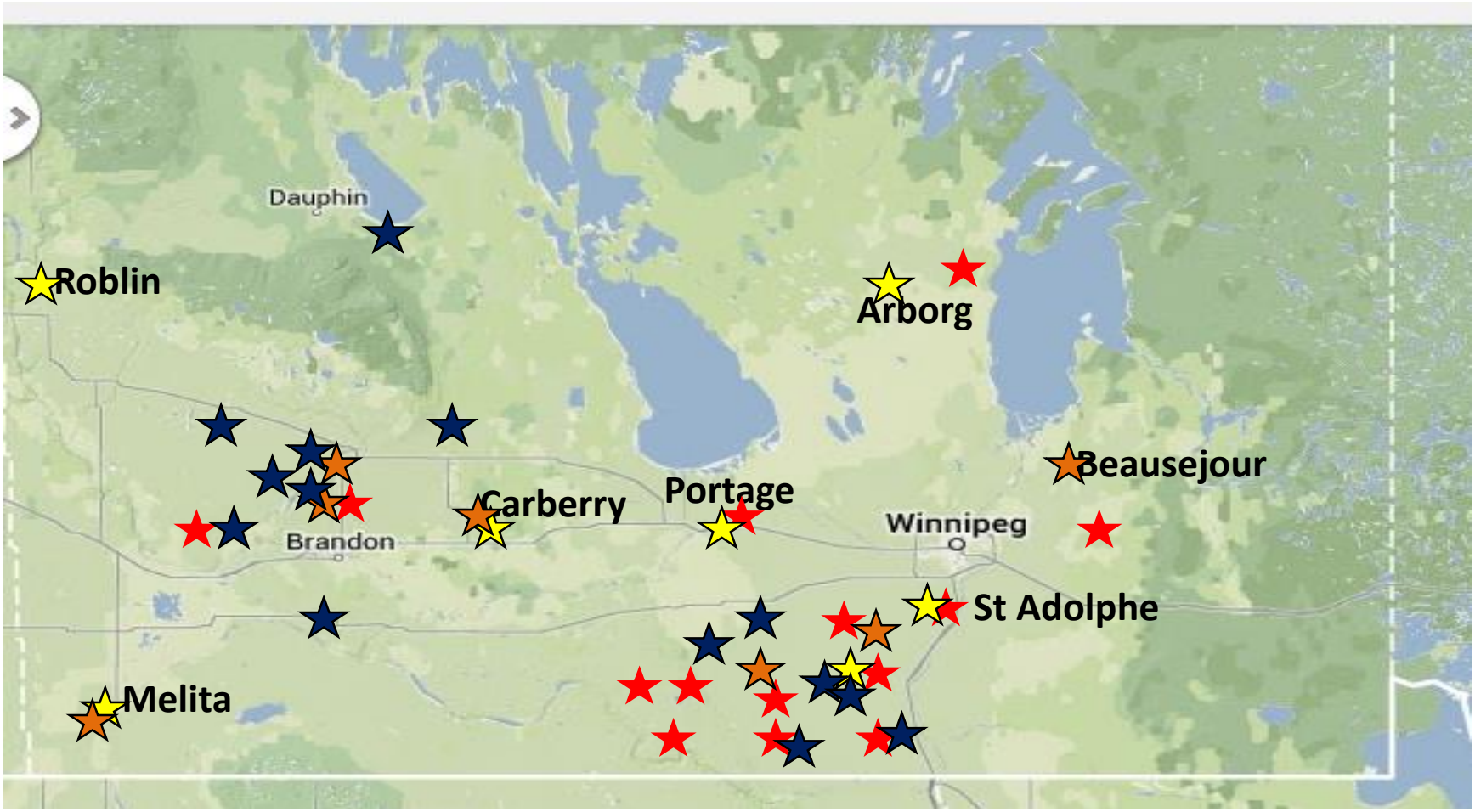
2015-16 wheat N small plot and OFT studies



2016 trials – 3 N Strategies

Rep 1	Check
	& 60
	& 30
Rep 2	& 30
	Check
	& 60
Rep 3	Check
	&30
	&60
Rep 4	&30
	Check
	& 60

