

Agronomic Research

William May

AAFC

Indian Head



Macro and Micro Nutrient Trial

| Nutrients | Treatments | | | | | | | | | | |
|--------------|------------|----|----|----|----|----|----|----|----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| N | 0 | 15 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 90 |
| P | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| CL | | 18 | 18 | 18 | 18 | 18 | 0 | 18 | 18 | 18 | 18 |
| S | | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Cu | | | | | | | | 3 | | | |
| Zinc | | | | | | | | | 3 | | |
| Cu, Z, Mg, B | | | | | | | | | | Yes | Yes |



Locations

- **Indian Head – Indian Head Agricultural Research Foundation**
- **Swift Current - Wheatland Conservation Association**
Redvers – South East Research Farm
- **Yorkton – East Central Research Foundation**
- **Melfort - North East Research Foundation**
- **Scott – Western Applied Research Corporation**



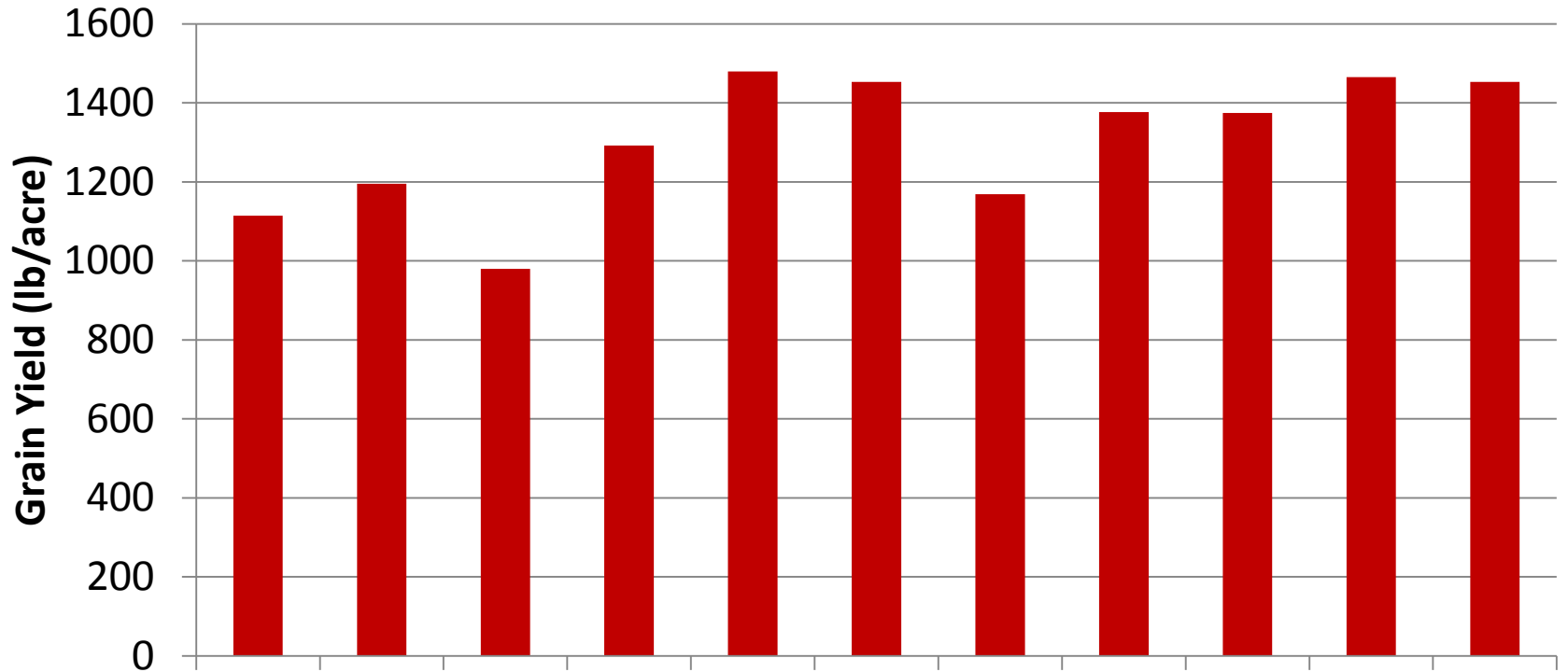
Funding

ADF – Saskatchewan Ministry of Agriculture

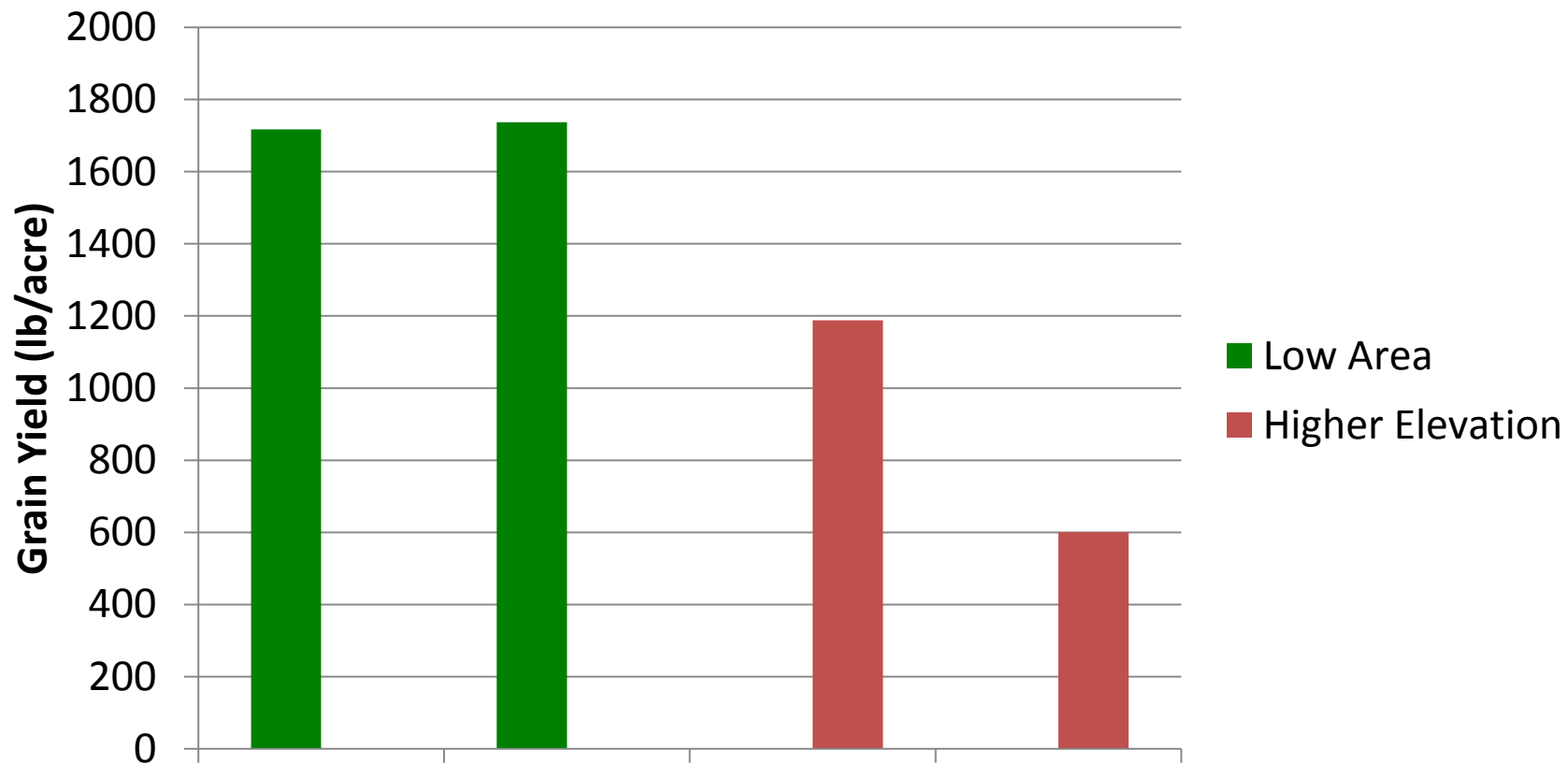
Canaryseed Development Commission of
Saskatchewan



