Small Grain Variety Update
Langdon REC – 2018

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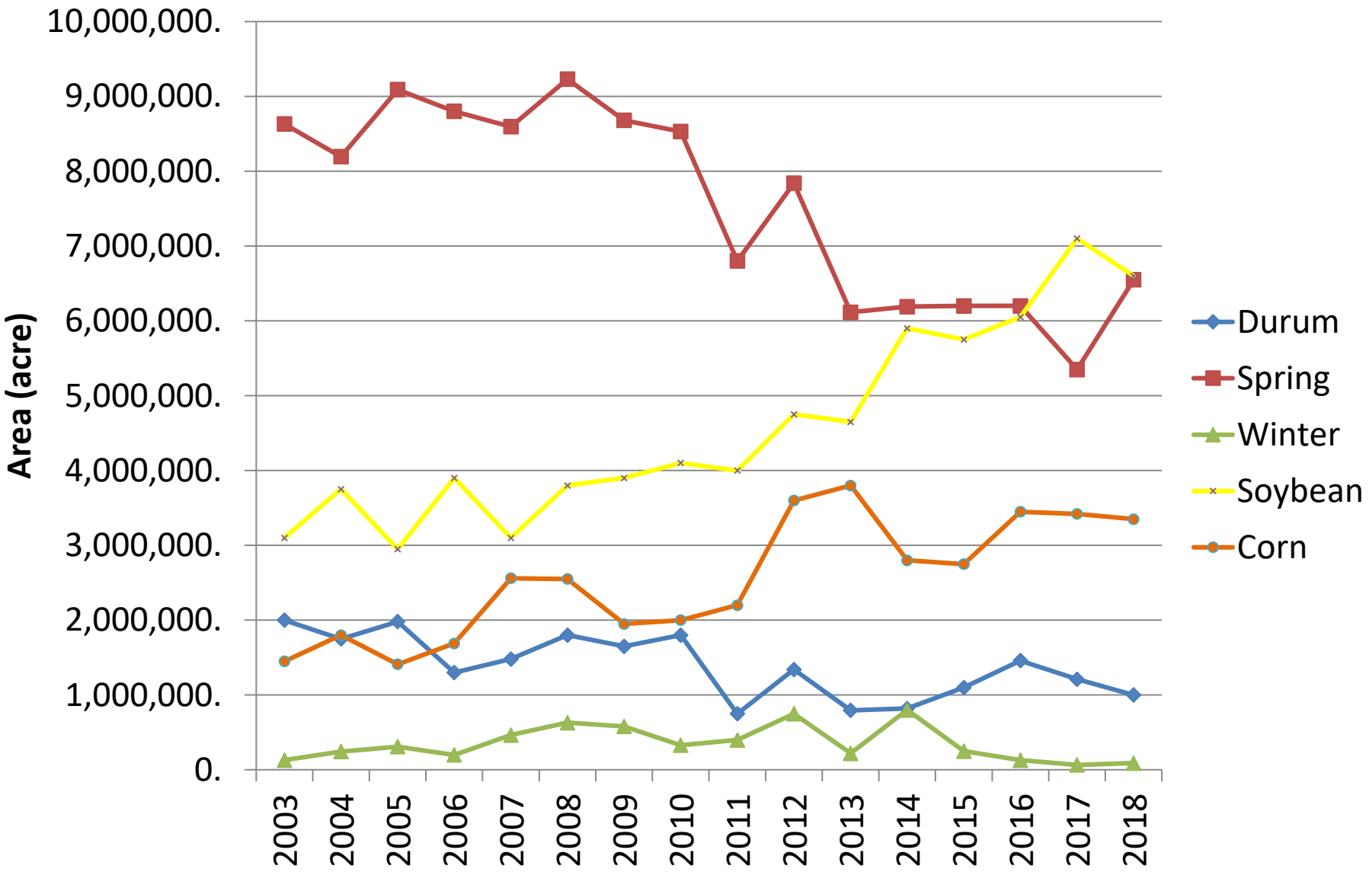
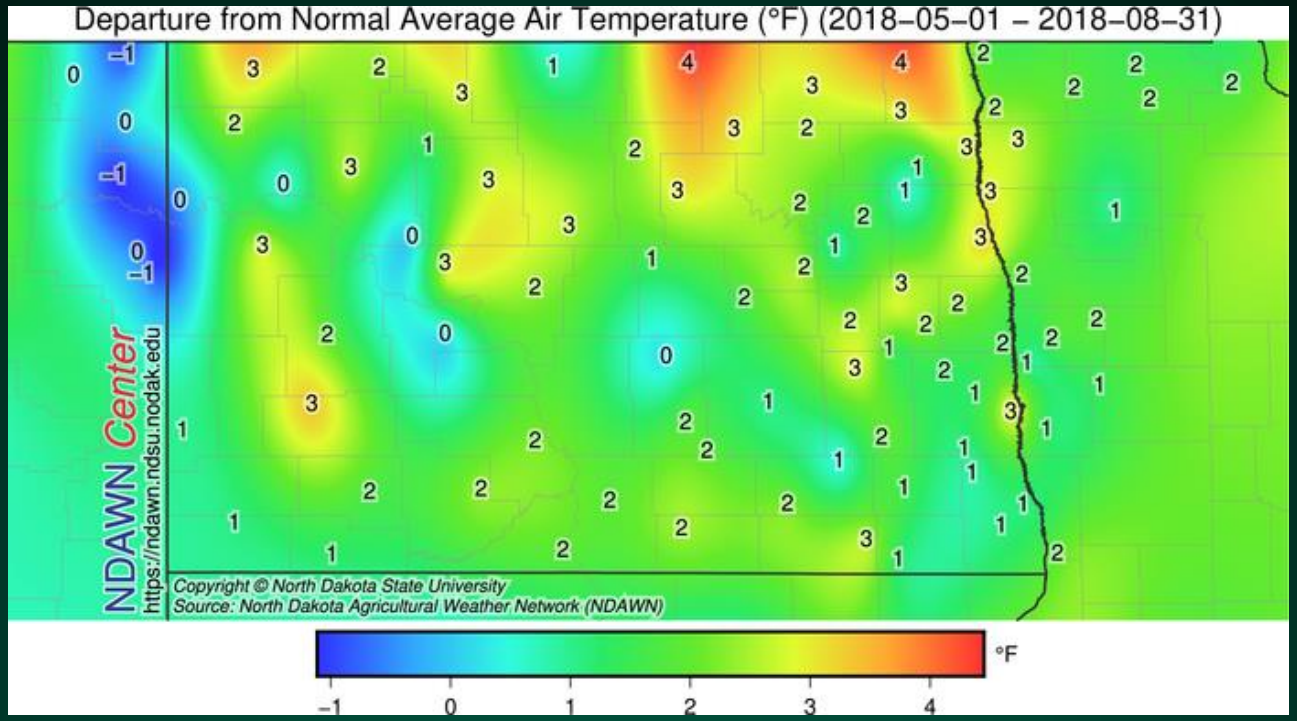
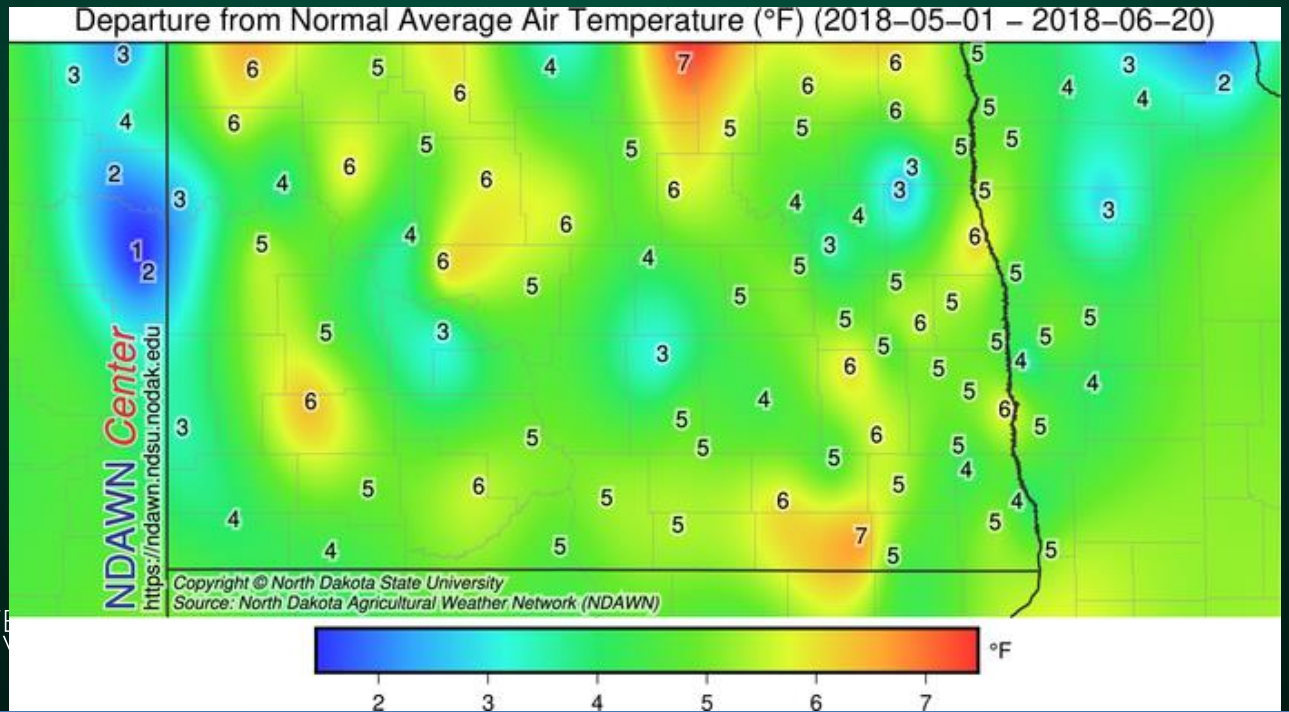

Trends in area planted in ND over the past 15 years for three classes of wheat, soybeans and corn.
Area (acre)
10,000,000.
9,000,000.
8,000,000.
7,000,000.
6,000,000.
5,000,000.
4,000,000.
3,000,000.
2,000,000.
1,000,000.
0.
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Durum
Spring
Winter
Soybean
Corn

Record yield in spite of somewhat challenging weather

- Warmer than average early spring weather probably reduced spike size and tiller numbers
- Drought impacted yield potential in western regions but less so than last year
- Near average temperatures during grain filling and lack of diseases were key to higher than expected yields
- Yield trend is strongly upward