- 4 replications
- Weigh wagon yields
- Continuous protein sampling
- Scouting – flag leaf N, GreenSeeker
- UAV flights
- Weigh wagon vs grain cart vs yield monitor

N Strategy 1: Supplemental N rates

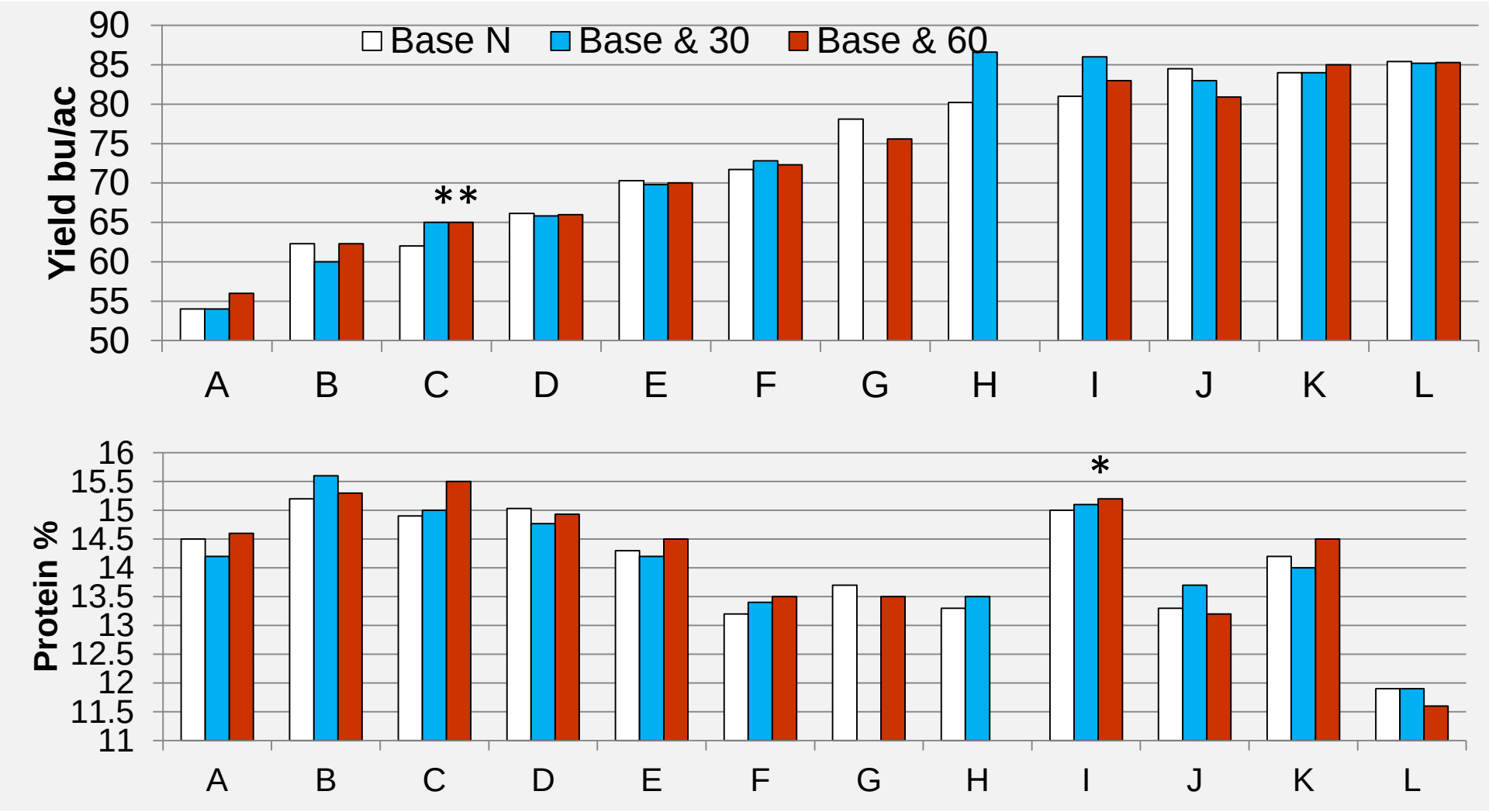
- Base rate N
- Base rate & 30 N
- Base rate & 60 lb N/ac

Supplemental N:
N Application Summary

Lb N/ac	CNHR (8)	CWRS (3)	GP (1)
Soil N*	41	66	25
Fertilizer N	120	82	110
Total N	156	144	135

* Not all sites had soil test N information.