Indian Head



| | | | | | | | | | | | |
|---------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|
| N | 0 | 15 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 90 |
| P | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| CL | | 18 | 18 | 18 | 18 | 18 | 0 | 18 | 18 | 18 | 18 |
| S | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Cu | | | | | | | | 3 | | | |
| Zinc | | | | | | | | | 3 | | |
| Cu, Z, Mg, B | | | | | | | | | | Yes | Yes |



| | | | | |
|-----------|-----------|-----------|-----------|-----------|
| N | 60 | 60 | 60 | 60 |
| P | 30 | 30 | 30 | 30 |
| CL | 18 | 0 | 18 | 0 |
| S | 15 | 15 | 15 | 15 |



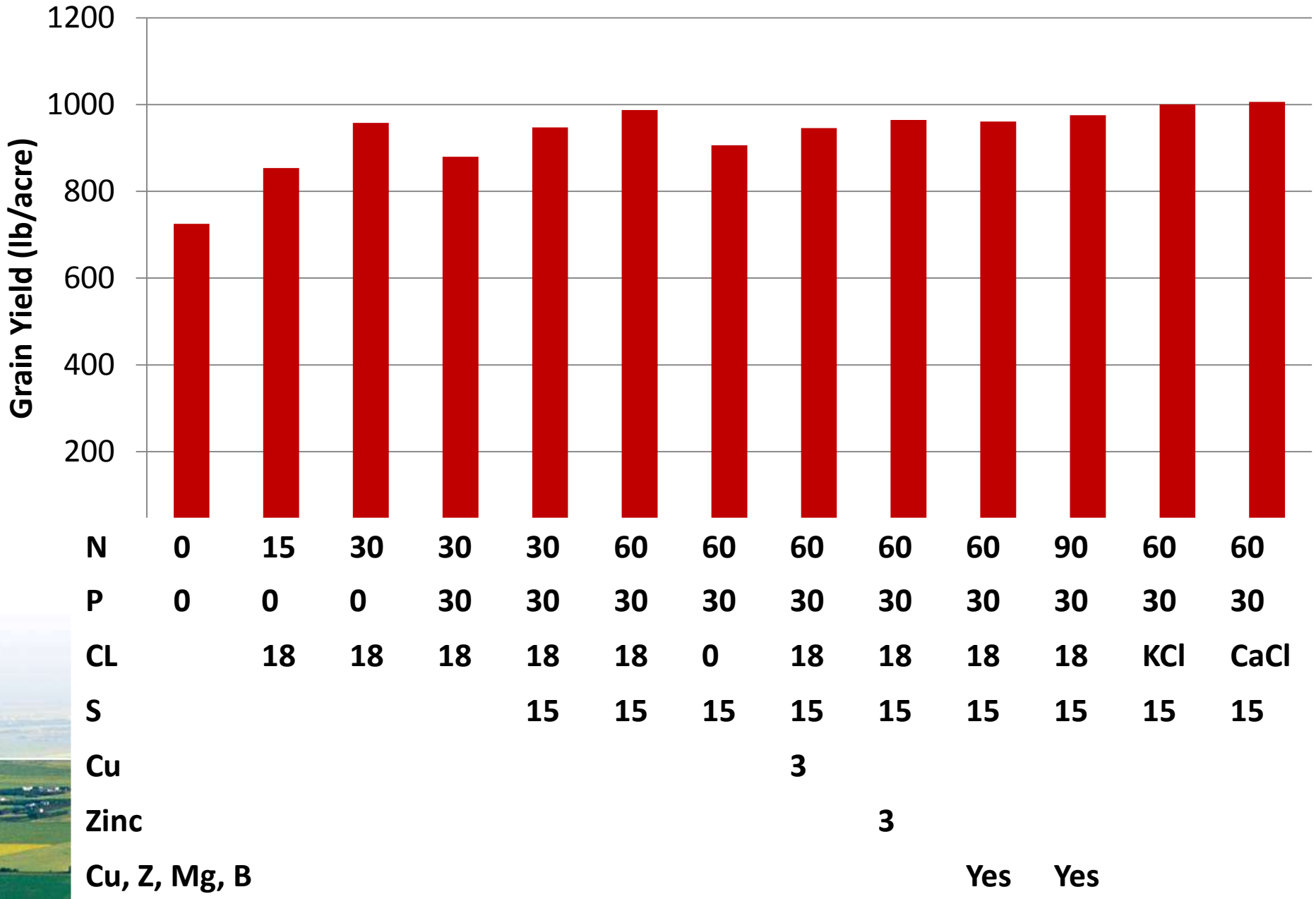


| | |
|------------|---------|
| Nitrogen | 0 kg/ha |
| Phosphorus | 0 kg/ha |
| Chloride | 0 kg/ha |
| Micro | 0 kg/ha |

| | |
|------------|----------|
| Nitrogen | 30 kg/ha |
| Phosphorus | 30 kg/ha |
| Chloride | 18 kg/ha |
| Micro | 0 kg/ha |