NDSU EXTE
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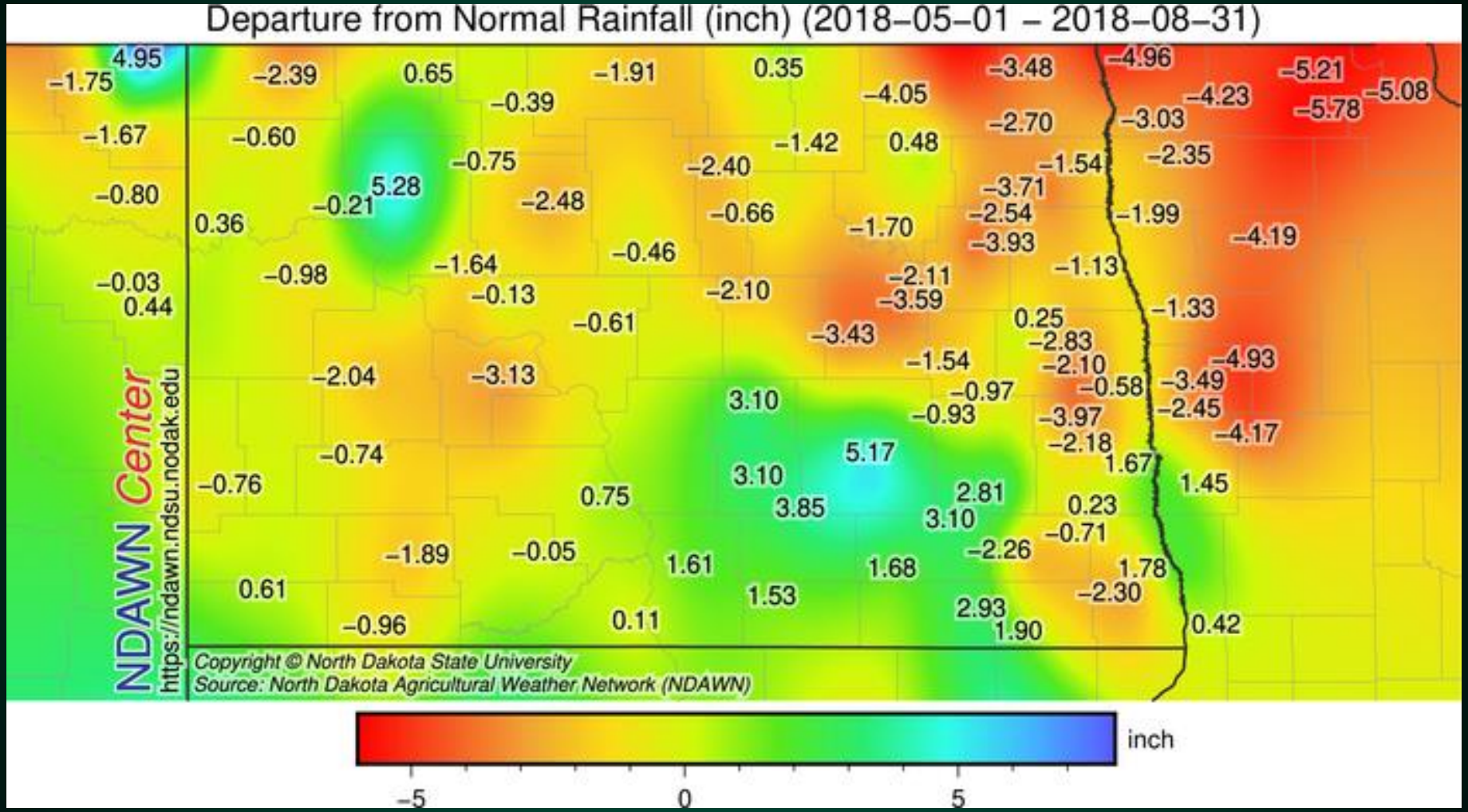
Departure from Normal Rainfall (inch) (2018-05-01 – 2018-08-31)
4.95
-1.75
-2.39
0.65
-1.91
0.35
-3.48
-4.96
-5.21
-5.08
-0.39
-4.05
-4.23
-5.78
-1.67
-0.60
-2.70
-3.03
-1.42
0.48
-0.75
-2.40
-1.54
-2.35
-0.80
5.28
-0.21
-2.48
-3.71
0.36
-0.66
-2.54
-1.99
-1.70
-4.19
-3.93
-0.46
-1.64
-1.13
-0.98
-2.11
-0.03
-0.13
-2.10
-3.59
0.44
-1.33
-0.61
0.25
-3.43
-2.83
-4.93
-2.04
-3.13
-1.54
-2.10
-0.58
-3.49
-0.97
3.10
-0.93
-2.45
-3.97
-4.17
-0.74
-2.18
5.17
1.67
-0.76
3.10
1.45
0.75
2.81
3.85
0.23
3.10
-0.71
-1.89
-0.05
-2.26
1.61
1.68
1.78
0.61
-2.30
1.53
2.93
-0.96
0.11
1.90
0.42
NDAWN Center
https://ndawn.ndsu.nodak.edu
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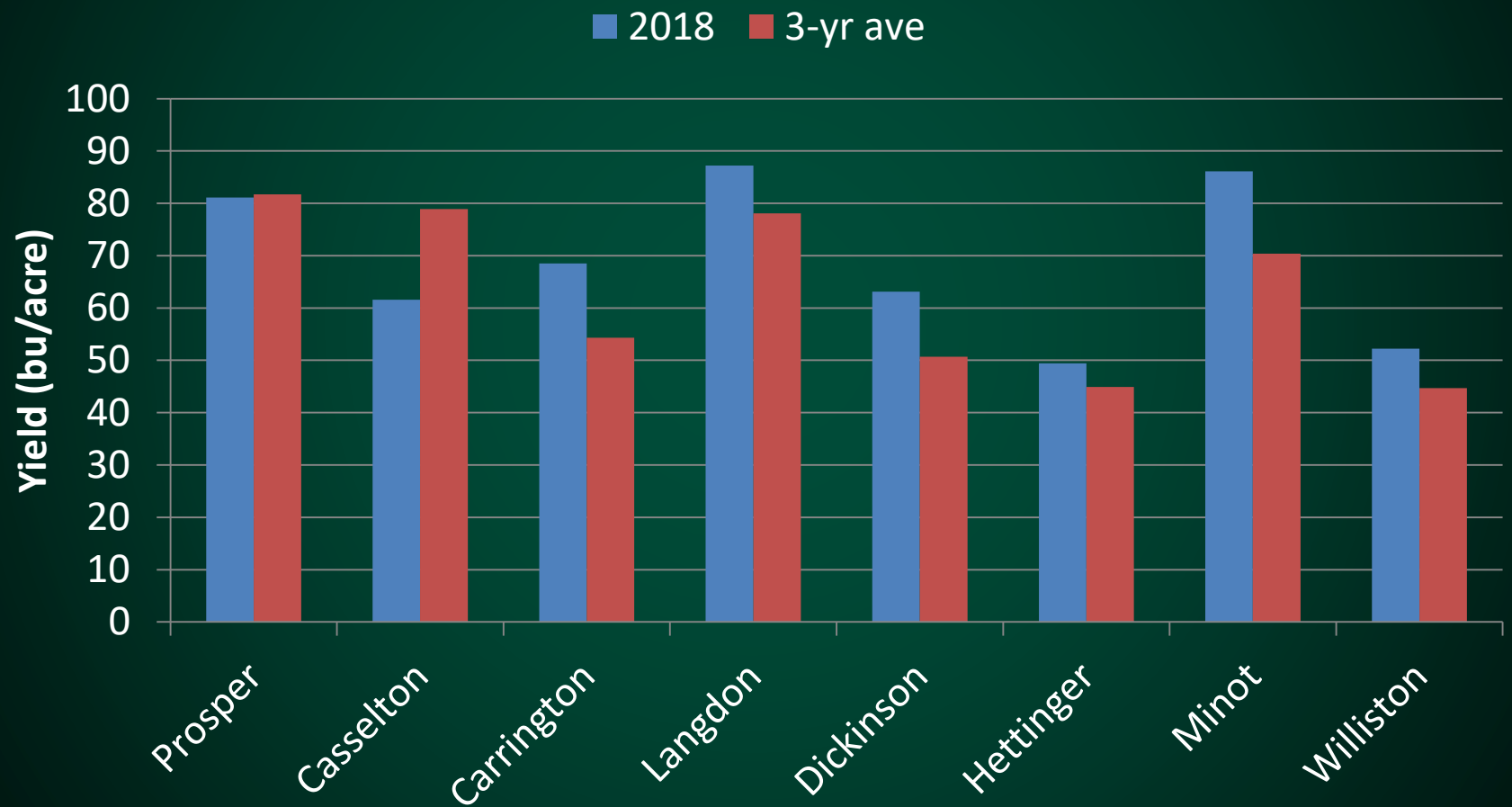
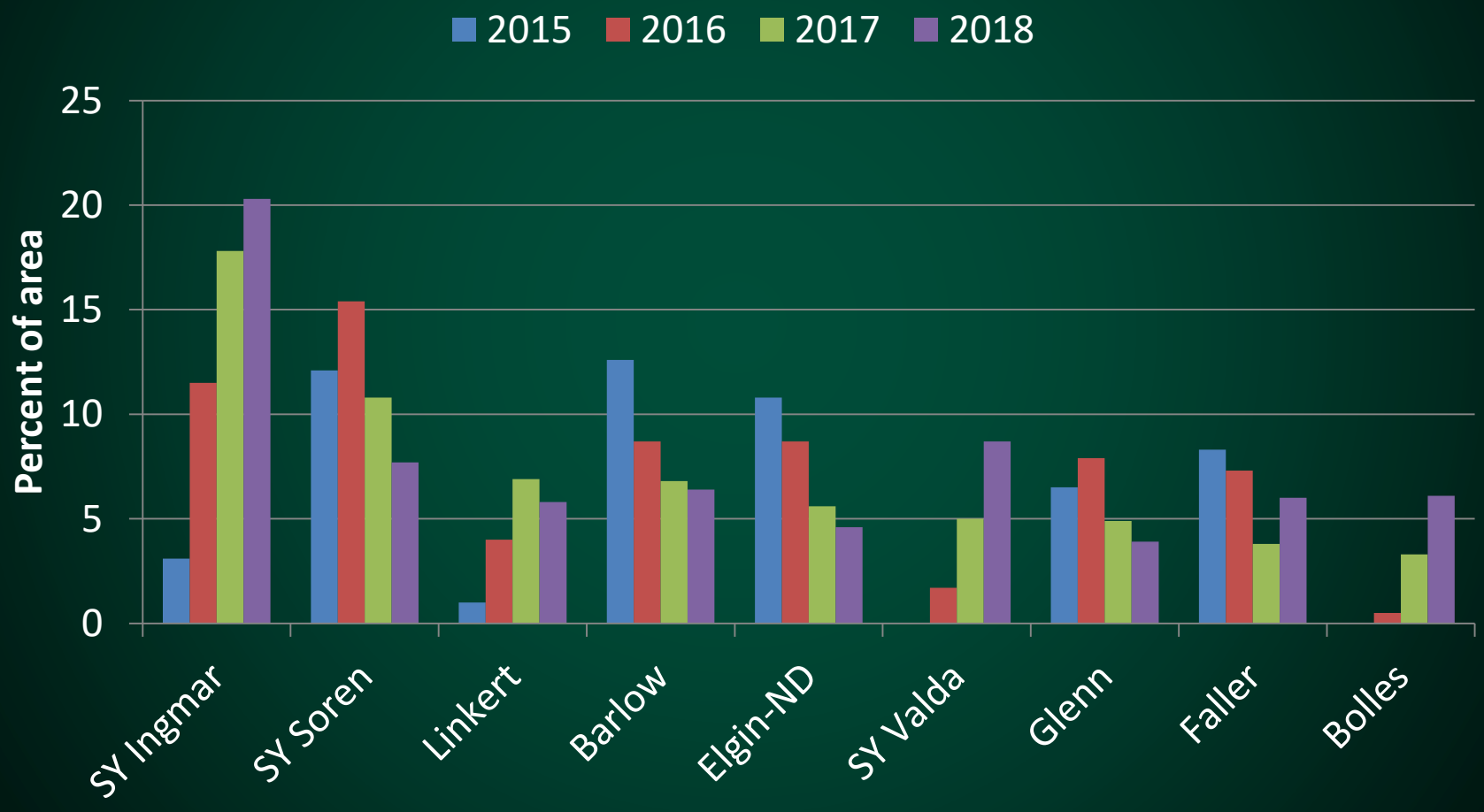
Source: North Dakota Agricultural Weather Network (NDAWN)
inch
-5
0
5

Average yields from spring wheat variety trials in various parts of the state.



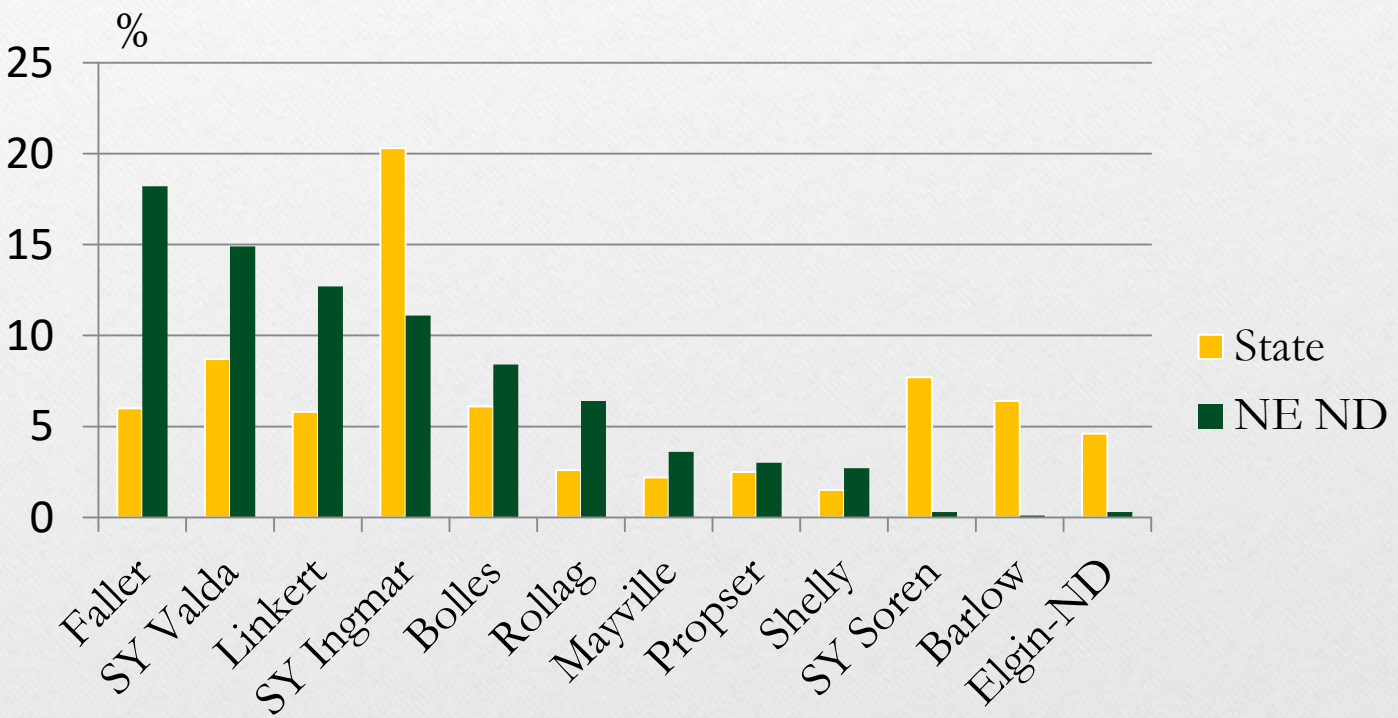
NDSU EXTENSION SERVICE

Trends in HRSW variety use in ND



NDSU EXTENSION SERVICE

HRSW variety acres in 2018



Releases in 2018

Variety	Origin
AAC Goodwin	Ag Canada
CP3888	Croplan
MS Barracuda	Meridian Seed
TCG-Glenville	21st Century Genetics
LCS Cannon	Limagrain

Releases in 2019

Variety	Origin
MN Washburn	Minnesota
SY McCloud	Syngenta
SY Longmire	Syngenta
SY611CL2	Syngenta
CP3910, CP3915, CP3939	Croplan
Dyna-Gro	Commander
Dyna-Gro	Ballistic
TCG-Heartland	21st Century Genetics
TCG-Stalwart	21st Century Genetics

Varieties

NDSU	MN
Glenn	Rollag*
Barlow	Linkert
Faller	Bolles
Prosper*	Shelly
Elgin-ND	Lang-MN
ND VitPro	MN Washburn

* Not testing in 2019

Varieties

SD

Surpass
Boost

Syngenta/AgriPro

SY Soren
SY Ingmar
SY Valda
SY McCloud
SY Longmire
SY611CL2

Varieties

Limagrain

LCS Breakaway
LCS Cannon
LCS Trigger
LCS Rebel

AAC

AAC Brandon*
AAC Goodwin*
AAC Penhold*

Croplan

CP 3419*
CP 3504
CP 3530
CP 3616
CP 3100*
CP 3888
CP3910
CP3915
CP3939

* Not testing in 2019

Varieties

Monsanto/Westbred

WB 9653*
WB 9479*
WB 9590*
WB 9719*

Meridian

MS Chevelle
MS Camaro
MS Barracuda

* Not testing in 2019

21st Century Genetics

TCG-Cornerstone*
TCG-Spitfire
TCG-Climax
TCG-Glenville*
TCG-Heartland
TCG-Stalwart