Wheat OFT – higher base N rates?



1. only once was there yield or protein advantage to increasing N above farmer rate
2. Average yield was 73.3, 73.8 and 73.9 bu/ac at base, &30 and & 60 N rates.
3. Average protein was 14.0, 14.1 and 14.2 % at base, &30 and & 60 N rates

Supplemental N

	CNHR (8)	CWRS (3)	GP (1)
	Yield bu/ac		
Base N	70.9	75.9	85.4
&30	70.4	77.9	85.2
& 60	69.6	76.4	85.3
	Protein %		
Base N	14.2	14.4	11.9
&30	14.2	14.6	11.9
& 60	14.4	14.6	11.6

In general – base rates used by farmers in 2015-16 were adequate to meet yield potential and produce high protein

Economics – generally unprofitable since little to no yield and protein improvement over base N rates.

	CNHR (8)	CWRS (3)	GP (1)
	Price $ per bu*		
Base	6.68	6.70	5.09
30N	6.44	6.74	5.09
60N	6.50	6.72	5.09
Gross revenue less N cost $/ac*			
Base	472	507	435
30N	437	510	419
60N	422	483	404
Revenue over base $/ac			
30N	-29	3	-16
60N	-50	-24	-31

* Late February 2017 wheat prices, spring 2016 fertilizer prices

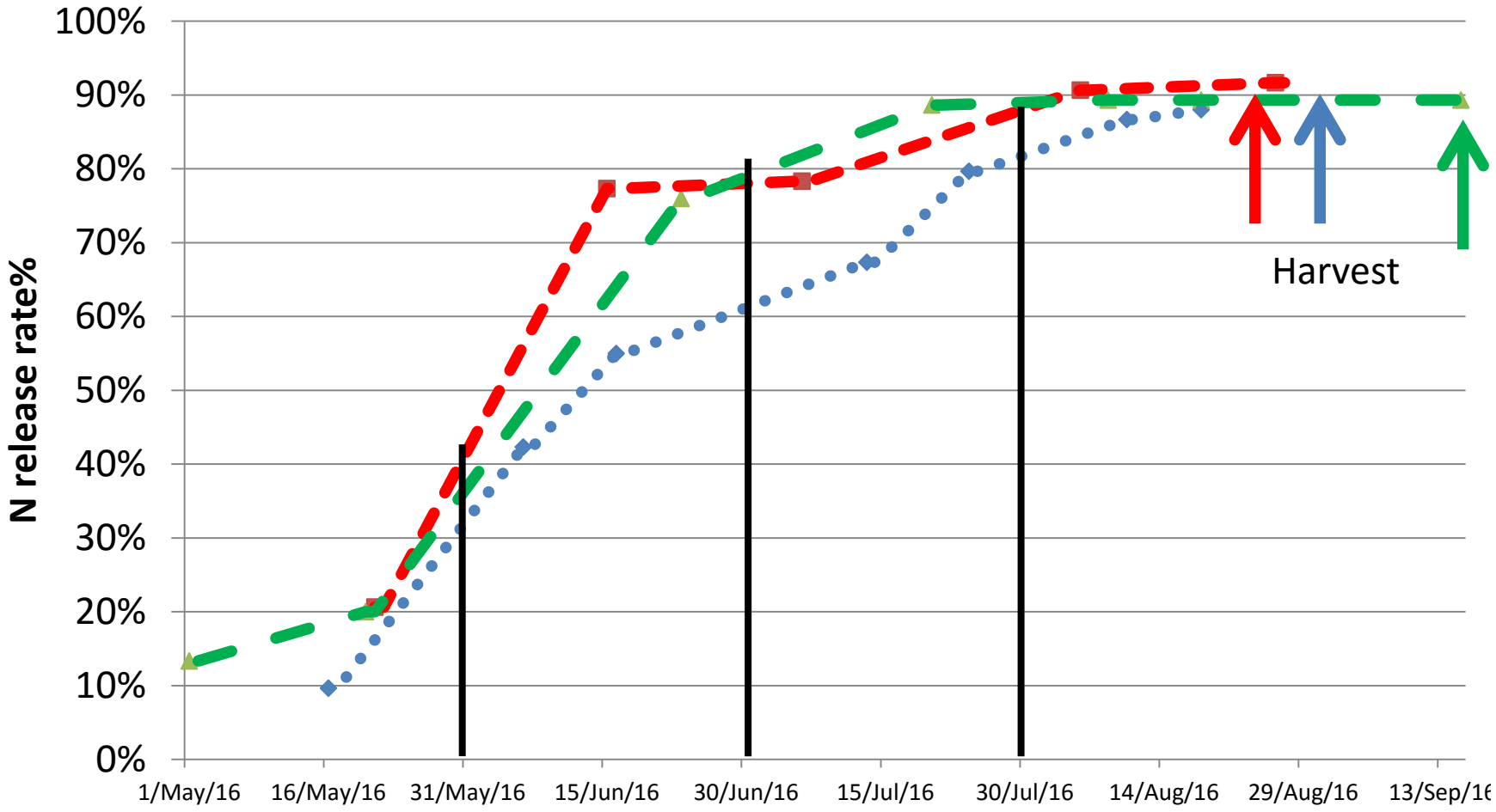
N Strategy 2: Use ESN as portion of N

ESN to be applied at

50 % of the base N rate
(38% at one site)


A.G.
ESN

N Release rate from ESN - 2016



Accomplishing in-season N supply:

Side dress UAN between every 2nd row with RTK guidance

Farm	A	B	C
N	130 urea vs 65 urea:65 ESN	98 UAN vs 49 UAN:49 ESN	160 NH3 vs 100 NH3:60 ESN
Yield Bu/ac			
Base N	78.0*	84.6	66.5**
ESN blend	79.7	86.9	70.0
UAN drib	78.1		
UAN coulter	78.3		
sign	ns	ns	ns
Protein %			
Base N	13.7 a	12.4	13.1 a
ESN blend	13.9 ab	12.5	13.5 b
UAN drib	14.0 b		
UAN coulter	13.8 ab		

