80 kg/ha	210.3	b-e	3.5	efg	4254.1	ef	110.6	ef	286.1	a	91.6	abc	1.5	de	82.8	a
CDC Dancer	120 kg/ha	194.0	d-g	2.4	gh	4901.9	c	127.5	c	259.8	bc	89.8	de	1.5	e	82.2	ab
Stride	40 kg/ha	200.3	c-f	4.9	a-d	3763.2	gh	97.8	gh	262.3	b	90.4	cde	1.6	b-e	73.5	ef
Stride	60 kg/ha	193.0	d-g	5.1	abc	4204.3	ef	109.3	ef	259.2	bc	90.1	cde	1.7	a-e	73.5	ef
Stride	80 kg/ha	175.8	fg	3.5	efg	4527.3	de	117.7	de	259.5	bc	89.1	e	2.2	a	73.2	fg
Stride	120 kg/ha	170.8	fg	3.6	d-g	5289.5	b	137.5	b	255.6	bcd	89.8	de	1.6	b-e	74.4	e
Summit	40 kg/ha	247.5	a	5.8	ab	3473.4	h	90.3	h	264.6	b	92.3	ab	1.6	cde	80.0	d
Summit	60 kg/ha	238.5	ab	6.0	a	4091.7	fg	106.4	fg	260.8	bc	92.0	ab	1.9	a-e	79.7	d
Summit	80 kg/ha	182.0	efg	5.1	abc	4473.7	de	116.3	de	261.9	b	90.9	bcd	2.0	a-e	80.0	cd
Summit	120 kg/ha	210.5	b-e	3.8	def	5409.5	b	140.7	b	258.7	bc	90.3	cde	2.0	a-e	81.2	bc
Triactor	40 kg/ha	210.1	b-e	1.7	h	4257.6	ef	110.7	ef	242.2	cde	89.1	e	2.0	a-d	72.2	g
Triactor	60 kg/ha	199.3	d-g	2.4	gh	4778.3	cd	124.2	cd	241.2	de	90.1	cde	2.1	ab	72.2	g
Triactor	80 kg/ha	219.0	a-d	3.1	fgh	5490.7	b	142.8	b	243.0	cde	89.2	e	2.2	a	72.7	fg
Triactor	120 kg/ha	170.0	g	3.9	c-f	6147.7	a	159.8	a	237.6	e	89.2	e	2.1	abc	73.5	ef
LSD P=.05		29.88		1.358		354.772		9.224		17.2365		1.558		0.503		1.15	
CV		10.44		23.82		5.57		5.57		4.77		1.23		19.67		1.06	
Treatment Prob(F)		0.0001		0.0001		0.0001		0.0001		0.0002		0.0001		0.03		0.0001	