DynaGro

Ambush
Caliber*
Commander
Ballistic

Leaf rust was not a problem in 2018, but susceptibility to current races should be known in varieties used

- Examples of susceptible varieties:
  - Barlow, Elgin-ND, Glenn, Faller, Prosper, LCS Rebel, LSC Cannon, Shelly, TCG-Climax

- Examples of highly resistant varieties:
  - HRS3504, HRS3530, HRS3888, Lang-MN, LCS Trigger, MS Camaro, SY Soren, SY Valda, TCG-Glenville, WB9479, MS Barracuda

Stripe rust was not a problem in any of the test locations in 2018

- New races may be more tolerant to warmer temperature, so know level of resistance as part of control program (new releases do not yet have assigned levels of resistance)
- Examples of highly resistant varieties:
  - Lang-MN, Linkert, WB9479, LSC Trigger, MS Camaro, Rollag, WB9719
- Examples of susceptible varieties:
  - Faller, HRS 3530, Prosper, SY Soren, SY Valda, WB9590, WB9653

FHB - Scab

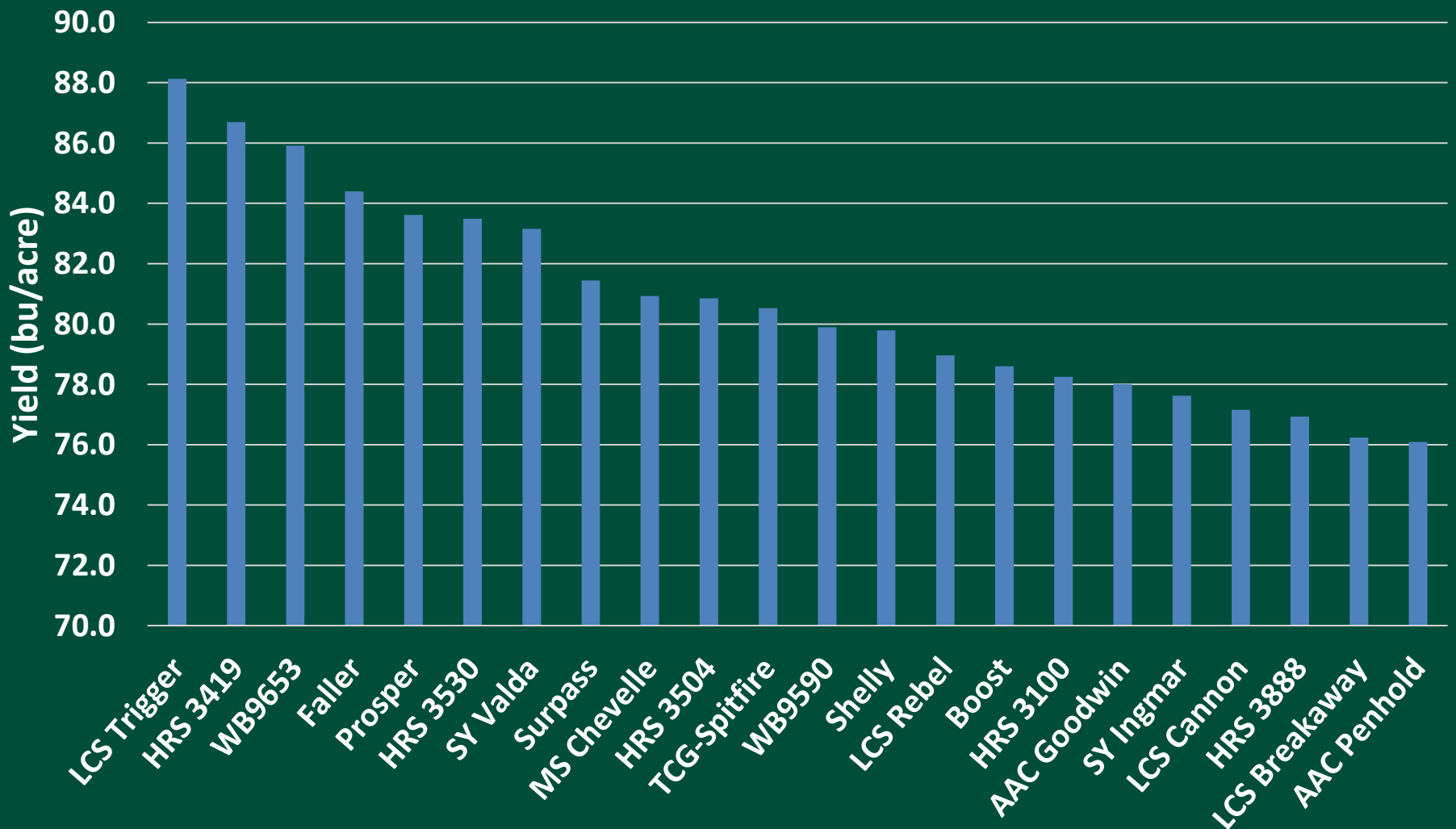
- FHB was problematic in small regions of the state in 2018.

Scab Reaction

Glenn	3
Rollag	3
Boost	4
HRS 3888	4
LCS Rebel	4
LCS Trigger	4
ND-VitPro	4
SY Valda	4
HRS 3504	7
HRS 3616	7
Caliber	8
WB-Mayville	8

1=resistant and 9=very susceptible

Varieties with yields > mean, eastern North Dakota, 2018



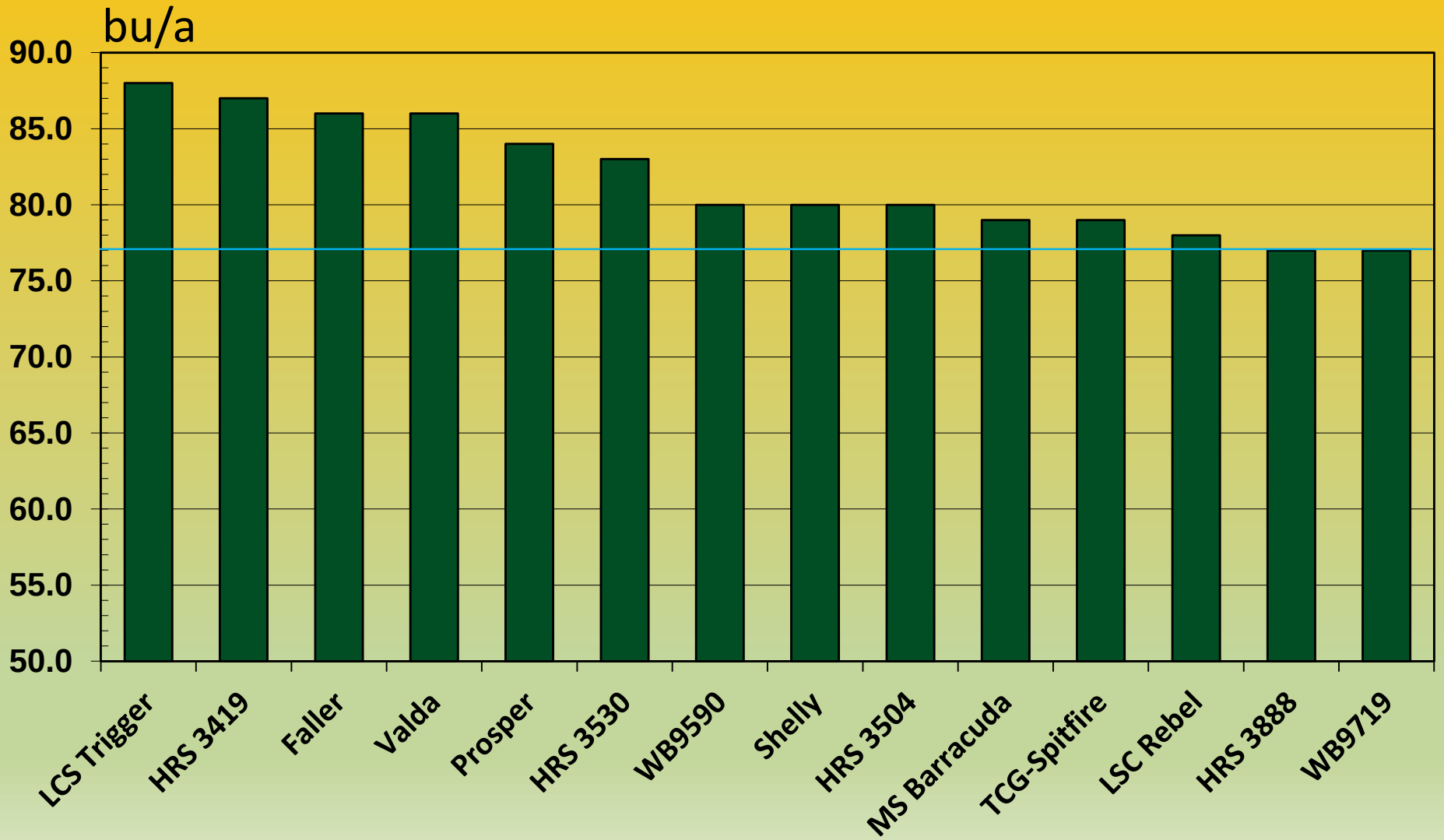
Yield and protein content of top yielding varieties at Langdon (Langdon, Park River, Pekin, Cando), 2018

Variety	Yield (bu/a)	Protein (%)
LCS Trigger	88	11.8
HRS 3419	87	12.8
Faller	86	13.6
SY Valda	86	13.6
Prosper	84	13.8
HRS 3530	83	14.1
HRS 3504	80	13.1
Shelly	80	13.6
WB9590	80	14.4
MS Barracuda	79	14.4

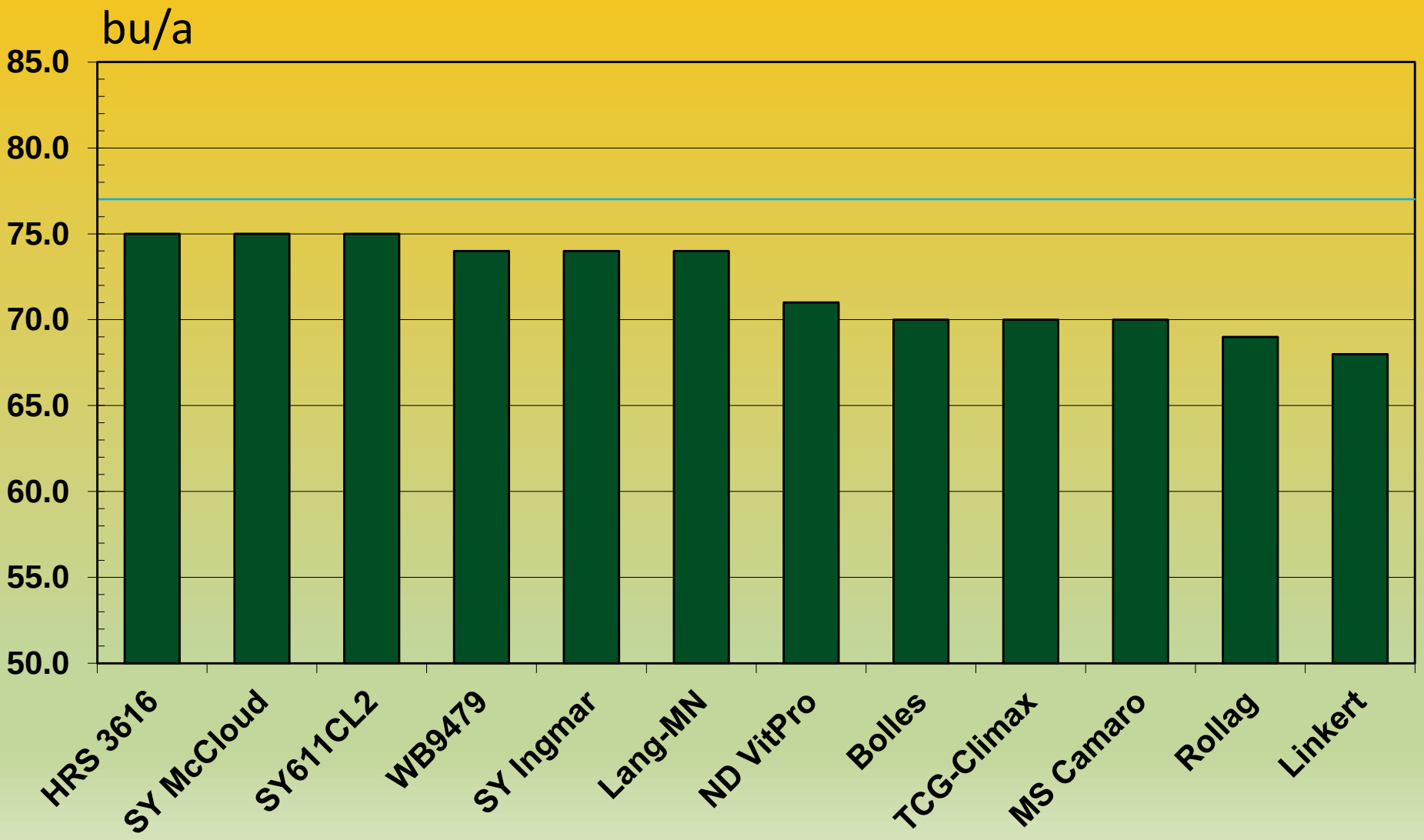
Protein and yield content of top protein varieties at Langdon (Langdon, Park River, Pekin, Cando), 2018

Variety	Yield (bu/a)	Protein (%)
Bolles	70	15.5
WB9479	74	15.3
TCG-Climax	70	15.3
Rollag	69	15.1
HRS 3616	75	14.9
Linkert	68	14.9
SY Ingmar	74	14.8
Lang-MN	74	14.8
ND VitPro	71	14.7
SY McCloud	75	14.7
WB9590	80	14.4
MS Barracuda	79	14.4