* First urea strip had wheel tracks

**One of 4 strips had drowned out area

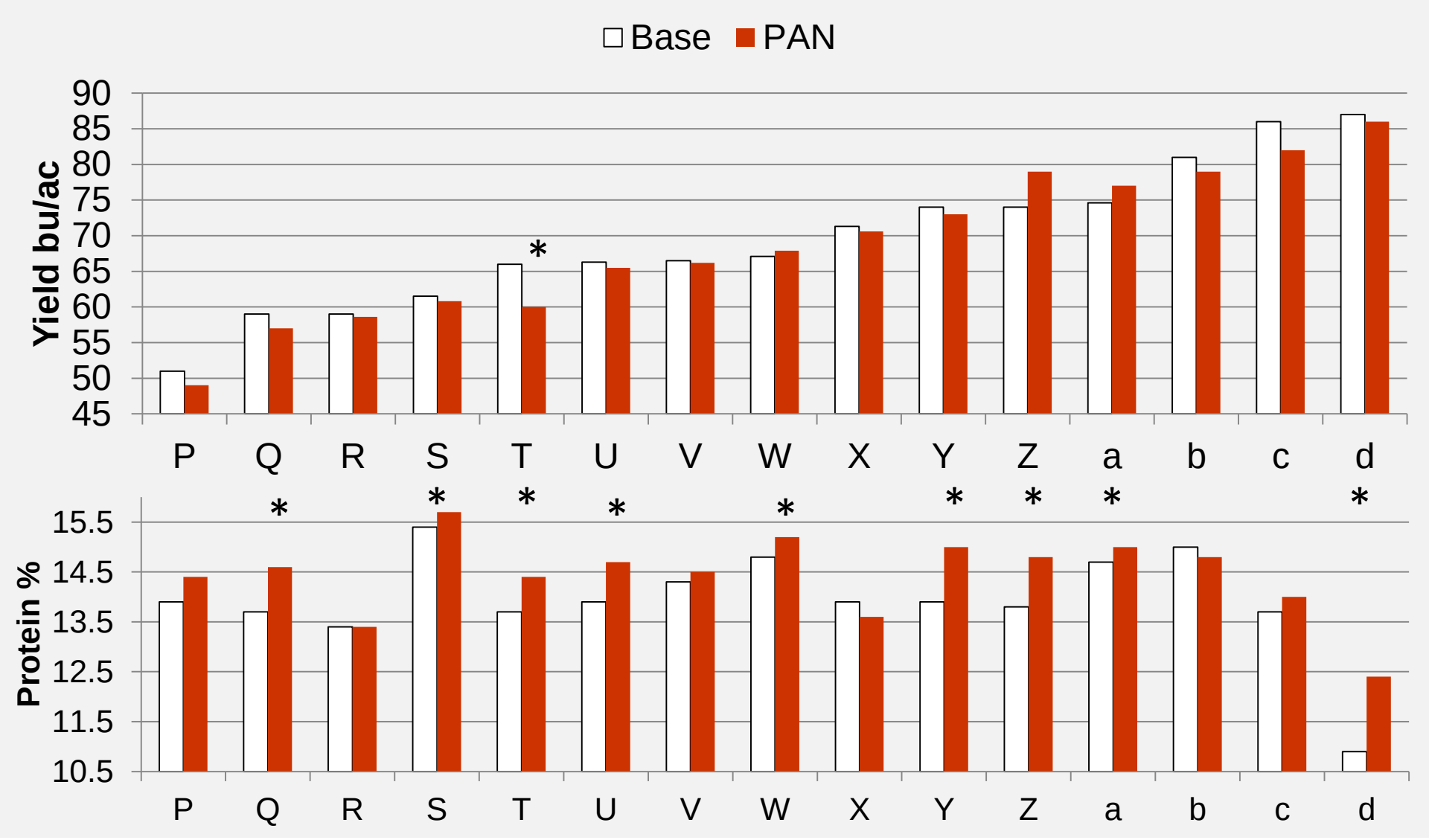
Economic summary – slight positive income – more to yield than protein premium

Farm	A	B	C
N	130 urea vs 65 urea:65 ESN	98 UAN vs 49 UAN:49 ESN	160 NH3 vs 100 NH3:60 ESN
Variety/Class	Penhold/CPS	Prosper CNHR	Faller CNHR
	$/bu		
Base	5.17	5.86	6.07
ESN blend	5.17	5.89	6.19
	GR-N ($/ac)		
Base	$333	$441	$329
ESN blend	$333	$452	$346
	Return above base N source ($/ac)		
	$0.30	$10.70	$17.60

* Late February 2017 wheat prices, spring 2016 fertilizer prices

N Strategy 3: Post Anthesis Nitrogen (PAN)

- UAN applied in 50:50 mix with water to supply 30 lb N/ac applied 7-10 days after anthesis – avoid heat of the day



1. Of 15 sites, yield was reduced once but protein increased 9 times.
2. Average yield was 69.6 and 68.8 bu/ac at base, & PAN rates
3. Average protein was 13.9% and 14.4% at base, & PAN rates.

PAN Summary

	CNHR (6)	CWRS (7)	CPS (2)
Yield bu/ac			
Base N	80	68	69
Base N & PAN	78	68	65
Protein %			
Base N	13.0	14.2	13.8
Base N & PAN	13.6	14.6	14.1

Of 15 trials, yield reduced significantly once (sprayed mid day), but protein increased in 9 cases.

Only 2 of the sites had positive economic returns (with N application @ $20/ac)

Summary of yield and protein studies

	CNHR (16 sites)	CWRS (10 sites)	CPS (3 sites)	GP (1)
Soil N lb N/ac *	37	40	30	25
Fertilizer N applied lb N/ac	124	95	97	110
Total N supply lb N/ac	158	135	127	135
Yield bu/ac	72	70	72	85
Protein %	13.8	14.3	13.8	11.9
NUE lb N/bu	2.3 (1.4 – 3.1)	2.0 (1.7-2.3)	1.7 (1.5-1.9)	1.6

* Not all sites had soil test N information.

