Let's Make Wheat Great Again!

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Economics, Quality, & Yield

The Big Three

Fusarium Head Blight

Fusarium Head Blight

- *Fusarium graminearum*
- Yield and Quality losses; mycotoxin introduction (DON/Vomitoxin)

- Favored by warm, humid conditions at flowering and early kernel development
- Overwinters in cereal stubble

- Disease-free seed, seed treatments, residue management, three year crop rotation break, genetic resistance

Fusarium Head Blight Control

- Fungicides are suppression only and not control.
  - APPLICATION TIMING IS CRITICAL!
  - **Optimal Application Timing:** 75% head emergence and 50% flowering

- Fungicide application is different than herbicide application
  - Vertical versus horizontal target
  - Dual nozzles, forward angle
  - Coarse sprays
  - Low boom height

Improving Fungicide Efficacy With Optimal Application Technology

- **Objective:** demonstrate recommendations provide by North Dakota State University and Dr. Tom Wolfe

- Check
- Standard
  - Single nozzles, 90º downward, 18” above
  - Single nozzles, 30º forward, 8 to 10” above
- Improved:
  - Dual nozzles, optimal height, no wind
  - Dual nozzles, optimal height, wind (> 5 mph)
  - Dual nozzles, non-optimal height, no wind
  - Dual nozzles, non-optimal height, wind

Standard Fungicide Application

0° & 8 inches above canopy

“Herbicide” type application

30° Forward & 8 inches above canopy

“Targeting head” type application

Top strip – facing direction of travel

Improved Fungicide Application

Dual Nozzles & 8 inches above canopy

“Excellent” Fusarium application

Dual Nozzles & 18 inches above canopy

“Sub-optimal” Fusarium application

Top strip – facing direction of travel

Yield and Quality

Protein

High Yields are Achievable!

- 250 bu/ac – New Zealand 2017
- 246 bu/ac – Northeast England 2015
  - 277 bu/ac N fertilizer split in 4 apps., 165 lb/ac seeding rate, 4 fungicide applications, 4 PGR application
- 233 bu/ac – New Zealand in 2010

Northumberland grower breaks world wheat yield record

Monday 21 September 2015 15:43 David Jones

Northumberland grower Rod Smith has beaten the world wheat yield record by a whisker after an ideal growing season with plenty of sunshine and low disease levels.

Harvesting only 10 days after Tim Lamyman's record crop in Lincolnshire, Mr Smith recorded a yield of 16.52t/ha on his farm overlooking Holy Island on the Northumberland coast.

He achieved this bumper yield with inputs similar to those used commercially across the farm, which helped push his average winter wheat yields to above 14t/ha this summer.

Agrii agronomist Andrew Wallace (left), Rod Smith (centre) with Eric Horsburgh (Agrii)

High Yields are Achievable!

Shawridge Farms – Ontario

- Early seeding
- 7 inch rows
- Total 160 to 190 lb/ac N and 30 lb/ac S
  - 60 to 70% at stem elongation
- Two pass late fungicide system
- 154 bu/ac average

Hugh Dietrich - Ontario

- MAP at seeding
- Tile drainage
- Average 135 lb/ac N, 90 lb/ac at seeding
  - “Ramp up strips” – Early flag & when required
- Three fungicide system