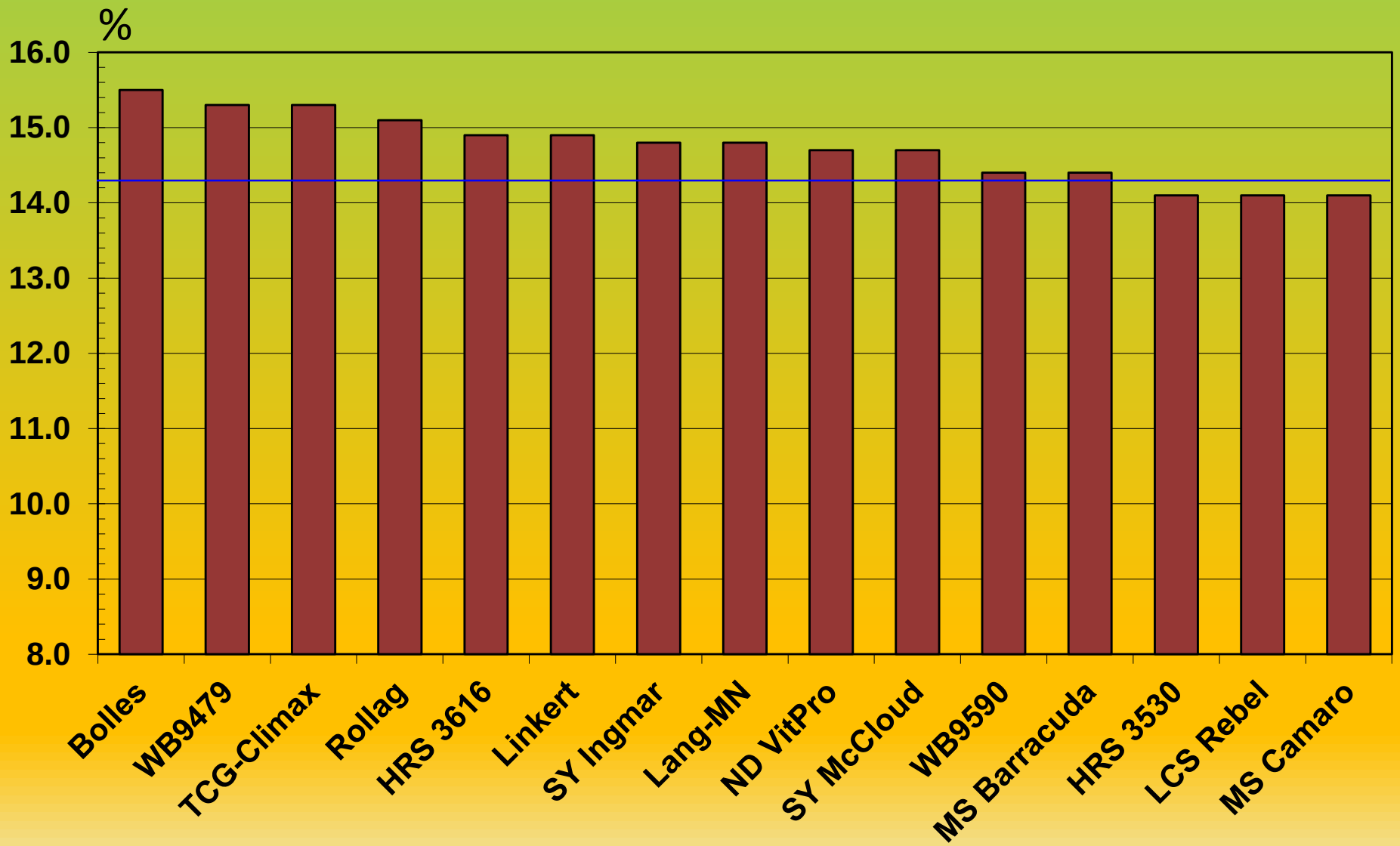
2018 HRSW 4-site Yield



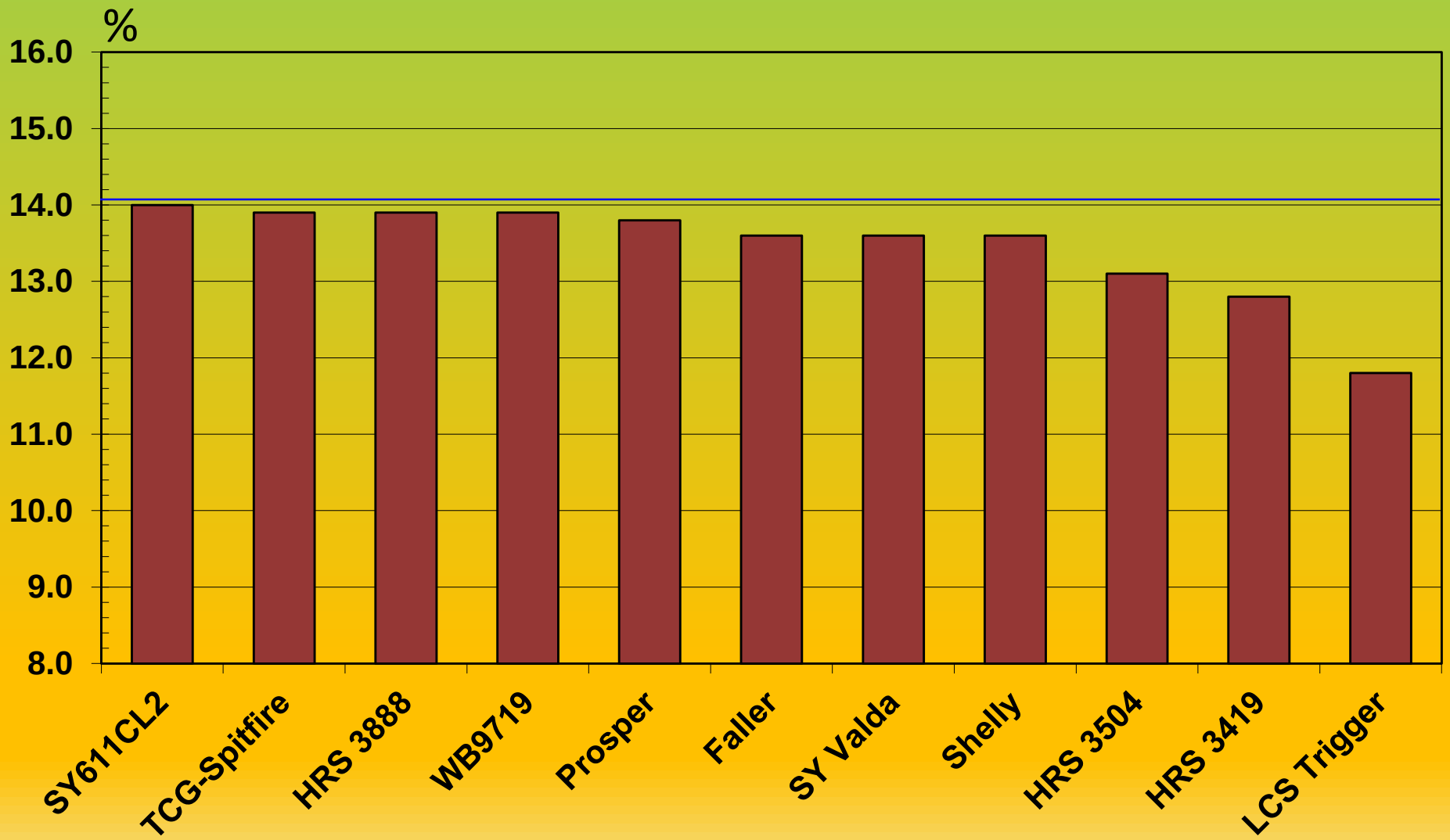
2018 HRSW 4-site Yield



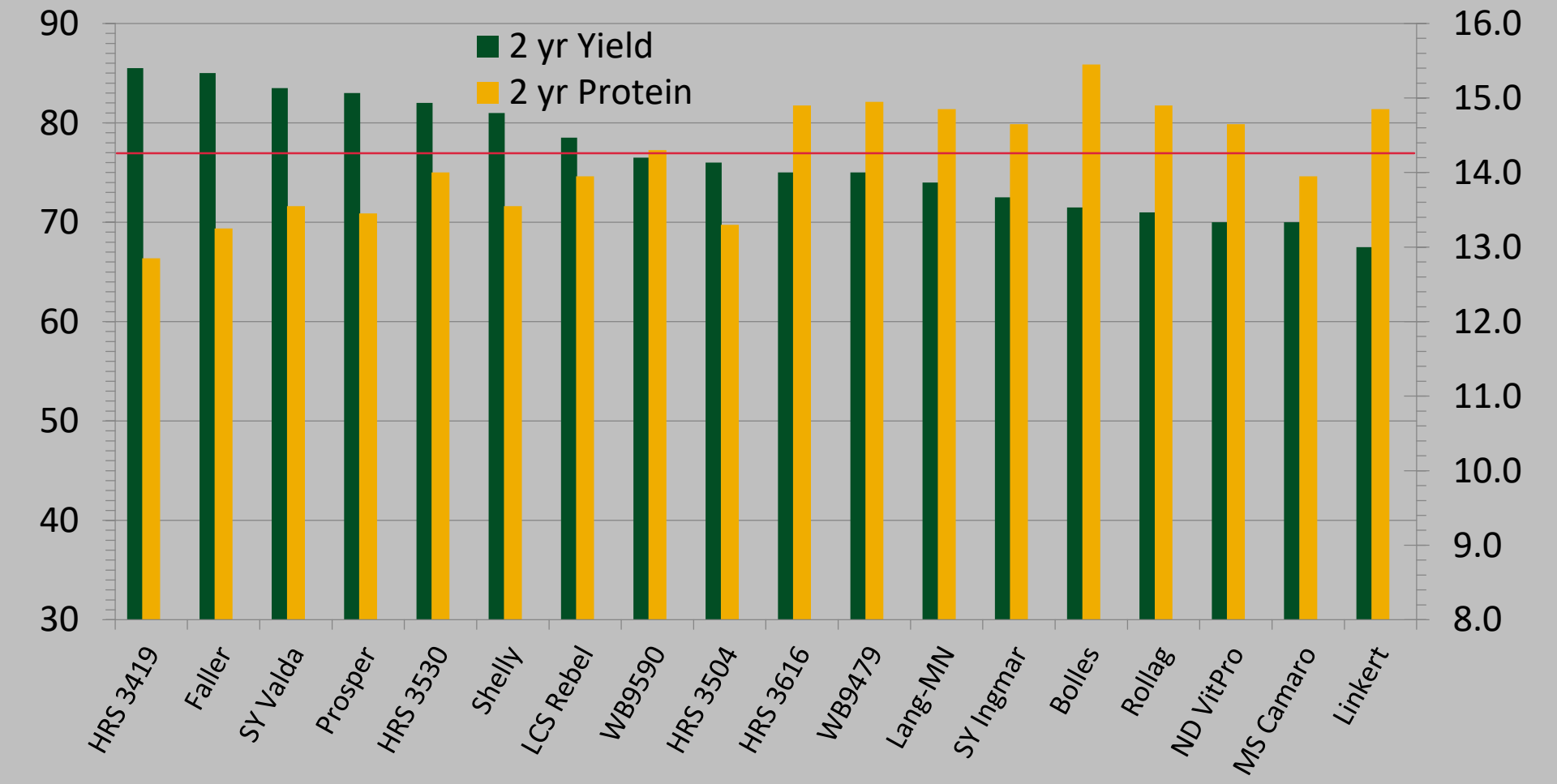
2018 HRSW 4-site Protein



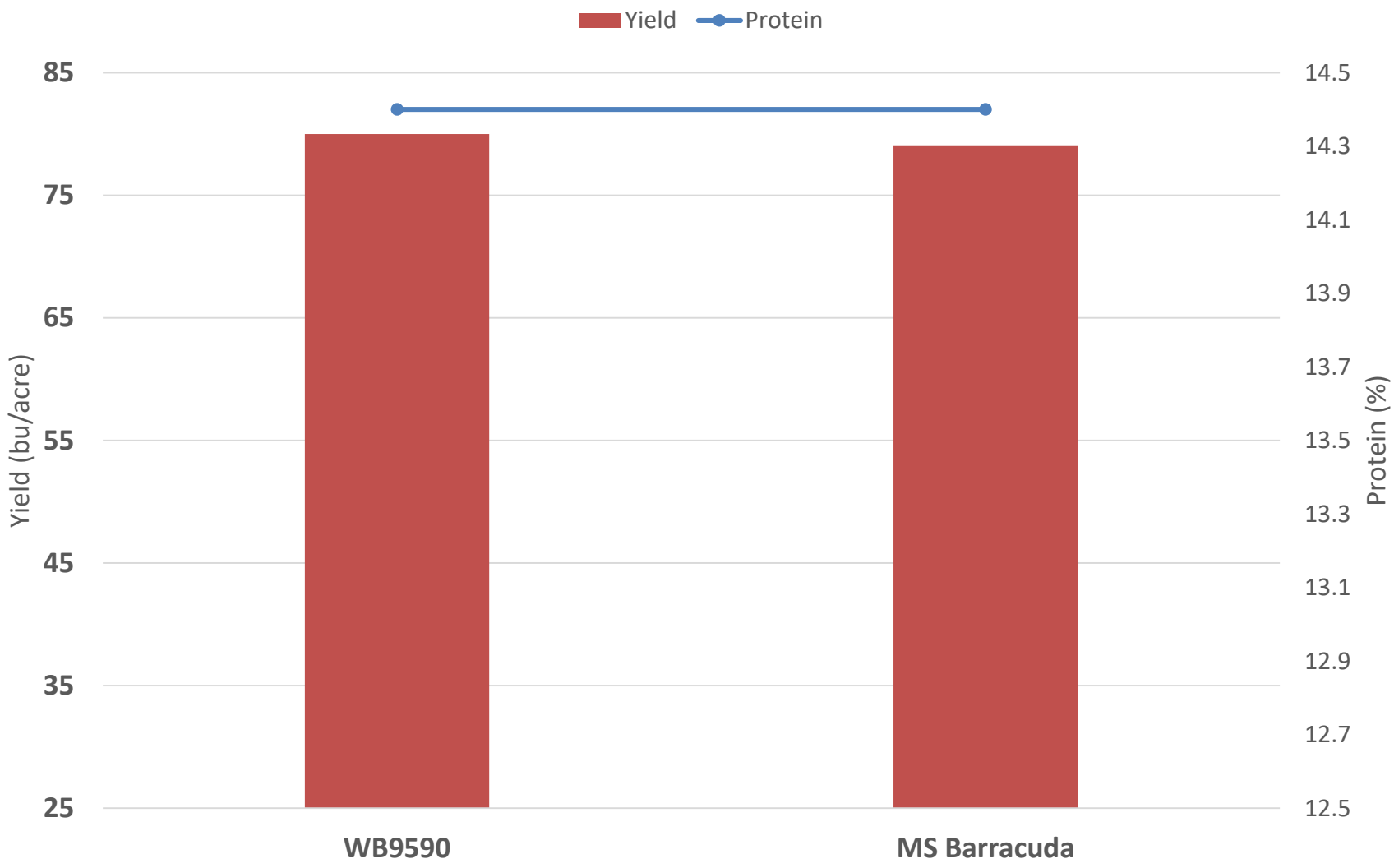
2018 HRSW 4-site Protein



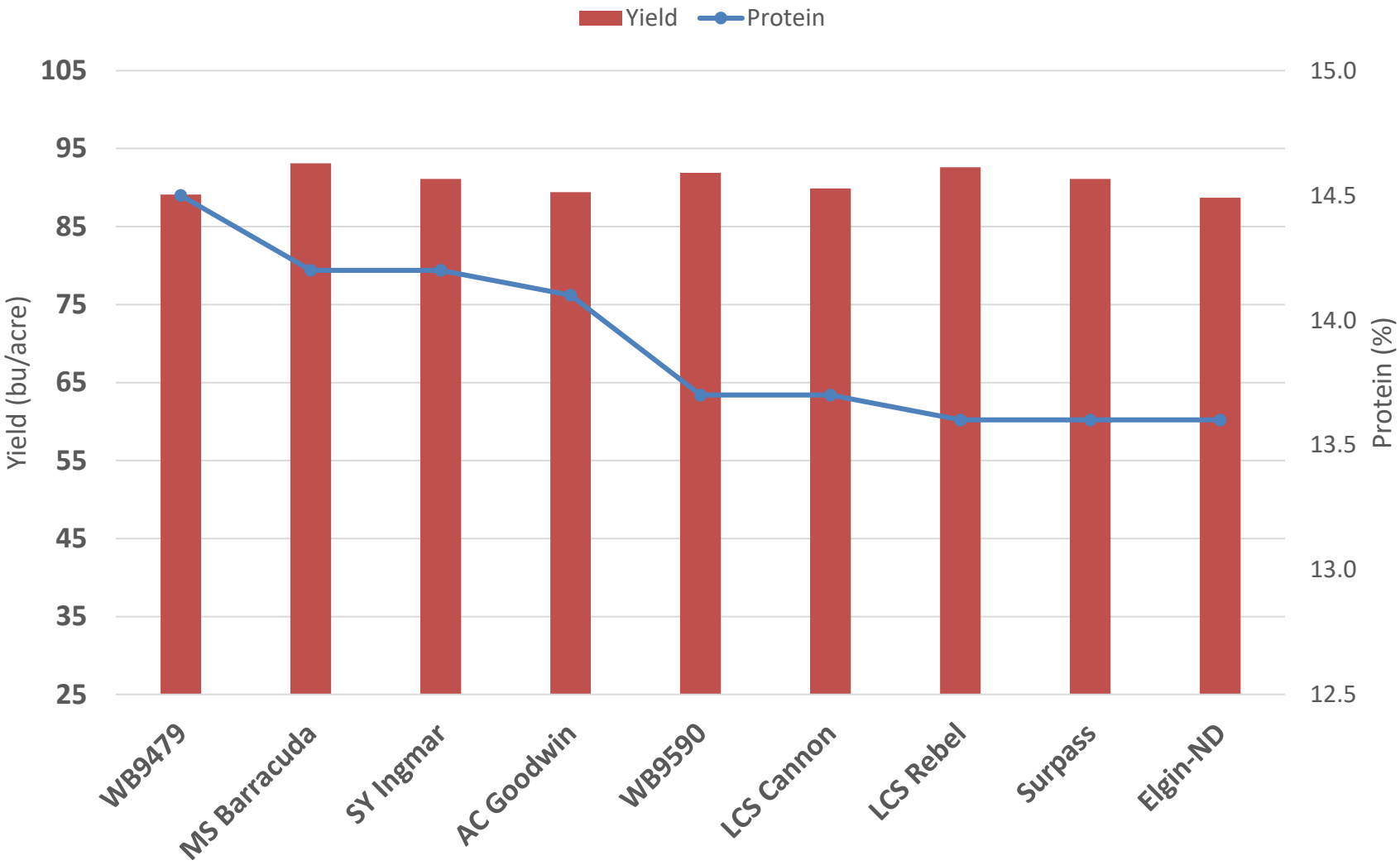
2yr (9 site) yield and protein averages for HRSW varieties at Langdon and off-station, 2017-2018.



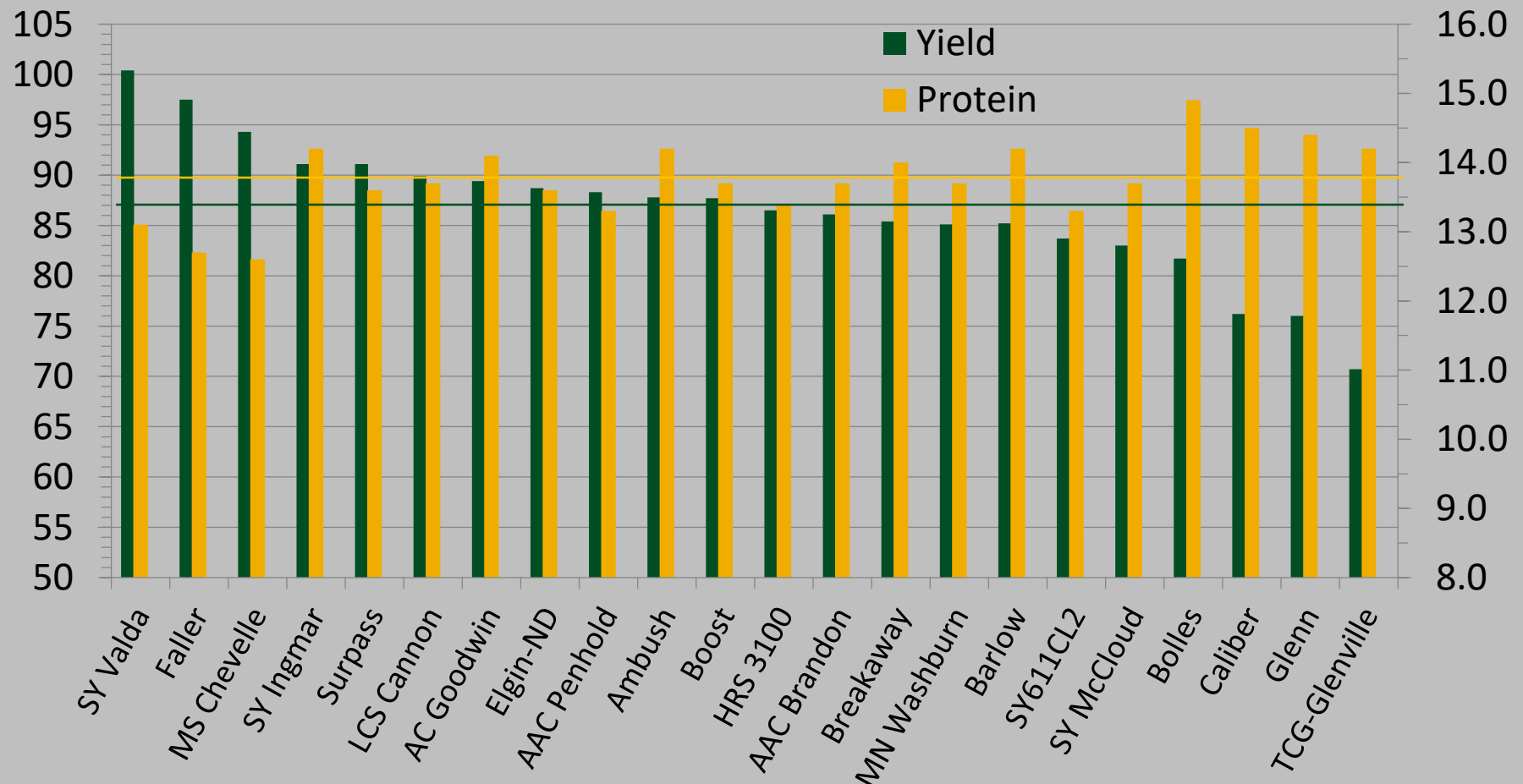
Varieties with protein and yield > mean, 4 locations means, LREC 2018



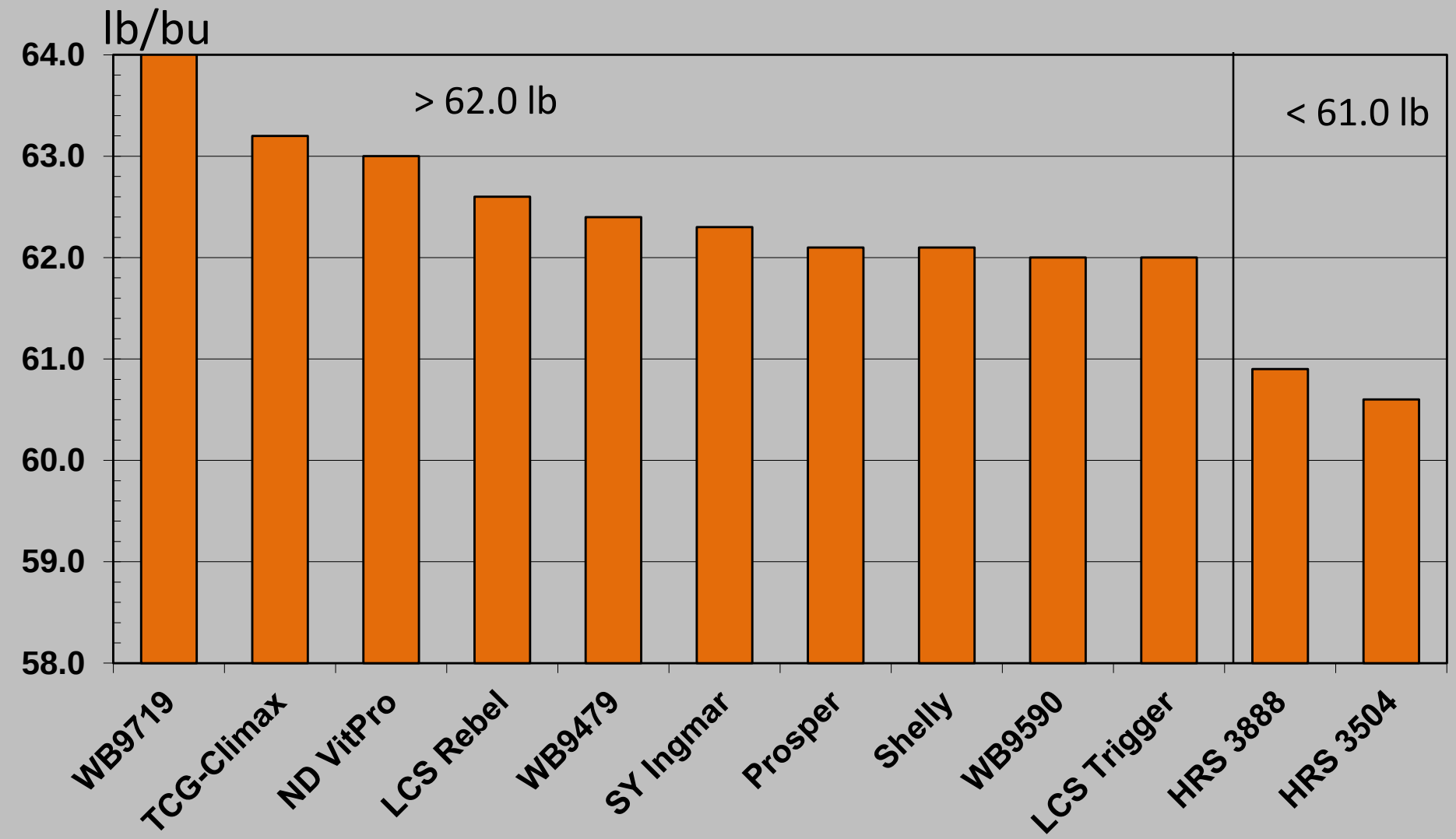
Varieties with protein and yield > mean, Langdon, 2018



Comparative yield of selected HRSW varieties at Langdon, 2018



2018 HRSW 4-site Test Weight



Days to Head - Langdon 2018

44-45	46-47	48	49	50	51-53
Surpass	Barlow	Elgin-ND	Rollag	Faller	HRS 3419
MS Barracuda	Glenn	SY Soren	SY Ingmar	Prosper	Boost
LCS Cannon	LSC Breakaway	ND VitPro	WB9653	Bolles	Shelly
	MS Chevelle	SY McCloud	SY Valda	Linkert	TCG-Spitfire
	LCS Rebel	SY611CL2	HRS 3616	HRS 3530	Lang-MN
	DG Ambush		WB9479	HRS 3504	LCS Trigger
	TCG Glenville		WB9590	HRS 3100	TCG-Climax
	MS Camaro		AAC Brandon	DG Caliber	AAC Penhold
			AC Goodwin	MN Washburn	WB9719
			HRS 3888		