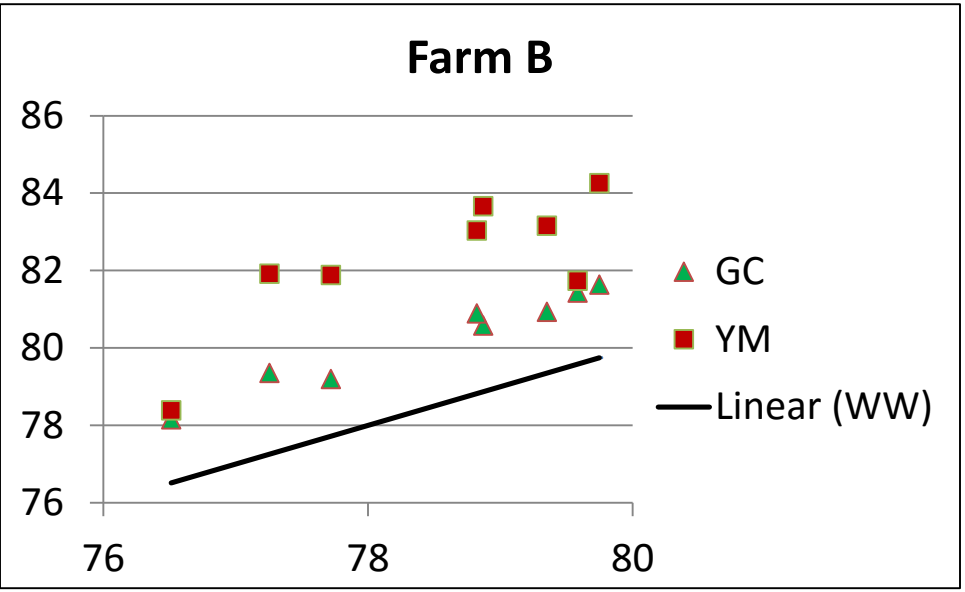
Summary of N Strategies

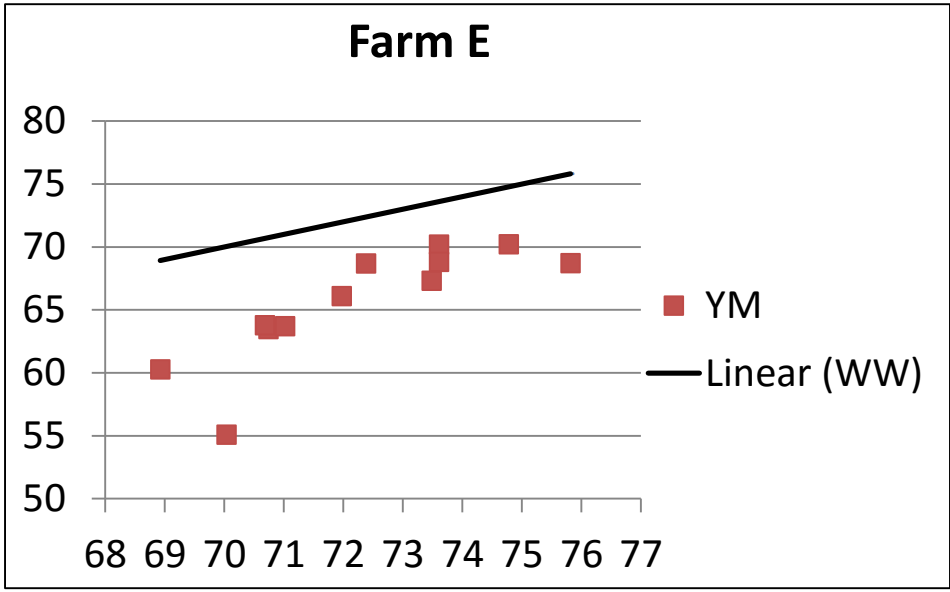
1. With current base rates – additional N were unwarranted (unless yield limiting factors overcome - lodging, wetness)
2. ESN – slight advantage observed – but few sites and a stiff portion in blend.
3. PAN usually increases protein, but was not economical when adequate protein was achieved with base N rates and with current protein payments.