Table A5: N rate and cultivar interaction on Oat Yield at Melfort in 2015

Description		Plant Density	Lodge Belgian		Grain Yield		Grain Yield		Test Wt	Plump		Thin		Groat Yield			
Rating Unit		/m ²	0-5		Kg/ha		Bu/ac		g/0.5L	%		%		%			
Cultivar	N Rate																
AC Morgan	40 kg/ha	245.8	a	1.0	c	5007.9	fg	130.2	fg	248.2	c	95.3	bc	0.8	fg	70.2	e
AC Morgan	60 kg/ha	243.8	a	1.0	c	5591.8	de	145.4	de	247.2	cd	95.0	bc	0.7	g	70.3	e
AC Morgan	80 kg/ha	251.3	a	1.0	c	6107.5	bc	158.8	bc	246.9	cde	94.8	bc	1.0	d-g	70.4	e
AC Morgan	120 kg/ha	239.5	a	1.0	c	6618.4	a	172.1	a	244.4	cde	95.8	bc	0.9	efg	70.6	de
CDC Minstrel	40 kg/ha	235.8	a	1.0	c	4520.7	h	117.5	h	244.1	cde	98.0	a	1.0	d-g	72.3	bc
CDC Minstrel	60 kg/ha	215.0	a	1.0	c	4760.9	gh	123.8	gh	241.3	ef	97.5	a	1.2	c-g	72.3	bc
CDC Minstrel	80 kg/ha	255.0	a	1.0	c	5556.2	de	144.5	de	237.0	fg	97.4	a	1.4	a-e	73.2	ab
CDC Minstrel	120 kg/ha	229.5	a	1.0	c	6172.3	abc	160.5	abc	241.9	def	98.4	a	0.7	g	74.0	a
CDC Seabiscuit	40 kg/ha	199.5	a	1.0	c	4666.8	gh	121.3	gh	237.9	fg	96.0	b	1.2	c-g	73.8	a
CDC Seabiscuit	60 kg/ha	212.0	a	1.0	c	5467.9	def	142.2	def	236.4	fg	95.9	bc	1.3	b-f	74.2	a
CDC Seabiscuit	80 kg/ha	220.3	a	1.0	c	5614.1	de	146.0	de	232.3	g	94.3	c	1.9	a	73.9	a
CDC Seabiscuit	120 kg/ha	225.3	a	2.0	a	6427.9	ab	167.1	ab	221.8	h	95.0	bc	1.8	abc	74.1	a
Stride	40 kg/ha	217.5	a	1.0	c	4004.3	i	104.1	i	257.5	a	91.5	d	1.5	a-d	71.2	cde
Stride	60 kg/ha	211.5	a	1.0	c	4627.1	gh	120.3	gh	255.0	ab	88.7	e	1.9	ab	71.2	cde
Stride	80 kg/ha	196.3	a	1.0	c	5247.2	ef	136.4	ef	254.9	ab	88.4	e	1.8	ab	71.4	cde
Stride	120 kg/ha	195.8	a	1.5	b	5814.9	cd	151.2	cd	249.3	bc	88.2	e	1.9	ab	71.7	cd
LSD P=.05		47.0		0.5		470.0		12.2		5.8							1.3
CV		14.7		30.3		6.1		6.1		1.7		1.99t		21.85t			1.3
Treatment Prob(F)		0.2063		0.0052		0.0001		0.0001		0.0001		0.0001		0.0001			0.0001

Table A6: N rate and cultivar interactions on Oat Yield at Indian Head in 2015

Description		Plant Density		Lodge		Grain Yield		Test Wt		Plump Seed		Thin Seed		Groats Yield	
Rating Unit		/m2		1-10		Kg/ha		g/0.5L		%		%		%	
Cultivar	N Rate														
CDC Big Brown	40 kg/ha	244.0	a	1.3	b	3796.6	e-h	259.7	ab	95.7	abc	1.1	a-d	74.4	b
CDC Big Brown	60 kg/ha	255.1	a	1.0	b	4639.3	ab	261.9	a	97.2	ab	0.7	c-f	75.1	ab
CDC Big Brown	80 kg/ha	261.2	a	1.5	b	4891.4	ab	259.5	ab	97.2	ab	1.1	a-e	75.7	a
CDC Big Brown	120 kg/ha	241.6	a	1.5	b	4275.4	b-f	260.9	ab	97.8	a	0.5	ef	75.3	ab
CDC Ruffian	40 kg/ha	234.2	ab	1.0	b	3904.8	d-g	248.7	def	95.8	abc	0.6	c-f	74.4	b
CDC Ruffian	60 kg/ha	239.1	a	1.5	b	4006.9	c-f	249.5	def	96.8	ab	0.5	def	74.5	b
CDC Ruffian	80 kg/ha	223.1	abc	1.3	b	4620.4	abc	250.8	de	96.5	ab	0.6	def	75.3	ab
CDC Ruffian	120 kg/ha	157.9	d	1.3	b	4480.7	bcd	244.7	fg	97.0	ab	0.4	f	75.0	ab
CS Camden	40 kg/ha	202.6	a-d	1.0	b	3695.5	fgh	248.3	d-g	95.0	abc	0.7	c-f	70.9	f
CS Camden	60 kg/ha	207.9	a-d	1.0	b	4498.0	a-d	247.6	d-g	92.9	cd	1.0	b-f	71.7	def
CS Camden	80 kg/ha	220.2	a-d	1.0	b	4770.8	ab	246.1	efg	93.7	bc	0.9	b-f	72.2	cde
CS Camden	120 kg/ha	208.3	a-d	1.0	b	5117.2	a	243.2	g	93.7	bc	0.9	b-f	73.0	c
Stride	40 kg/ha	228.4	abc	1.3	b	3208.7	h	256.3	bc	87.0	ef	1.4	ab	71.4	ef
Stride	60 kg/ha	236.2	a	2.3	a	3330.5	gh	257.0	abc	85.4	f	1.6	a	71.4	ef
Stride	80 kg/ha	172.7	bcd	1.5	b	3732.2	e-h	252.9	cd	88.3	ef	1.5	ab	72.6	cd
Stride	120 kg/ha	167.7	cd	2.5	a	4327.0	b-e	252.3	cd	89.6	de	1.2	abc	73.2	c
LSD P=.05		62.6		0.7		629.7		5.4		3.6		0.6		1.0	
CV		20.1		37.7		10.5		1.5		2.7		47.5		1.0	
Prob(F)		0.0406		0.002		0.0001		0.0001		0.0001		0.004		0.0001	