Average Canadian and Sask. Wheat Yields

45.9 bu/ac

Canada

44.3 bu/ac

Saskatchewan

New Zealand vs. Ontario vs. Saskatchewan

What's Common

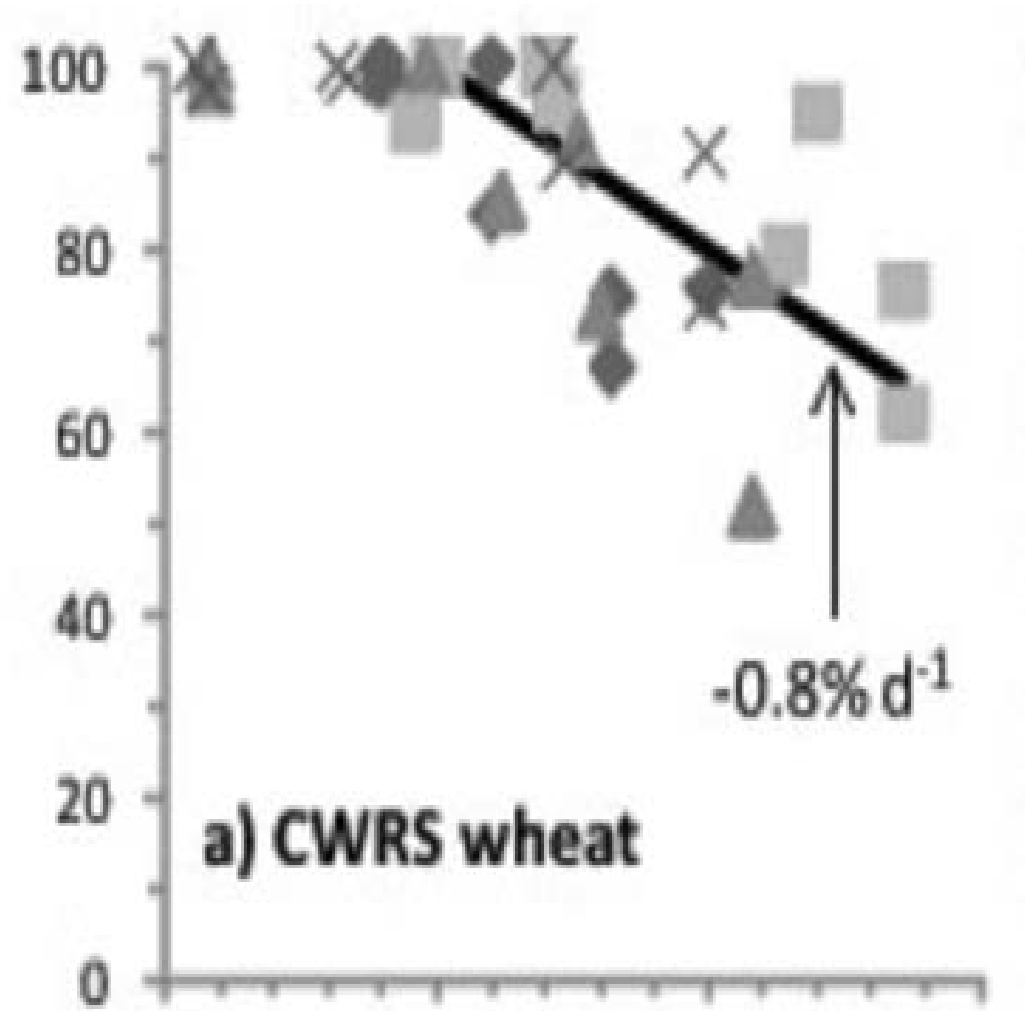
- Winter wheat/Early seeding
- Feed Varieties
- Higher Seeding Rates

Early vs. Late Seeding

- Alberta Agriculture
- After April 30th

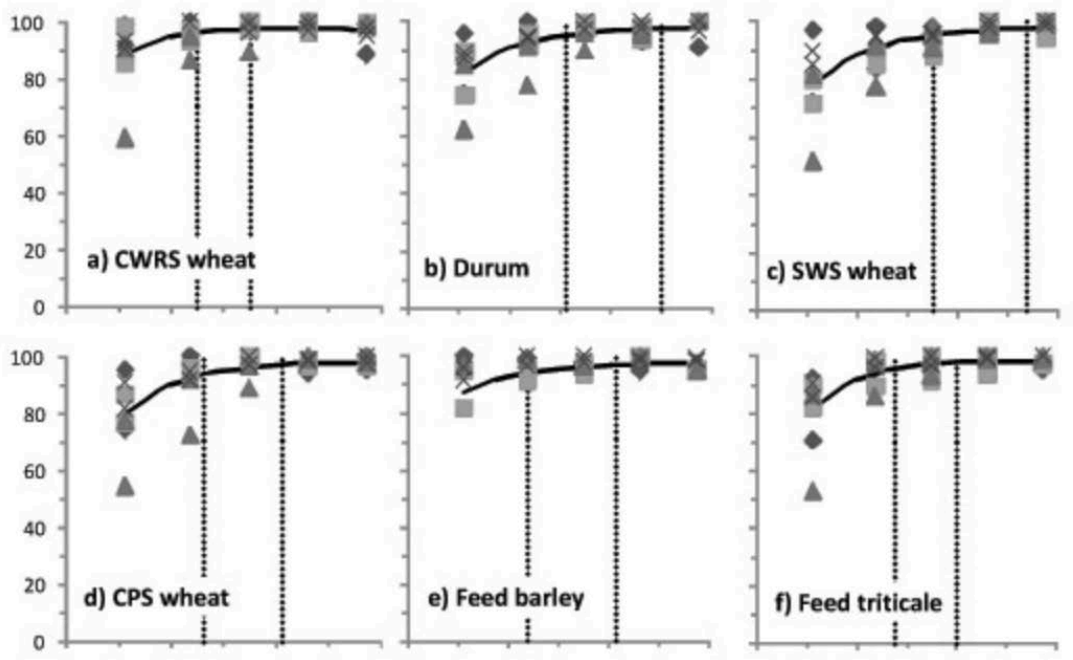
- -0.8% yield decrease per day

- Increased solar capture
- Flowering prior to intense heat
- Utilizing early spring moisture