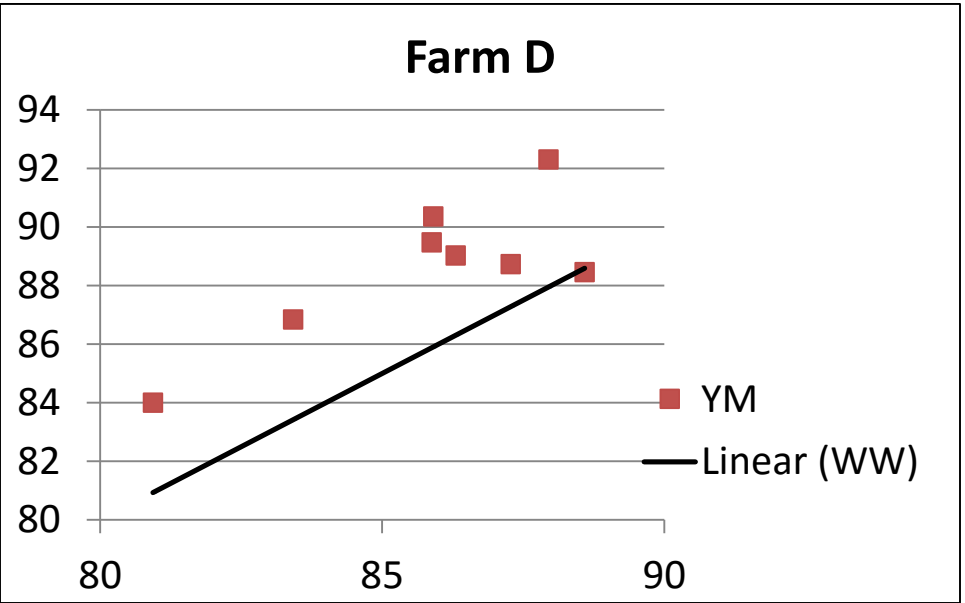
OFT – need for weigh wagons?

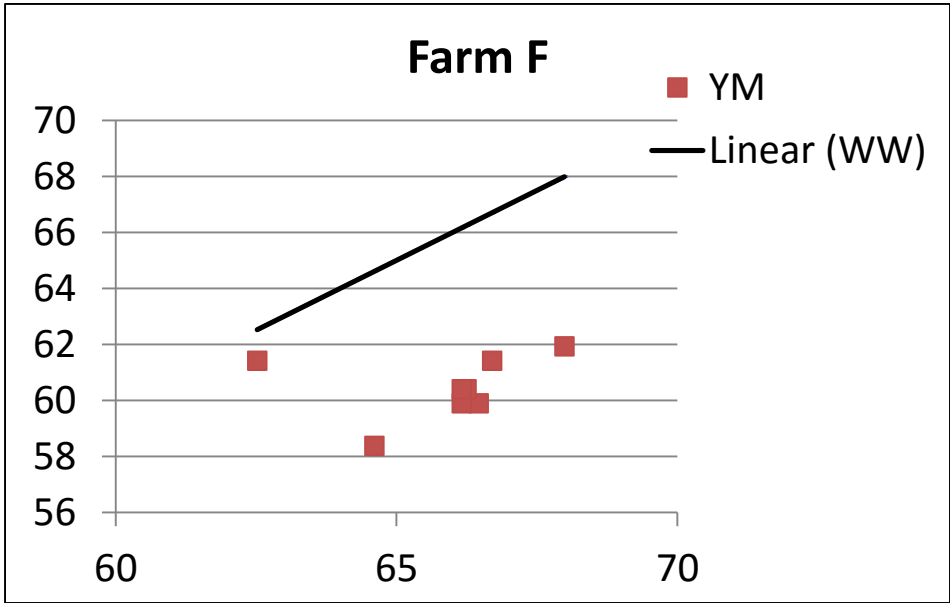
	Grain cart vs weigh wagon			Yield monitor vs weigh wagon		
	Difference		Corr.	Difference		Corr
	Bu/ac	%	R2	Bu/ac	%	R2
A	-1.7	-2.0%	0.98	-0.5	-0.6%	0.77
B	1.8	2.3%	0.98	3.8	4.5%	0.79
C	1.0	1.4%	0.89	-0.7	-0.9%	0.91
D				2.9	3.3%	0.81
E				-6.7	-9.3%	0.83
F				-5.4	-8.1%	0.22
G				-1.0	-1.7%	0.97
H	-0.5	-0.7%	0.98			