Table A7: N rate and cultivar interactions on Oat Yield at Redvers in 2015

Description		Plant Density		Lodge		Grain Yield		Test Wt		Plump Seed		Thin Seed		Groat Yield	
Rating Unit		/m2		1-10		Kg/ha		g/0.5L		%		%		%	
Cultivar	N Rate														
CDC Morrison	40 kg/ha	249.5	abc	1.0	e	4177.1	bc	250.8	abc	74.9	abc	3.8	bcd	69.3	a-d
CDC Morrison	60 kg/ha	258.4	abc	1.0	e	4407.5	bc	246.9	bcd	68.6	a-e	5.0	bcd	68.5	cd
CDC Morrison	80 kg/ha	283.5	ab	1.0	e	4771.7	ab	247.5	bcd	71.0	a-d	4.0	bcd	69.9	abc
CDC Morrison	120 kg/ha	253.9	abc	1.2	e	5054.8	a	244.8	de	74.8	abc	3.3	cd	70.3	ab
Leggett	40 kg/ha	241.6	bc	1.4	de	4119.3	c	251.8	ab	82.4	a	2.5	d	70.0	abc
Leggett	60 kg/ha	245.1	abc	1.4	de	4458.7	abc	245.3	cd	74.7	abc	4.5	bcd	69.3	a-d
Leggett	80 kg/ha	228.3	c	1.6	de	4535.1	abc	243.3	def	72.8	a-d	5.2	bc	69.8	abc
Leggett	120 kg/ha	273.1	ab	3.9	b	5056.1	a	238.2	fg	78.6	ab	3.6	bcd	71.1	a
Souris	40 kg/ha	280.0	ab	2.3	cd	4227.2	bc	239.0	fg	77.9	ab	4.3	bcd	70.3	abc
Souris	60 kg/ha	285.4	a	4.6	ab	4579.6	abc	234.2	g	60.9	cde	11.1	a	70.5	ab
Souris	80 kg/ha	266.2	abc	7.1	a	4632.4	abc	236.2	g	58.6	de	11.0	a	71.0	a
Souris	120 kg/ha	280.5	ab	5.8	ab	4522.9	abc	234.5	g	59.5	de	9.9	a	70.9	ab
Stride	40 kg/ha	156.0	d	1.0	e	4094.1	c	254.2	a	74.3	abc	3.1	cd	69.1	bcd
Stride	60 kg/ha	162.4	d	1.0	e	4418.4	bc	251.8	ab	64.4	b-e	4.8	bcd	69.4	a-d
Stride	80 kg/ha	174.2	d	1.4	de	4731.1	ab	248.6	a-d	61.6	cde	4.9	bcd	69.3	a-d
Stride	120 kg/ha	158.0	d	3.8	bc	4422.9	bc	239.3	efg	56.1	e	6.6	ab	67.9	d
LSD P=.05															
CV															
Prob(F)															

Table A8. Yield response and test weight stability of oat to fertilizer N at Yorkton in 2016