High Seeding Rates

- Seeding Rates differ between classes
- Reduced tillering
- Weed control
- Uniform growth staging
  - Increase FHB fungicide efficacy
- Better solar light capture



- Know your TKW – it can make a huge difference!
  - 10, 000 seeds/lb at 150 lb/ac = 1.5 million seeds/ac
  - 15, 000 seeds/lb at 150 lb/ac = 2.25 millon seeds/ac

Fungicides & Cultivars – Leaf Disease

- Fungicide treatment was most beneficial on cultivars that were more susceptible to leaf spotting diseases.
  - AC Barrie and Infinity showed a benefit from fungicide application, whereas fungicide application on the more disease resistant variety (5603HR) was not required.
- These results indicate that choosing a disease resistant variety may reduce the need for fungicide application.

Wheat	Leaf Spot Severity (%)	Yield (bu/ac)
AC Barrie	poor	
Tilt	26.3	54.9
Headline	22.2	54.2
Check	39.6	50.3
Infinity	good	
Tilt	21.3	55.6
Headline	16.8	58.9
Check	37.1	52.2
5603 HR	good	
Tilt	21.7	64.6
Headline	22.8	68.4
Check	25.7	63.8

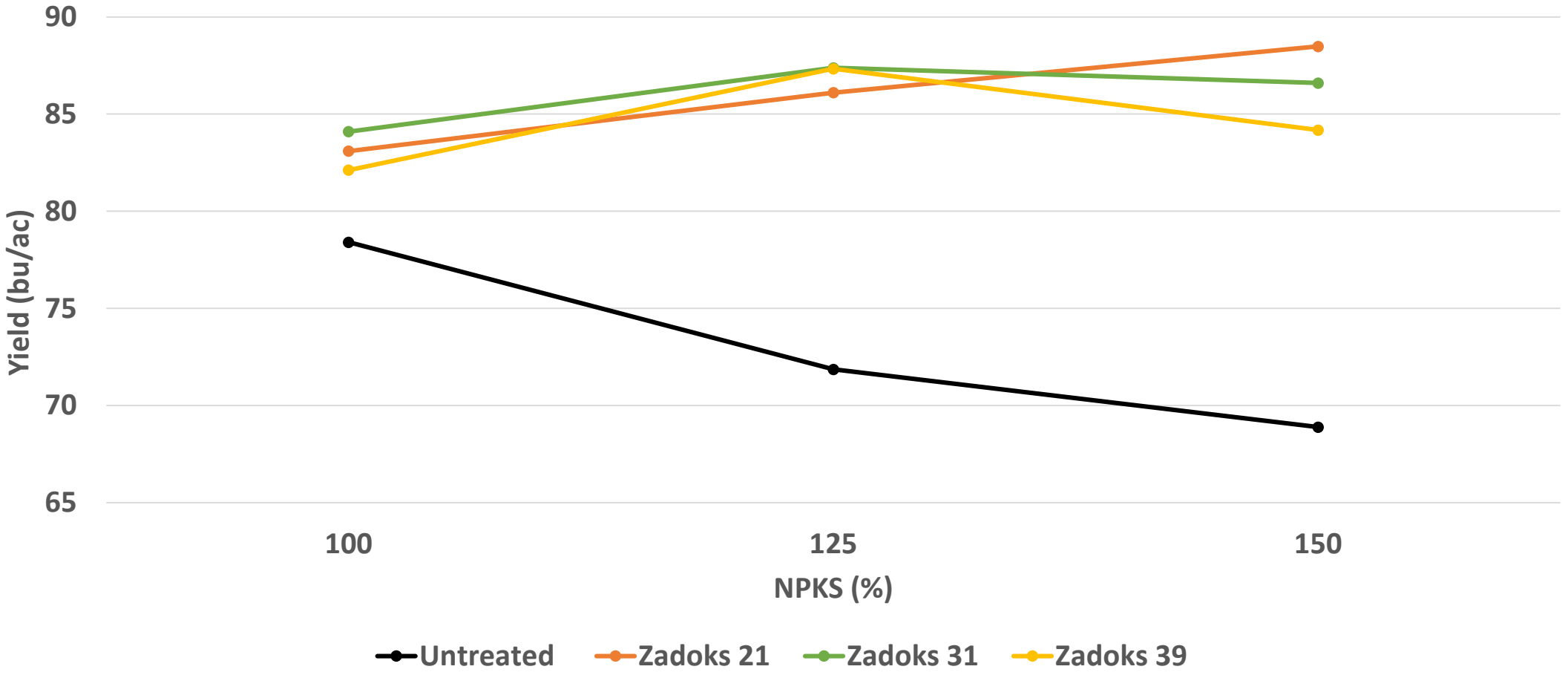
Fungicide on Flag Leaf

New Zealand vs. Ontario vs. Saskatchewan

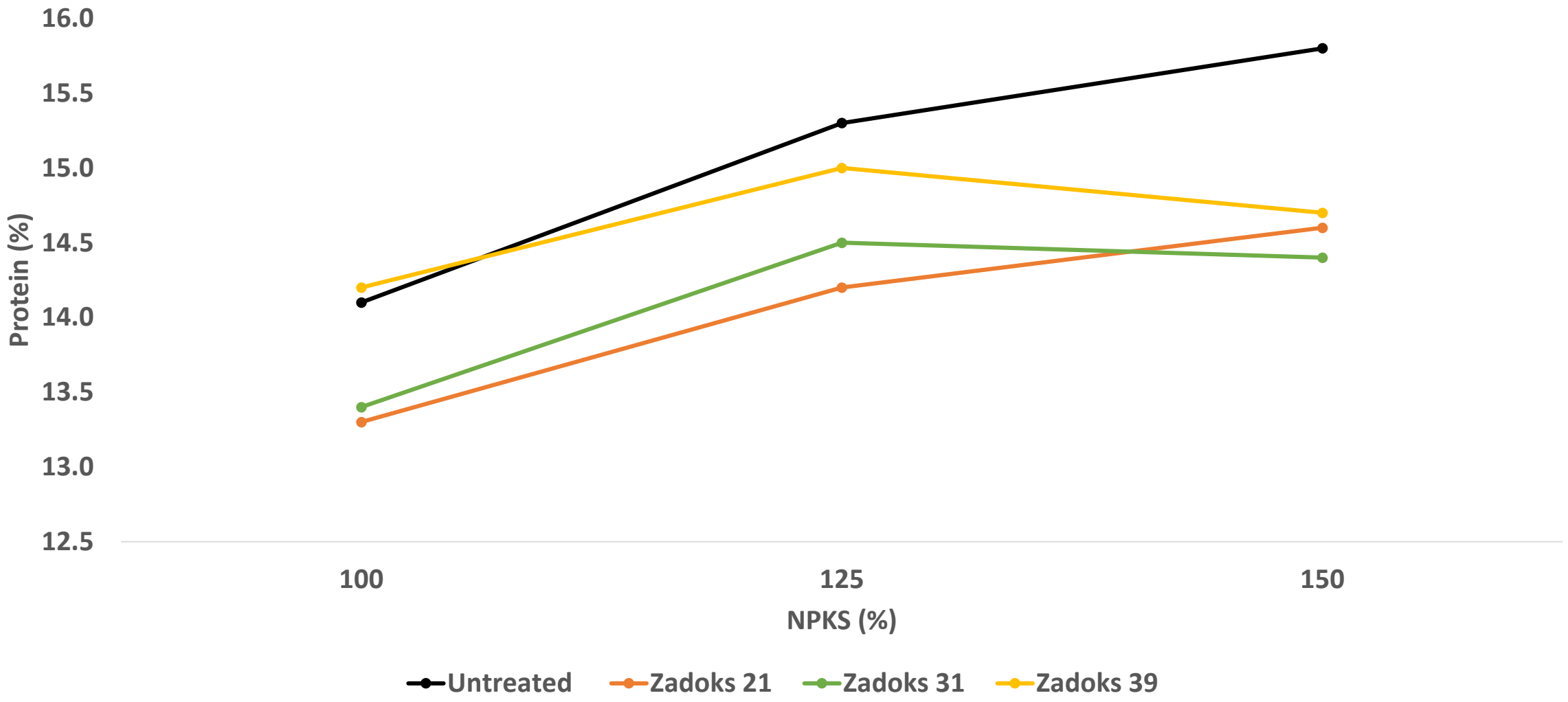
What's Common

- Winter wheat/Early seeding
- Feed Varieties
- High Seeding Rates
- Plant Growth Regulators
- Focus on Head Development
  - Increased Nitrogen
  - Multiple Fungicide Passes

Plant Growth Regulators (Manipulator™)



Plant Growth Regulators (Manipulator™)