Plant Height (in) - Langdon 2018

26-28	29-30	31	32	33-34	35-36
SY Soren	LCS Breakaway	MS Chevelle	Surpass	Barlow	Elgin-ND
MS Camaro	Rollag	HRS 3616	AAC Brandon	Faller	Glenn
WB9479	SY Ingmar	TCG-Spitfire	AC Goodwin	Prosper	Lang-MN
WB9590	Linkert	TCG-Climax		Bolles	LCS Trigger
DG Caliber	SY Valda	DG Ambush		HRS 3530	
TCG Glenville	HRS 3504	HRS 3888		LCS Rebel	
	Shelly			ND VitPro	
	HRS 3100				
	WB9719				
	AAC Penhold				
	MS Barracuda				
	LCS Cannon				
	SY McCloud				
	SY611CL2				

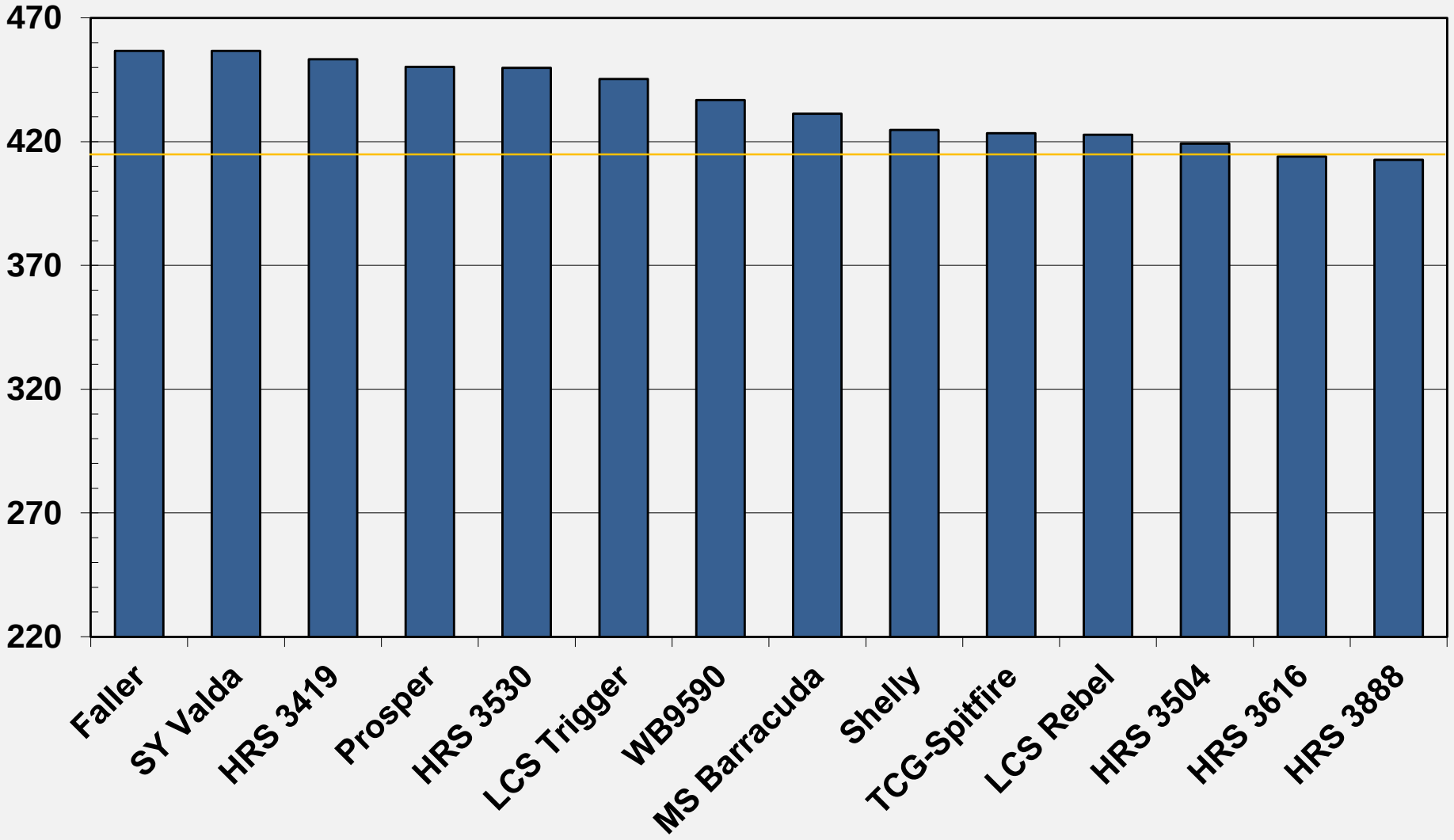
Straw Strength- Statewide

1=strongest, 9=weakest

2	3	4	5	6
DG Caliber	AAC Penold	Bolles	AAC Brandon	Barlow
HRS 3419	HRS 3504	Glenn	AAC Goodwin	
Linkert	MS Barracuda	HRS 3100	DG Ambush	
TCG-Climax	ND VitPro	HRS 3530	Boost	
	Rollag	HRS 3616	Elgin-ND	
	SY Ingmar	HRS 3888	Faller	
	SY Soren	LCS Cannon	Lang-MN	
	TCG-Glenville	TCG-Spitfire	LCS Rebel	
		WB9479	LCS Tigger	
		WB9590	MS Camaro	
		WB9653	MS Chevelle	
		WB9719	Shelly	
		SY Valda	Surpass	
			LCS Breakaway	

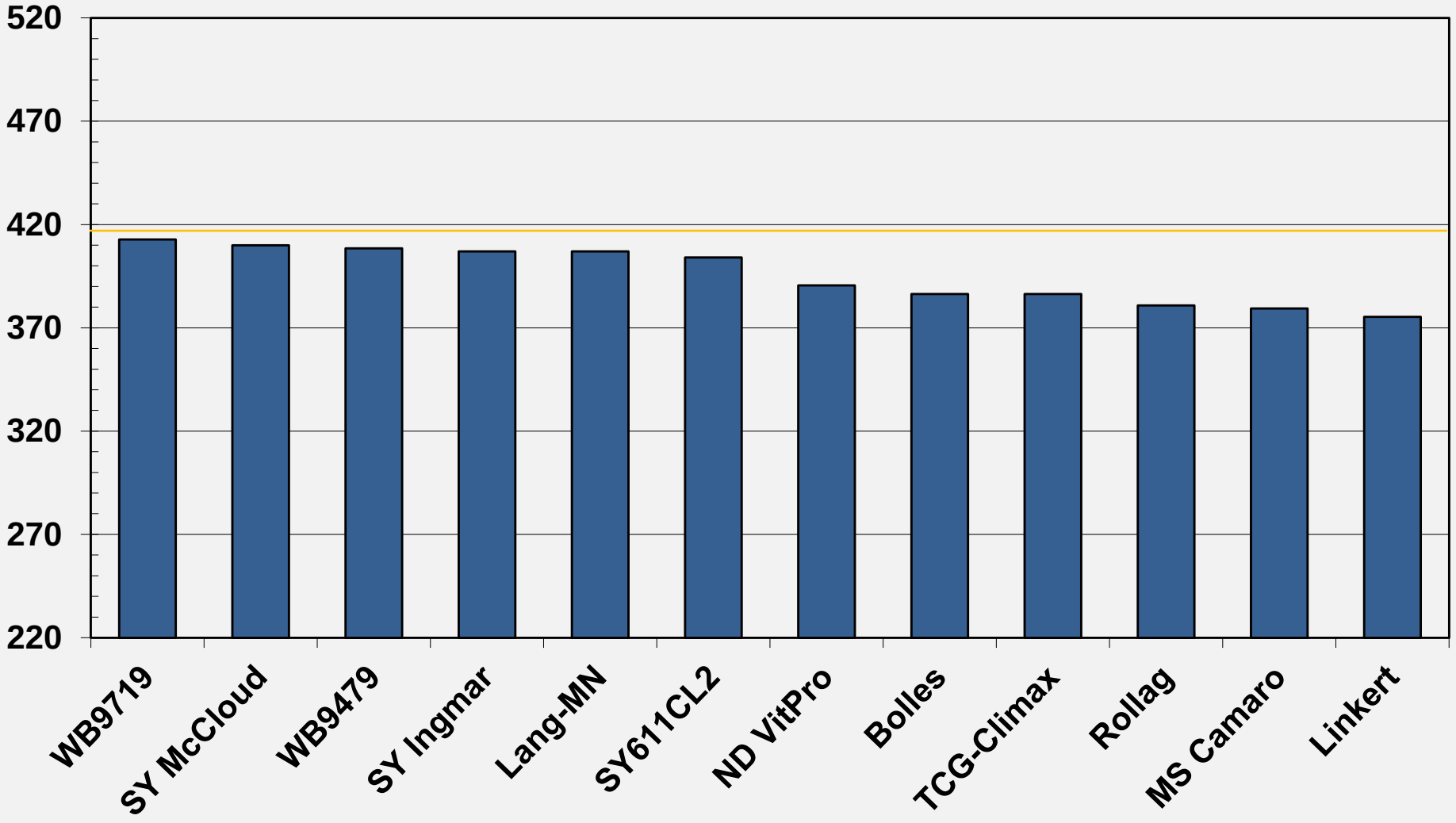
2018 HRSW 4-site - $Return/a

Langdon Nov 26 quote. $5.52/bu, protein discount/premium. $0.03/fifth down to 11%. $0.02/fifth up to 15%



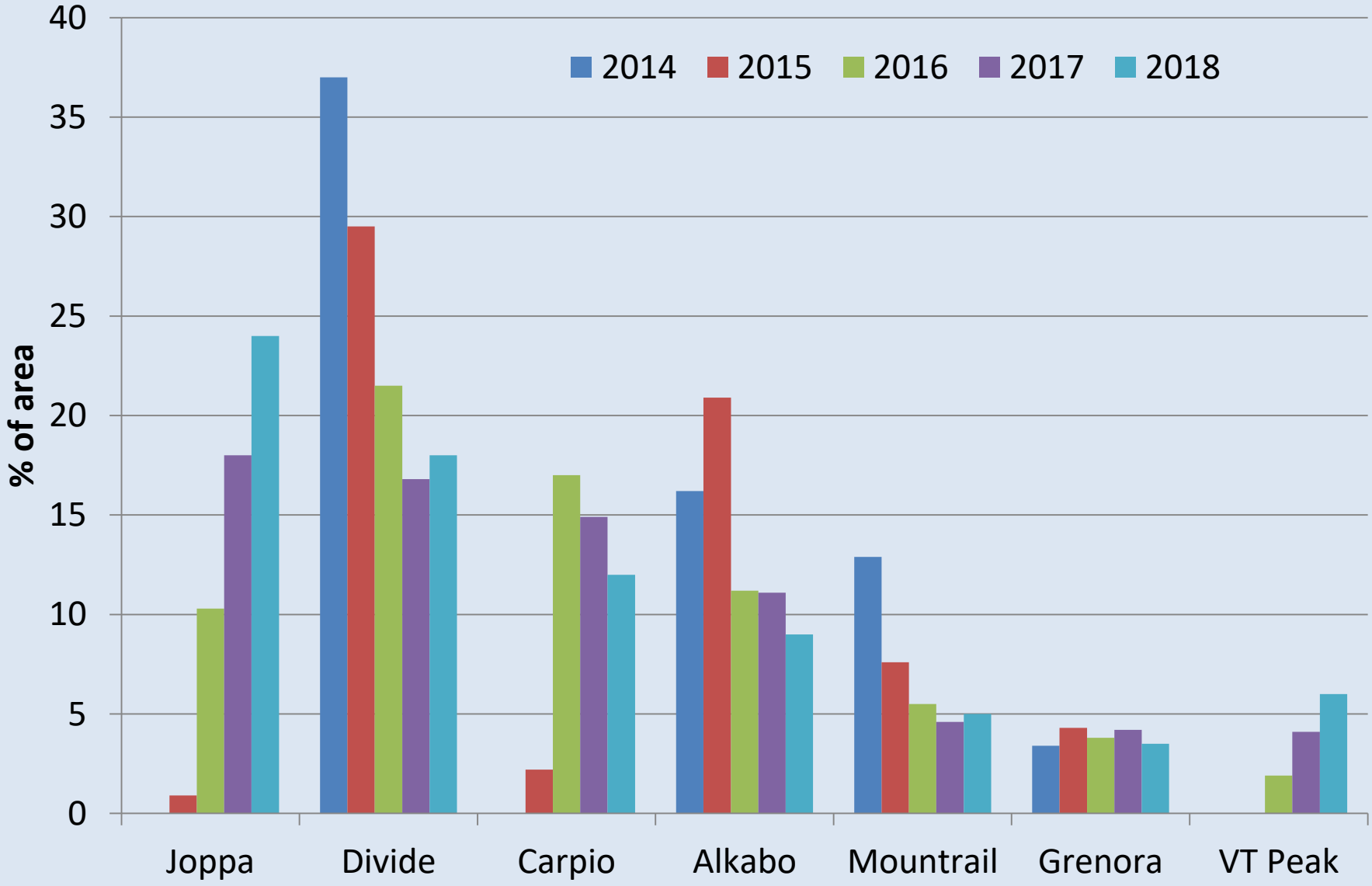
2018 HRSW 4-site - $Return/a

Langdon Nov 26 quote. $5.52/bu, protein discount/premium. $0.03/fifth down to 11%. $0.02/fifth up to 15%