		Plant Density	Lodge	Grain yield		Grain yield		Test Wt			
		/m ²	1-10	kg/ha		bu/acre		g/0.5 L			
Treatment											
Stride	40	300.7	a-d	1.34	de	3460.9	e-h	90.6	e-h	262.6	a
Stride	60	308.6	abc	1.36	cde	3661	def	95.9	def	263.1	a
Stride	80	283.5	b-f	3.9	ab	4068	bcd	106.5	bcd	253.7	bc
Stride	120	293.8	b-e	4.15	a	3762.6	cde	98.5	cde	249.4	bcd
CDC Dancer	40	244.6	def	2.23	cd	2982.8	h	78.1	h	253.9	b
CDC Dancer	60	277.1	b-f	2.43	bc	3141.5	gh	82.3	gh	252.2	bcd
CDC Dancer	80	302.2	a-d	3.94	ab	3457.9	e-h	90.5	e-h	241.1	efg
CDC Dancer	120	247.5	c-f	4.92	a	3133.9	gh	82.1	gh	238.4	fg
Summit	40	317.9	ab	1.51	cde	3755.6	c-f	98.3	c-f	255.1	b
Summit	60	358.3	a	1	e	3257.5	fgh	85.3	fgh	256.6	ab
Summit	80	305.1	a-d	1.11	e	4530.8	ab	118.6	ab	250.5	bcd
Summit	120	265.7	b-f	1.5	cde	4585.3	a	120.1	a	246.4	cde
Triactor	40	306.1	a-d	1.11	e	3508.4	efg	91.9	efg	244.5	def
Triactor	60	294.8	a-e	1.11	e	3902.7	cde	102.2	cde	241.6	ef
Triactor	80	236.2	ef	1.11	e	4221.1	abc	110.5	abc	240.3	efg
Triactor	120	229.3	f	1.82	cde	4477.1	ab	117.2	ab	234.2	g
LSD P=.05		63.52		0.917 - 1.861		499.4		13.08		7.32	
CV		15.61		24.54t		9.39		9.39		2.06	
Treatment Prob(F)		0.0139		0.0001		0.0001		0.0001		0.0001	

Table A9. Yield response and test weight stability of oat to fertilizer N at Melfort in 2016

Treatment		Plant Density /m ²	Lodge 1-10	Grain yield kg/ha	Grain yield bu/acre	Test Wt g/0.5 L
Stride	40	208.74 bc	1.1 cde	7077 cd	185.3 cd	257.18 a
Stride	60	224.33 bc	4.94 ab	7624.58 abc	199.7 abc	248.95 b
Stride	80	224.74 bc	3.19 bc	7069.5 cd	185.1 cd	253.8 ab
Stride	120	222.28 bc	4.63 ab	7259.51 bcd	190.1 bcd	239.98 cd
Minstrel	40	211.2 bc	0.2 e	7351.53 a-d	192.5 a-d	237.68 cde
Minstrel	60	204.23 bc	1.21 cde	7305.06 bcd	191.3 bcd	233.5 def
Minstrel	80	216.13 bc	0.9 cde	7351.42 a-d	192.5 a-d	233.58 def
Minstrel	120	214.9 bc	4.64 ab	7809.73 ab	204.5 ab	233.05 ef
AC Morgan	40	241.14 ab	0.2 e	7374.62 a-d	193.1 a-d	255 ab
AC Morgan	60	198.08 c	0.43 de	7476.87 a-d	195.8 a-d	250.3 b
AC Morgan	80	268.62 a	0.2 e	7810 ab	204.5 ab	250.93 ab
AC Morgan	120	229.66 bc	0.2 e	7891.12 a	206.6 a	248.09 b
Seabiscuit	40	207.92 bc	1.01 cde	6906.5 d	180.9 d	240.7 c
Seabiscuit	60	197.67 c	2.9 bc	7103.35 cd	186 cd	238.5 cde
Seabiscuit	80	228.02 bc	2.06 bcd	7180.87 cd	188 cd	233.63 def
Seabiscuit	120	194.8 c	6.97 a	7421.99 a-d	194.4 a-d	231 f
LSD P=.05		37.155	1.477 - 3.693	572.99	15	6.509
CV		11.95	46.08t	5.45	5.45	1.88
Treatment Prob(F)		0.0328	0.0001	0.0312	0.0312	0.0001