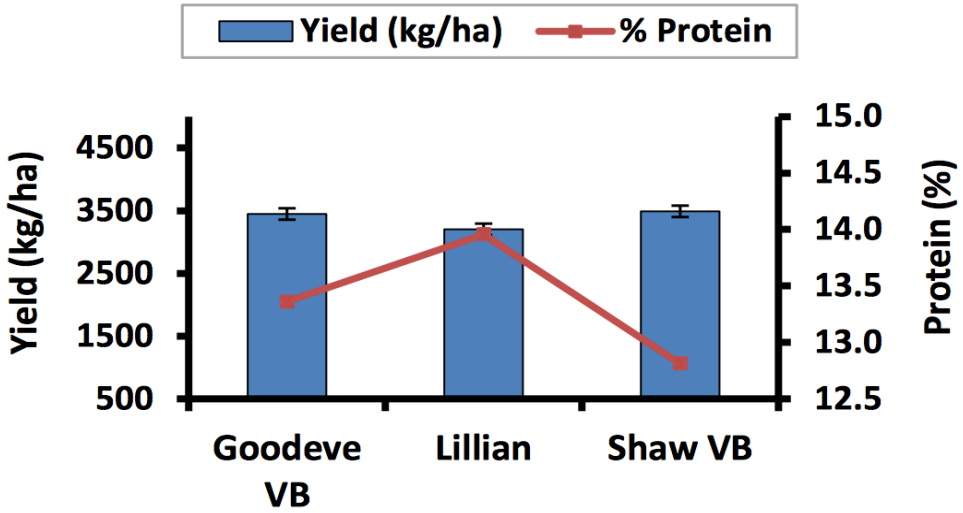


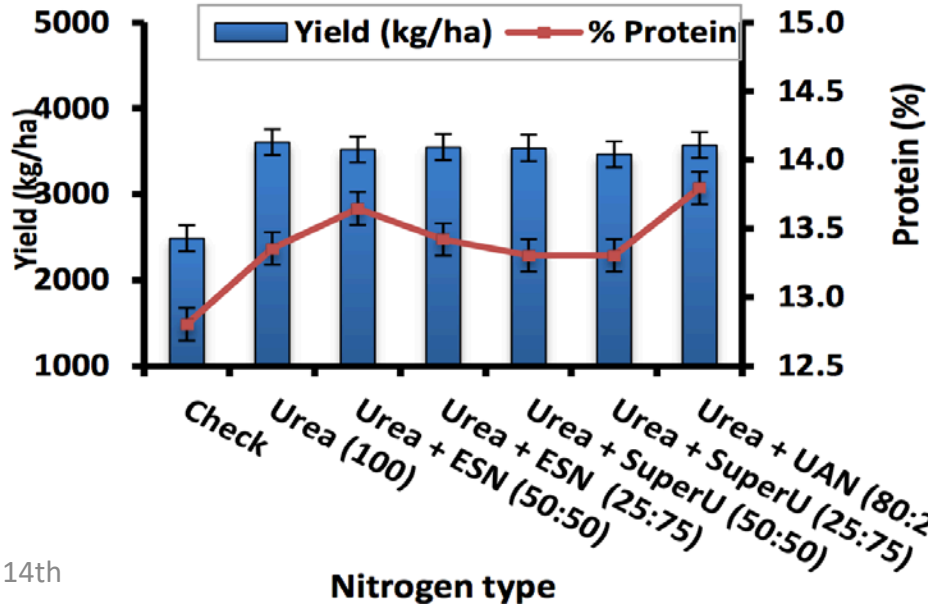
Yield Components – Focus on Head Development

$$\frac{plants}{m^2} * \frac{heads}{plants} * \frac{florets}{head} * \frac{seeds}{floret} * \frac{g}{1000\ seeds} = Yield$$

Nitrogen Fertility & Cultivars

- Most effective strategy for increasing protein in wheat was choosing varieties that are low-yielding and have high protein ratings.
- There is no advantage for the CRNs when considering only yield. However, the CRNs could delay N availability until later in the season to increase % protein.





New Zealand vs. Ontario vs. Saskatchewan

What's Different?

- Water Availability
- Growing Season
- Intensive Management

Intensive Wheat Management

- Poor economics?
- Logistic issues?

- Should different classes of wheat be managed differently?
- Does it differ between soil classes?
- Where are the best economic returns?

Input Study: Intensive Wheat Management

- To enhance wheat profitability by incorporating some or all components of intensive wheat management
- To identify how wheat classes and varieties are affected by enhanced wheat management
- To identify how these interactions vary in response to the various soil and climatic conditions across Saskatchewan
- To identify input combinations provide optimal yields and quality, while minimizing cost

Input Study: Intensive Wheat Management

- Indian Head, Melfort, Scott, Swift Current, and Yorkton
- RBCD with 4 replicates
- 2017, 2018, and 2019

Intensive Study: Intensive Wheat Management

Cultivar	Class	Fusarium Resistance	Lodging resistance	Maturity[z]	Yield[z]	Protein[z]
Carberry	CWRS	Marginally Resistant	Very Good	99	100	14.6
AAC Cameron VB	CWRS	Intermediate	Fair	-2	118	-0.7
CDC Utmost VB	CWRS	Marginally Susceptible	Fair	-2	112	-0.4
AC Andrew	CWSWS	Intermediate	Very Good	+2	137	NA
SY Rowyn	CPSR	Marginally Resistant	Fair	-1	107	-1.1
AC Ryley	CPSR	Marginally Susceptible	Poor	-2	110	-1.2