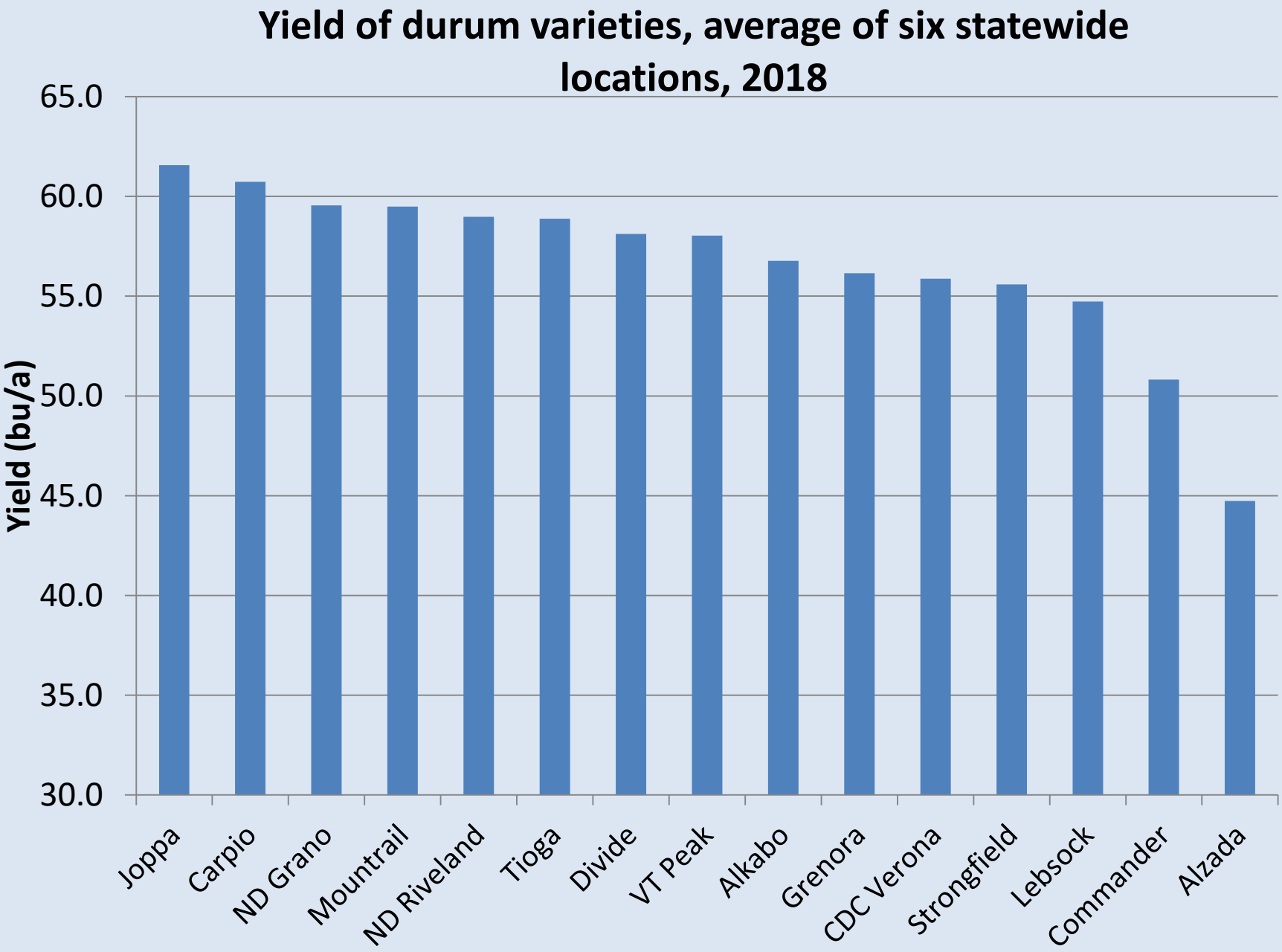
Durum

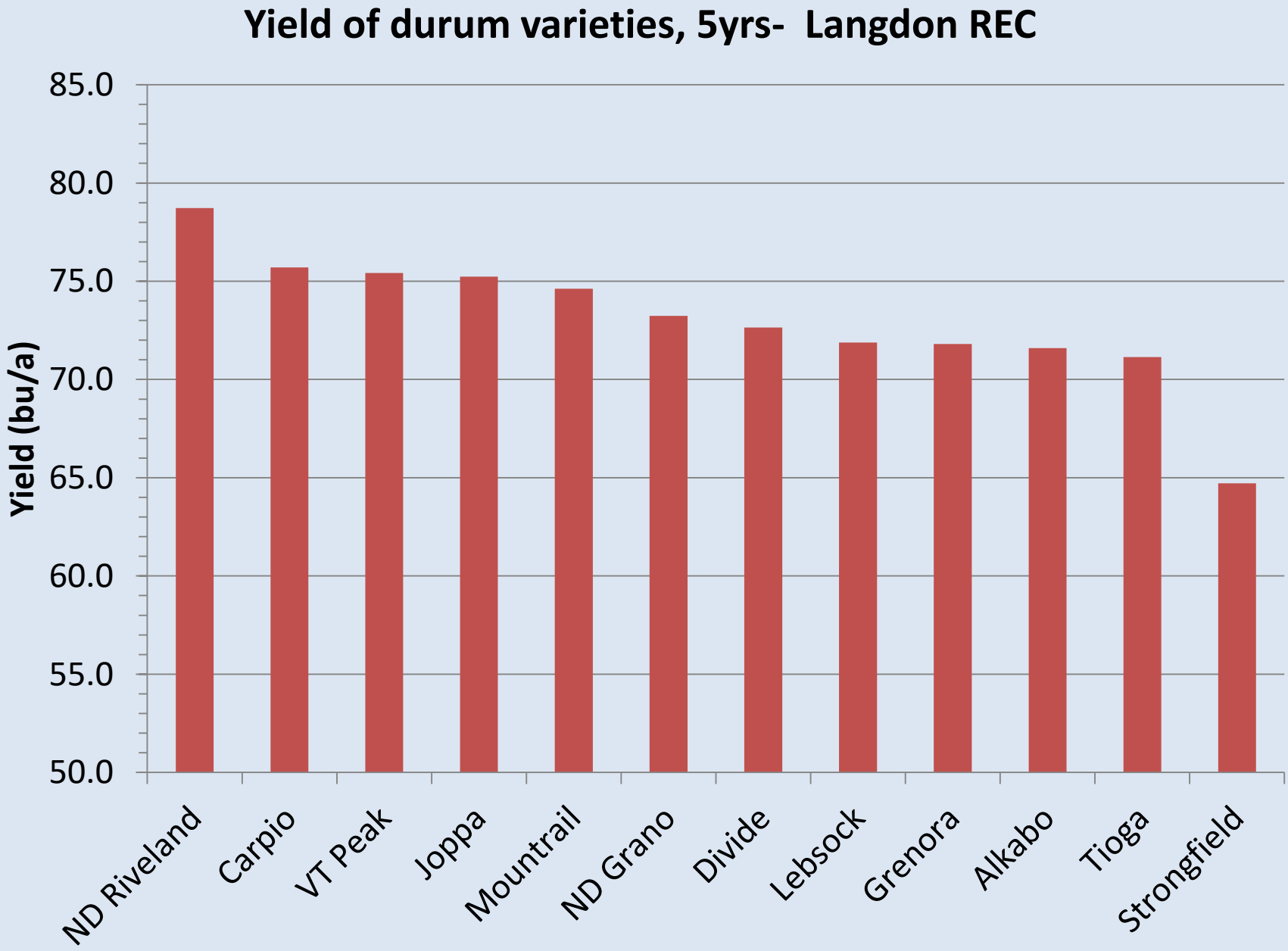
Durum varieties: % of area planted 2014-2018

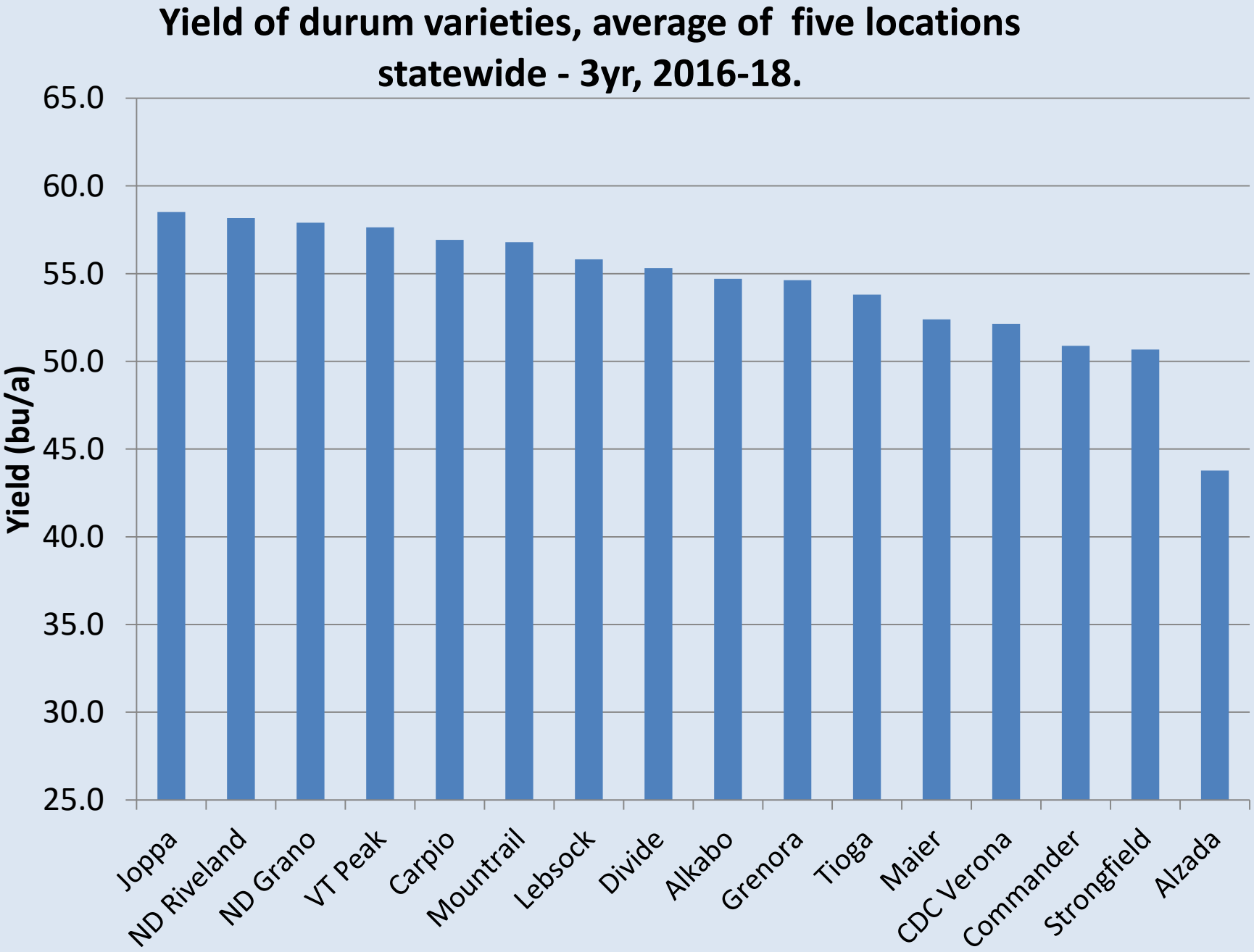


Two new durum varieties released in 2017

- ND Grano –
  - Medium tall,
  - Lodging=5
  - FHB=6
- ND Riveland –
  - Tall
  - Lodging = 4
  - FHB = 5
  - Large kernels
- Both have good yield and protein & low Cd accumulation gene


Yield of durum varieties, average of six statewide locations, 2018
Yield (bu/a)
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
Joppa
Carpio
ND Grano
Mountrail
ND Riveland
Tioga
Divide
VT Peak
Alkabo
Grenora
CDC Verona
Strongfield
Lebsock
Commander
Alzada


Yield of durum varieties, 5yrs- Langdon REC
Yield (bu/a)
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
ND Riveland
Carpio
VT Peak
Joppa
Mountrail
ND Grano
Divide
Lebsock
Grenora
Alkabo
Tioga
Strongfield


Yield of durum varieties, average of five locations statewide - 3yr, 2016-18.
Yield (bu/a)
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
Joppa
ND Riveland
ND Grano
VT Peak
Carpio
Mountrail
Lebsock
Divide
Alkabo
Grenora
Tioga
Maier
CDC Verona
Commander
Strongfield
Alzada

Barley

Barley Breeder Yield Trials at Osnabrock, ND

2018 Stats:

Area planted: 520,000

Average yield: 74 bu/acre

2017 stats:

Area planted: 520,000

Average yield: 63 bu/acre

2018 Barley Acres

Cavalier County

17,500

Barley Industry switching to Two-row

- Efficiencies in brewing technology coupled with increase in craft brewing
  - Two-rowed 2% >malt and higher extract - more beer
- Estimated 80% of acres in 2019 will be two-row
  - 2015 - 65% was six-row
  - 2005 - 80% was six-row
- Main varieties being contracted are:
  - AAC Synergy, ND Genesis, Pinnacle, CDC Meredith, and Explorer

Historical Disadvantages of Two-rowed Barley Compared to Six-rowed Barley

- Inherently lower yielding than six-rowed barley under favorable growing condition.
- Weaker straw than six-rowed barley
- More susceptible to foliar diseases.
- Malt is lower in enzymatic activity

Inherent Advantages of Two-rowed Barley Compared to Six-rowed Barley

- Often lower in grain protein.
- Plumper kernels under drought conditions.
- Often lower in deoxynivalenol (DON).

2-Row Barley

- AMBA – No 6-row testing
- State VT – No 6-row testing
- Risky to grow
- ND Genesis and ACC Synergy stay green longer
- More susceptible to sprouting even with heavy dew
- Less susceptible to shatter than 6-row
  - Explorer has more stem breakage then ND Genesis or ACC Synergy
- Growers have successfully straight harvest ND Genesis, Pinnacle and ACC Synergy.