Table A10. Yield response and test weight stability of oat to fertilizer N at Indian Head in 2016

		Plant							
		Density	Lodge	Grain yield	Grain yield	Test Wt			
		/m ²	1-10	kg/ha	bu/acre	g/0.5 L			
Treatment									
Stride	40	234 c	3.8 ab	3309 i	86.6 i	263 a			
Stride	60	250 c	4 ab	3869 fgh	101.3 fgh	262 a			
Stride	80	239 c	4.3 a	4325 de	113.3 de	263 a			
Stride	120	260 bc	3.8 ab	5042 ab	132 ab	258 a-d			
CDC Ruffian	40	253 c	2.5 de	3523 hi	92.3 hi	246 fg			
CDC Ruffian	60	242 c	2.5 de	4088 ef	107.1 ef	250 d-g			
CDC Ruffian	80	244 c	3.5 abc	4428 de	115.9 de	248 efg			
CDC Ruffian	120	251 c	2.8 cde	4847 bc	126.9 bc	245 g			
CS Camden	40	304 a	2 e	3349 i	87.7 i	252 b-g			
CS Camden	60	287 ab	2.8 cde	4060 efg	106.3 efg	250 c-g			
CS Camden	80	303 a	3.3 bcd	4381 de	114.7 de	249 efg			
CS Camden	120	313 a	3.3 bcd	5259 a	137.7 a	259 abc			
CDC Big Brown	40	174 d	2.3 e	3662 ghi	95.9 ghi	256 a-e			
CDC Big Brown	60	193 d	2 e	4218 def	110.4 def	259 ab			
CDC Big Brown	80	181 d	2.8 cde	4610 cd	120.7 cd	259 a-d			
CDC Big Brown	120	191 d	2.3 e	5215 ab	136.6 ab	254 b-f			
LSD P=.05		29.835	0.77	399.97	10.47	8.4014			
CV		8.55	18.23	6.59	6.59	2.32			
Treatment Prob(F)		0.0001	0.0001	0.0001	0.0001	0.0001			

Table A11. Yield response and test weight stability of oat to fertilizer N at Redvers in 2016

Treatment		Plant Density /m ²	Lodge 1-10	Grain yield kg/ha	Grain yield bu/acre	Test Wt g/0.5 L
Stride	40	223.51 a	3.75 e	5453.3 fg	142.8 fg	256.6 a
Stride	60	214.07 a	4.5 de	6045.6 cde	158.3 cde	249.73 abc
Stride	80	218.59 a	5.25 cde	6252.1 bcd	163.7 bcd	243.9 bcd
Stride	120	210.38 a	6.25 abc	5644.1 efg	147.8 efg	233.08 efg
Justice	40	202.18 a	5.13 cde	6224.1 bcd	163 bcd	252.68 ab
Justice	60	221.46 a	6 bcd	6513.2 abc	170.6 abc	249.45 abc
Justice	80	187.01 a	7.63 a	6185.6 bcd	162 bcd	248.75 abc
Justice	120	206.69 a	7.5 ab	6913.1 a	181 a	247.55 bc
Souris	40	219.82 a	3.75 e	5823.1 def	152.5 def	243.65 cd
Souris	60	210.79 a	5.5 cd	6235.9 bcd	163.3 bcd	241.55 cde
Souris	80	223.92 a	5.75 cd	6557.9 ab	171.7 ab	236.05 d-g
Souris	120	195.21 a	6.25 abc	6447 abc	168.8 abc	233.63 efg
CDC Morrison	40	229.25 a	2 f	4856.6 h	127.2 h	232.4 fg
CDC Morrison	60	200.95 a	2 f	5155.1 gh	135 gh	232.1 fg
CDC Morrison	80	217.77 a	2 f	5212 gh	136.5 gh	227.8 g
CDC Morrison	120	240.32 a	2 f	5491.8 fg	143.8 fg	237.25 def
LSD P=.05		32.065	1.533	493.04	12.91	8.829
CV		10.53	22.88	5.83	5.83	2.57
Treatment Prob(F)		0.1777	0.0001	0.0001	0.0001	0.0001