Intensive Study: Intensive Wheat Management

Management	Seed Treatment	Seeding Rate (viable seeds/m^2)	Nitrogen fertility (lb/ac N)	Phosphorus fertility (lb/ac P_2O_5)	Fungicide at Flag Leaf	Fungicide at Anthesis	PGR Application
Conventional	No	200	75	25	No	No	No
Enhanced	No	300	98	33	No	Yes	No
Intensive	Yes	360	120	40	Yes	Yes	Yes

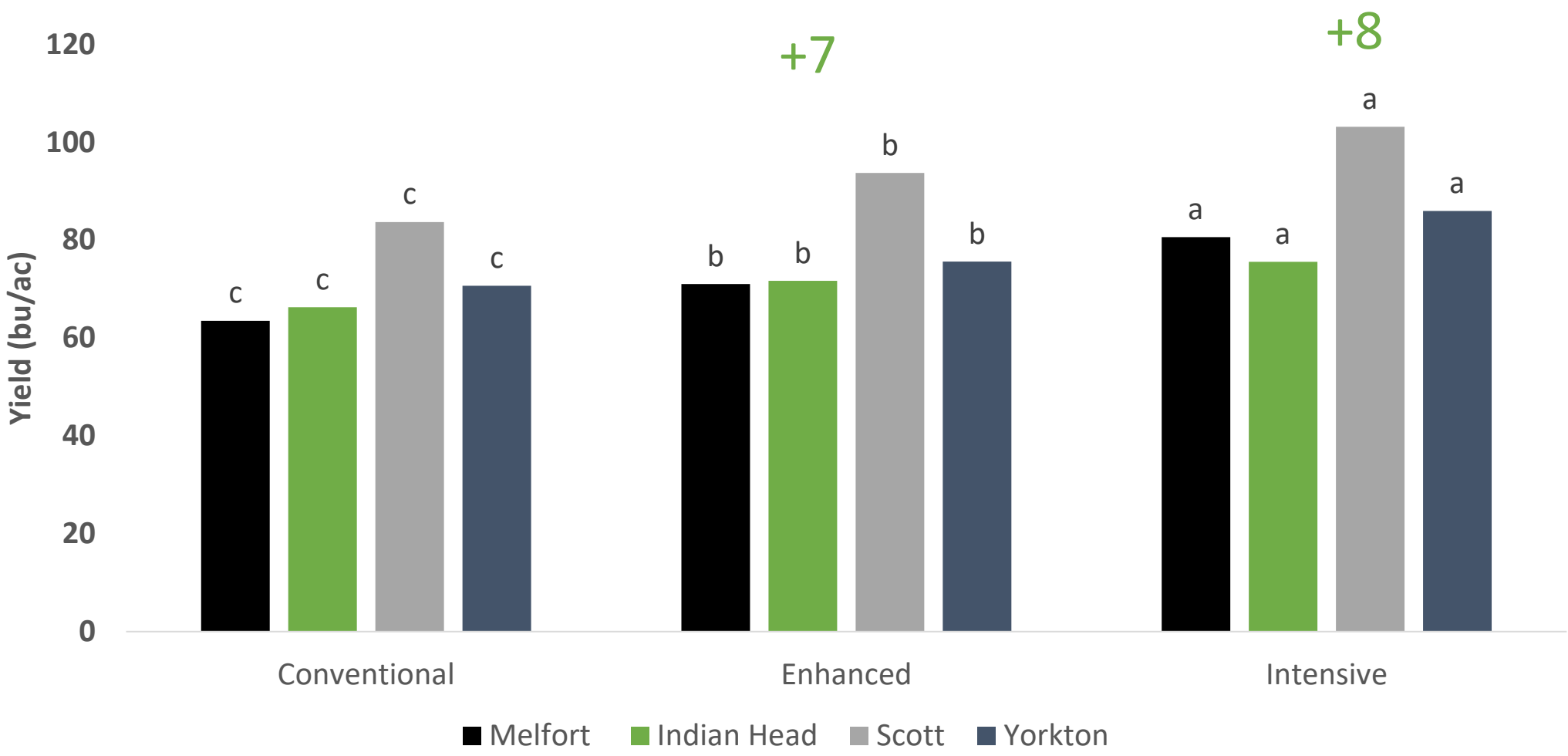
Wheat Inputs: Yield

Source	Melfort	Yorkton	Indian Head	Scott	Swift Current
Variety (V)	<0.001**	<0.001***	<0.001***	<0.001***	0.044*
Management (M)	<0.001***	<0.001***	<0.001***	<0.001***	0.206
V *M	0.548	0.095	0.093	0.059	0.361
Grand Mean	71.7	77.4	71.2	93.5	44.6
CV	13.8	8.95	4.63	4.45	13.59