Grain Cart (GC) and Combine Yield Monitors (YM) versus Weigh Wagon (WW) Wheat Yields (bu/ac)





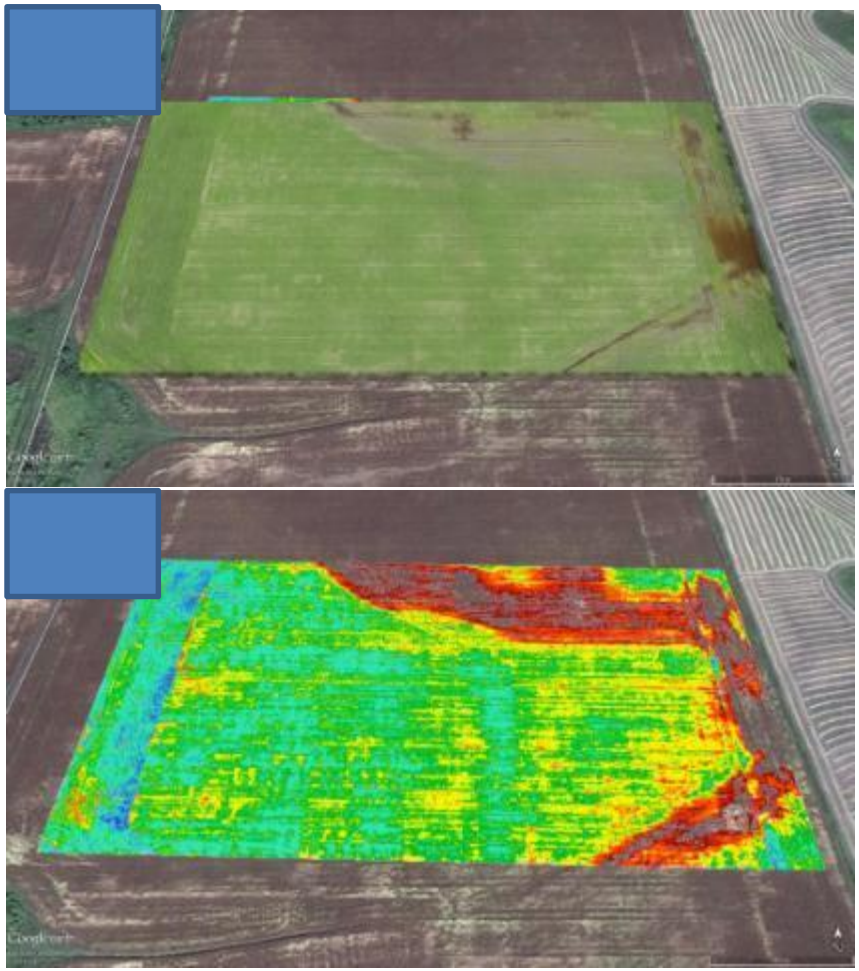




OFT must avoid sprayer tracks

Farm	No sprayer tracks	1 spray track	2 Spray tracks
	Yield bu/ac (% loss)		
A – 36’ header	62.7		53.5 (-14.8%)
B – 35’ header	60.9	57.9 (-4.9%)	55.8 (-8.4%)

UAV or other aerial images



- Images required in a timely fashion

1. To evaluate treatments
2. To direct harvest management

Scouting tools – N decision criteria

- Flag leaf N

- NDVI - GreenSeeker

Unable to relate to protein at field sites – a job for the small plot researchers!

OFT Summary

- Weigh wagons or scale grain carts
- Yield monitors – more calibration for reliable OFT data
- Avoid making and harvesting the *@# wheel tracks in strips
- UAV useful to improve data by trimming replicates
- Scouting tools – not ready for prime time-yet

Acknowledgements

- The farm cooperators
- MWBGA
- ANTARA Research
- DuPont Pioneer – Manitoba weigh wagon use
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