6-Row Barley

- 6-row breeding program will focus on pet food market
- Protein doesn't matter
- DON less stringent, <5 ppm
- Work on semi-dwarf trait – producers use more N
- Market $1 < 2-row malting

ND Genesis Seeding Rate

Million Seeds/A	Tradition bu/a	ND Genesis bu/a
500,000	0.9	1.2
750,000	1.4	1.8
1,000,000	1.9	2.4
1,250,000	2.4	3.0
1,500,000	2.9	3.6

Tradition – 40.0 TKW, 11,350 seeds/lb, 95% germ
ND Genesis – 50.0 TKW, 9080 seeds/lb, 95% germ

ND Genesis Agronomic Traits
Seeding Rates – Langdon 2015-2016

Seeding Rate million	Tiller/ plant	Days to Head	Height	Lodging	KWT	TW
0.5	10.0	61.5	35	1.9	49.1	48.0
0.75	5.6	60.5	35	2.7	48.3	48.2
1.0	4.3	59.5	36	2.6	48.0	48.7
1.25	3.1	59.0	33	1.8	47.8	48.9
1.50	2.7	58.5	36	3.2	47.0	48.4
1.75	2.0	58.0	36	3.0	48.5	48.7

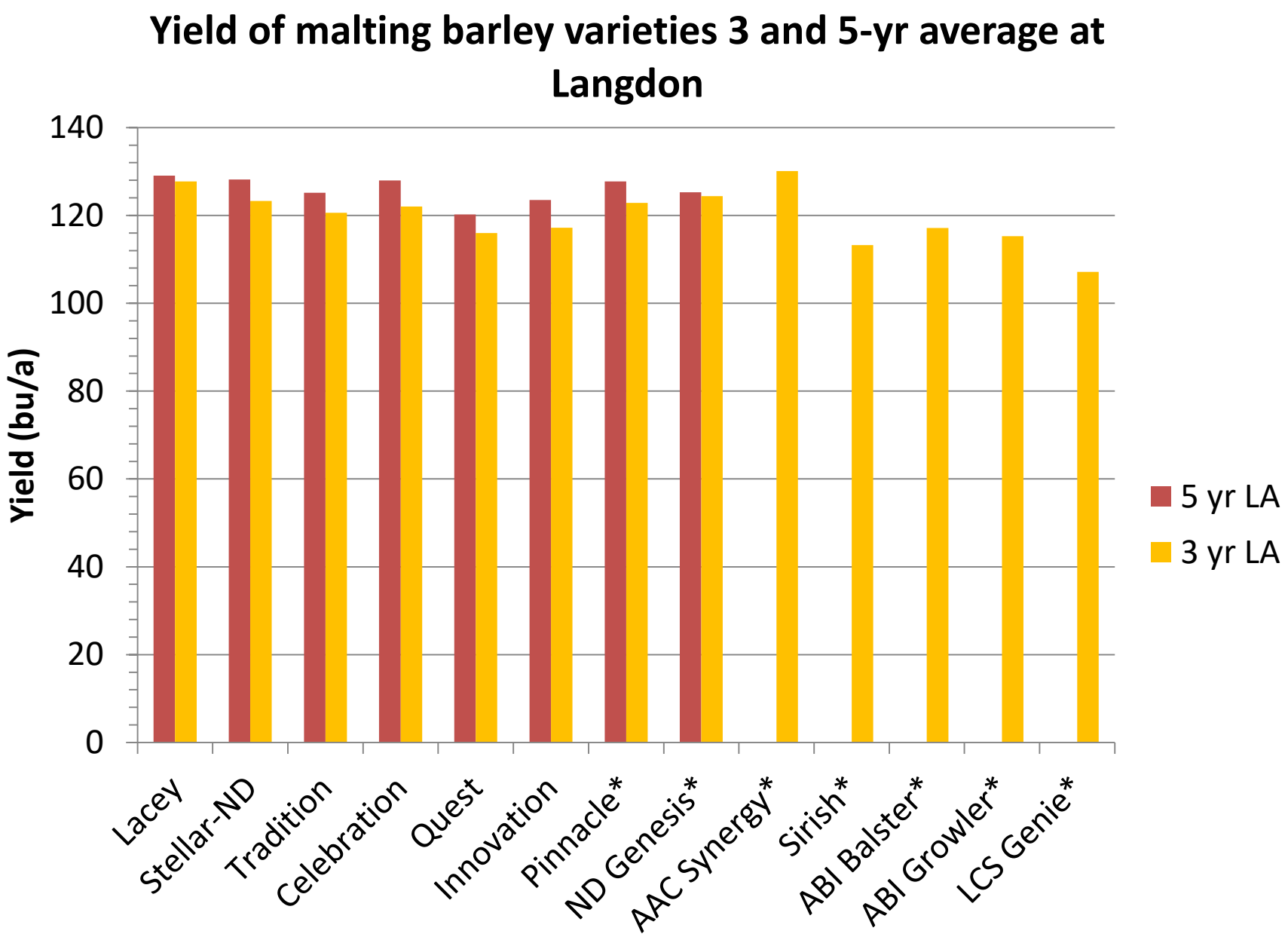
ND Genesis Yield
Seeding Rates – Langdon 2015-2016

Seeding Rate million	Langdon 2015	Langdon 2016	Langdon 2 yr	LAN, MINOT CARR 6-site	LAN, MINOT CARR 11-site
0.5	115.1	103.0	109.0	101.6	93.7
0.75	120.8	107.8	114.3	108.9	99.4
1.0	122.1	108.7	115.4	108.0	99.0
1.25	125.4	104.6	115.0	108.6	100.8
1.50	125.1	107.6	116.4	108.7	
1.75	131.7	105.6	118.7	113.1	

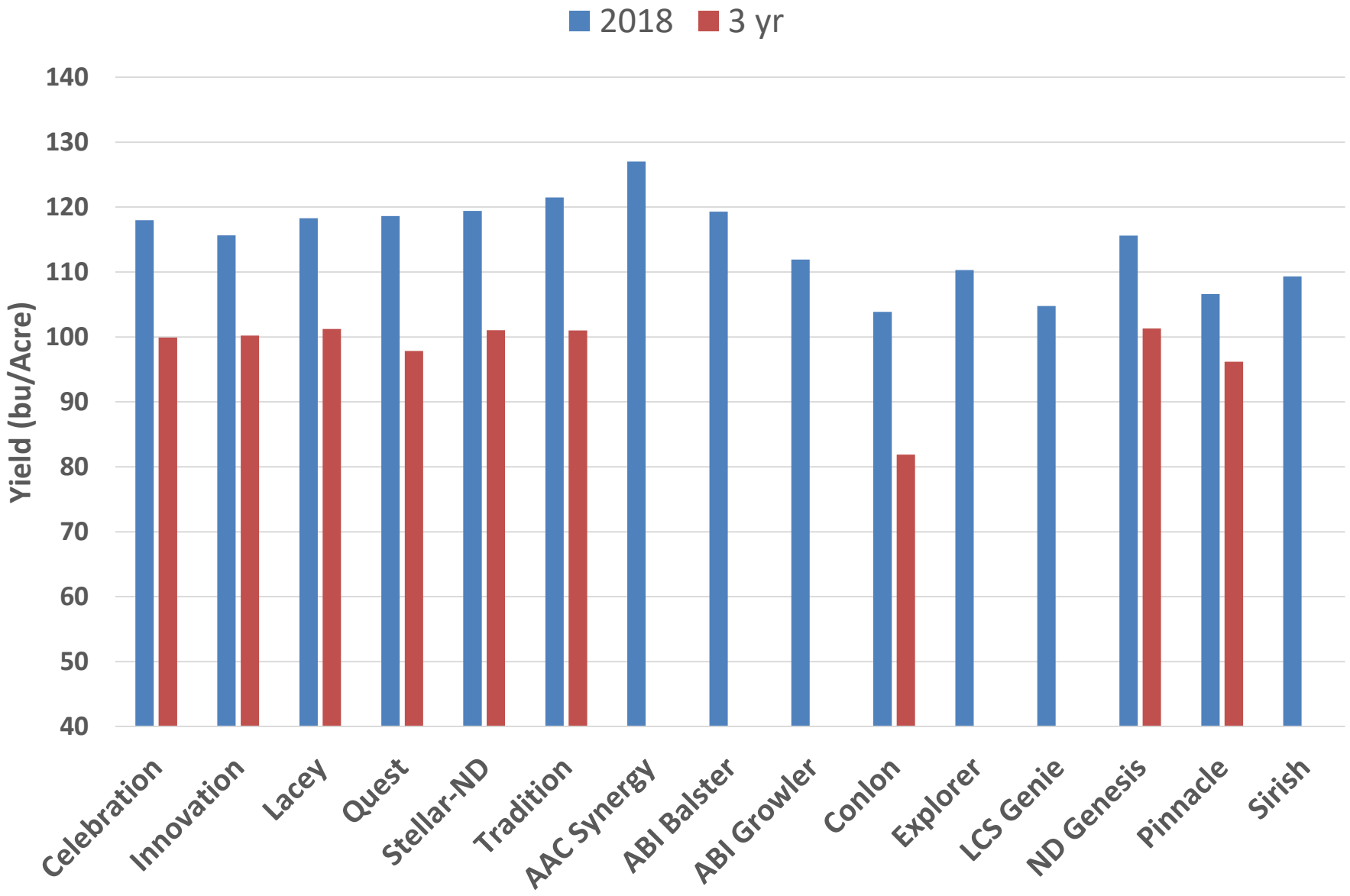
Barley Straw Strength

Six-row Varieties	Straw Strength
Celebration	Strong
Lacey	Strong
Quest	Strong
Stellar-ND	V. Strong
Tradition	V. Strong
Innovation	V. Strong

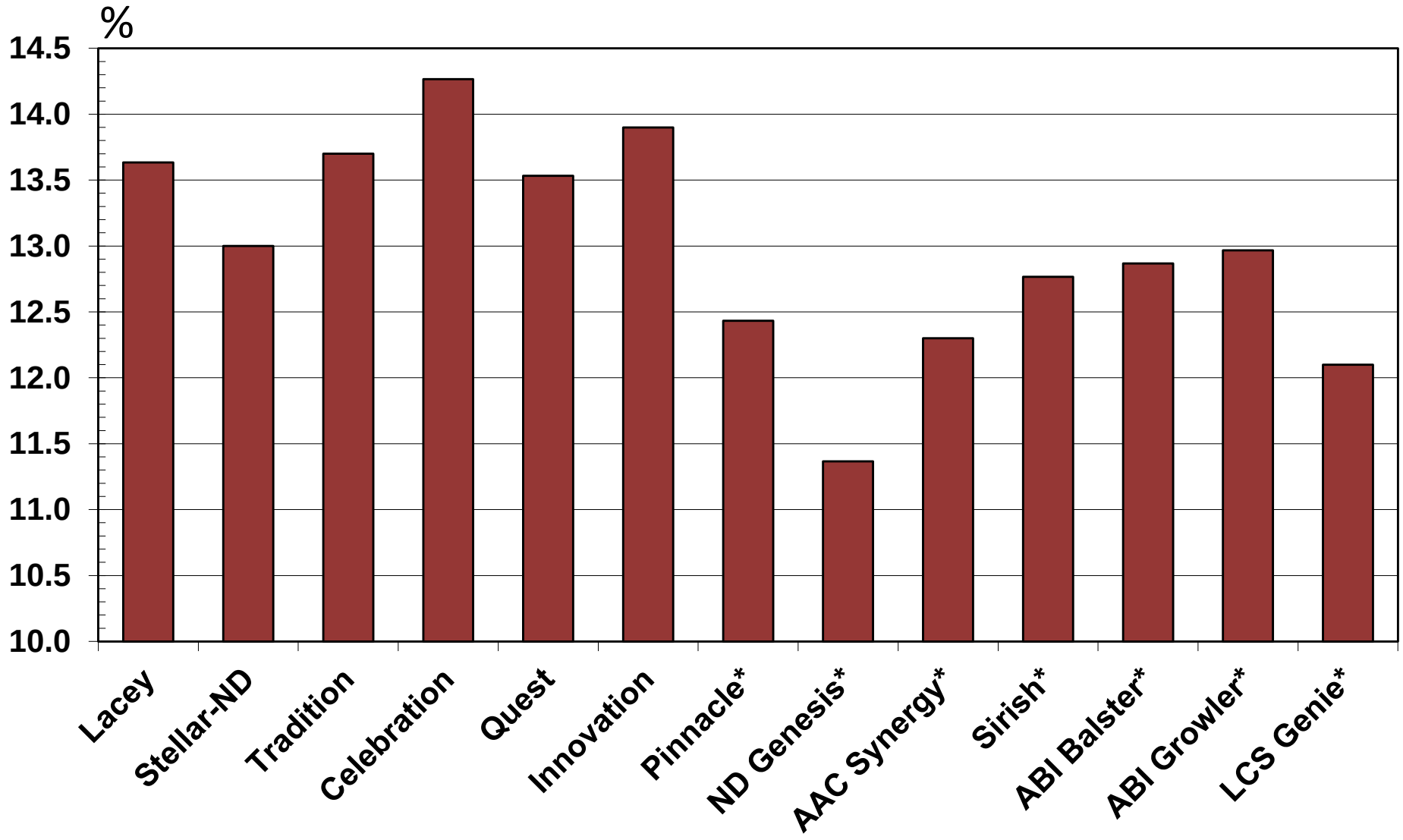
Two-row Varieties	Straw Strength
AAC Synergy	Strong
ABI Balster	Medium
ABI Growler	M. Strong
Explorer	M. Strong
LCS Genie	V. Strong
ND Genesis	M. Strong
Pinnacle	Strong
Sirish	M. Strong


Yield of malting barley varieties 3 and 5-yr average at Langdon
Yield (bu/a)
140
120
100
80
60
40
20
0
Lacey
Stellar-ND
Tradition
Celebration
Quest
Innovation
Pinnacle*
ND Genesis*
AAC Synergy*
Sirish*
ABI Balster*
ABI Growler*
LCS Genie*
5 yr LA
3 yr LA

Yield of malting barley varieties in eastern ND, 2018



Protein – 2015-18 Langdon



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