Wheat Inputs: Yield

		+ 11 bu		+ 9 bu		+ 5 bu
	+ 15 bu	+ 27 bu	+ 13 bu	+ 21 bu		+ 17 bu
Variety	**Melfort**	**Yorkton**	**Indian head**	**Scott**	**Swift Current**	**ALL**
Carberry	65.8b	69.3c	68.7c	87.0c	45.2a	67.2
AAC Cameron	68.0b	70.0c	68.0c	86.3c	43.5ab	67.2
CDC Utmost VB	73.5b	68.1c	68.3c	88.3c	44.3ab	68.5
AC Andrew	84.3a	96.4a	81.0a	108.1a	47.7a	83.5
SY Rowyn	67.6b	80.6b	71.7b	95.5b	39.9b	71.1
AAC Ryley	71.0b	80.2b	69.4bc	96.1b	46.8a	72.7

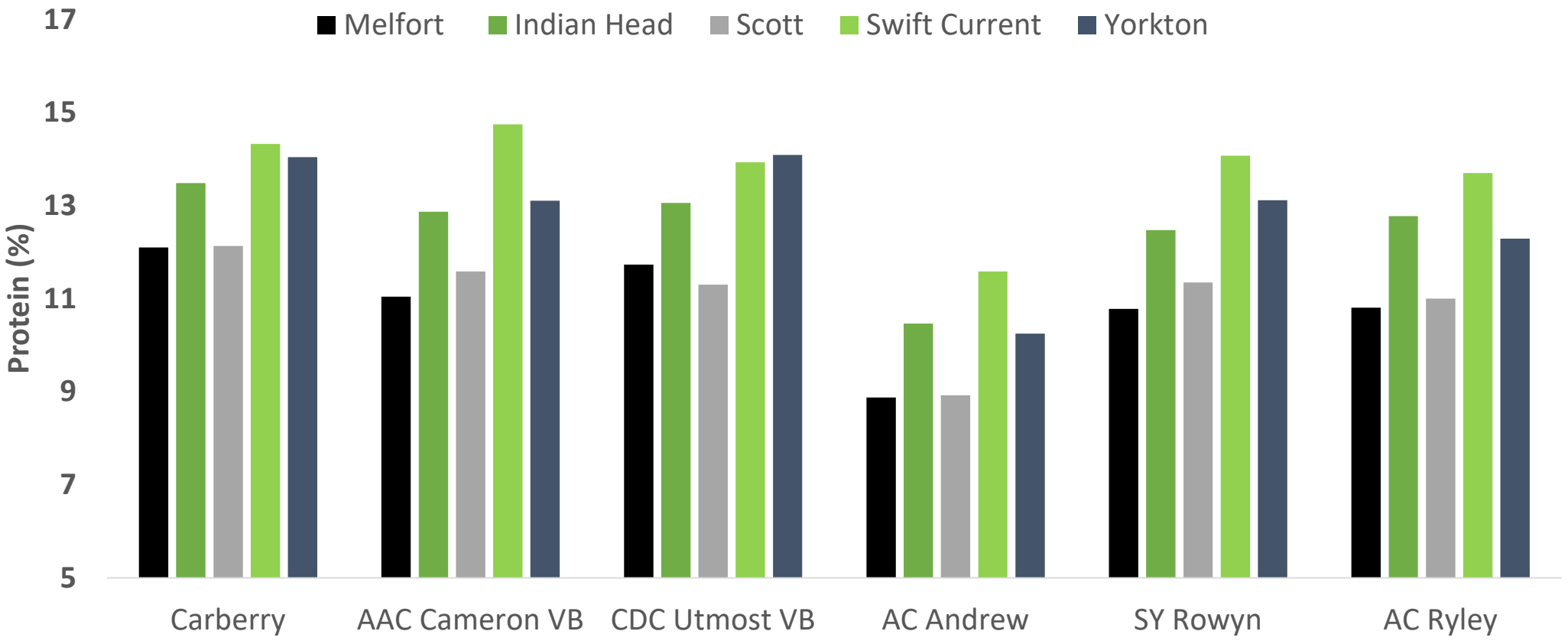
Wheat Inputs: Yield



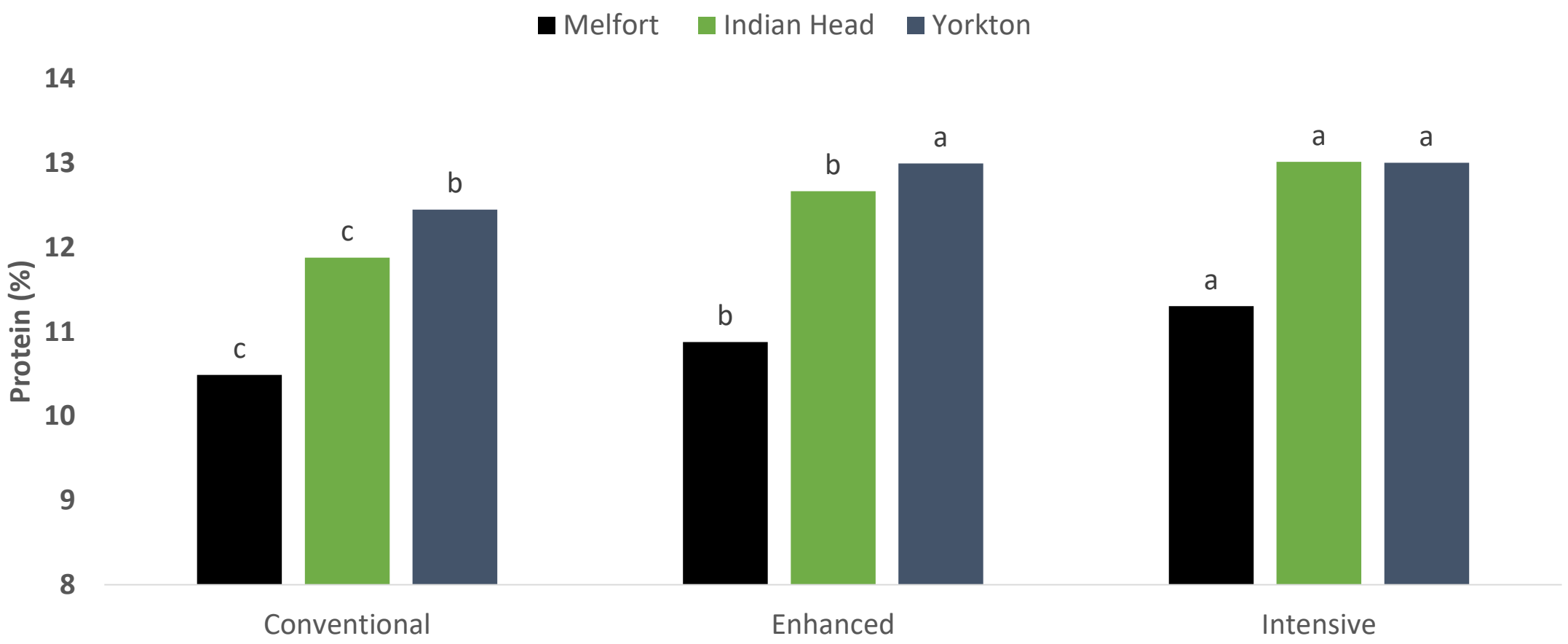
Wheat Inputs: Protein

Source	Melfort	Yorkton	Indian Head	Scott	Swift Current
Variety (V)	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
Management (M)	<0.001***	0.019*	<0.001***	0.125	0.307
V *M	0.989	0.588	0.214	0.984	0.455
Grand Mean	10.9	12.8	12.5	11.0	13.7
CV	4.60	5.85	2.66	7.53	3.66

Wheat Inputs: Protein



Wheat Inputs: Protein



Wheat Inputs: Economics

Revenue (per acre):

Yields: $7.00 CWRS, $5.00 CWSWS, $5.35 CPSR

Protein: $0.02 +/- 13.5% CWRS, $0.01 +/- 11.5% CPSR

Expenses (per acre):

Seed: per variety as in SaskPlanning Guide

Fertilizer: $45.50, $59.60, and $72.80

Chemical: $18.52 or $54.47

Other: $128.89

Wheat Inputs: Economics

	Conventional	Enhanced	Intensive
Carberry	102.77	104.02	66.89
AAC Cameron VB	57.41	77.74	62.91
CDC Utmost VB	100.30	207.08	199.62
AC Andrew	32.12	29.70	79.54
SY Rowyn	-40.93	1.91	-6.04
AC Ryley	1.27	-3.01	-23.33

Thank You!

- Agriculture Development Fund (ADF)
- Saskatchewan Wheat Development Commission
- NARF Technical and Summer Staff
- Western Applied Research Corporation
- East Central Research Foundation
- Indian Head Agricultural Research Foundation
- Wheatland Conservation Area

Saskatchewan Ministry of Agriculture and the Canada-Saskatchewan Growing Forward 2 bi-lateral agreement.