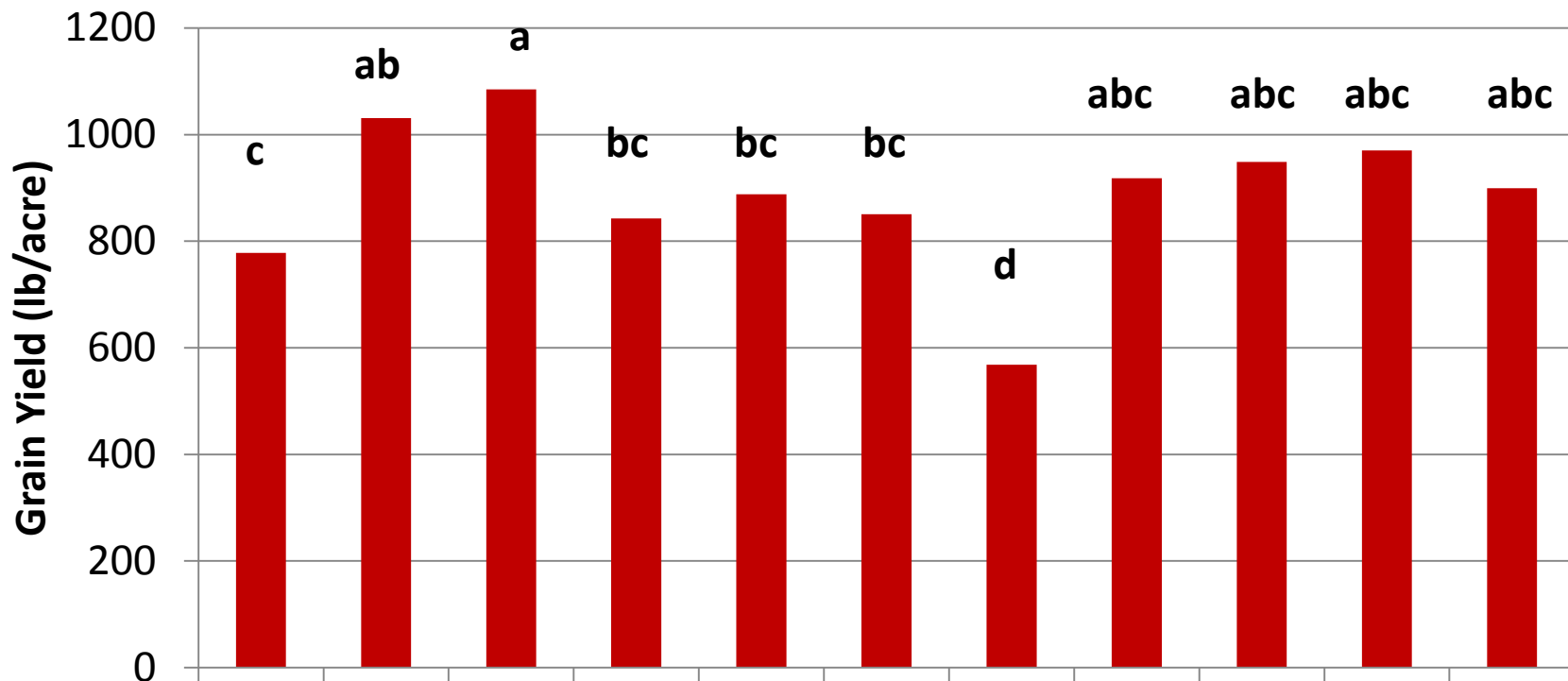
| | |
|------------|----------|
| Nitrogen | 90 kg/ha |
| Phosphorus | 30 kg/ha |
| Chloride | 18 kg/ha |
| Micro | Combo |

Indian Head - 2015



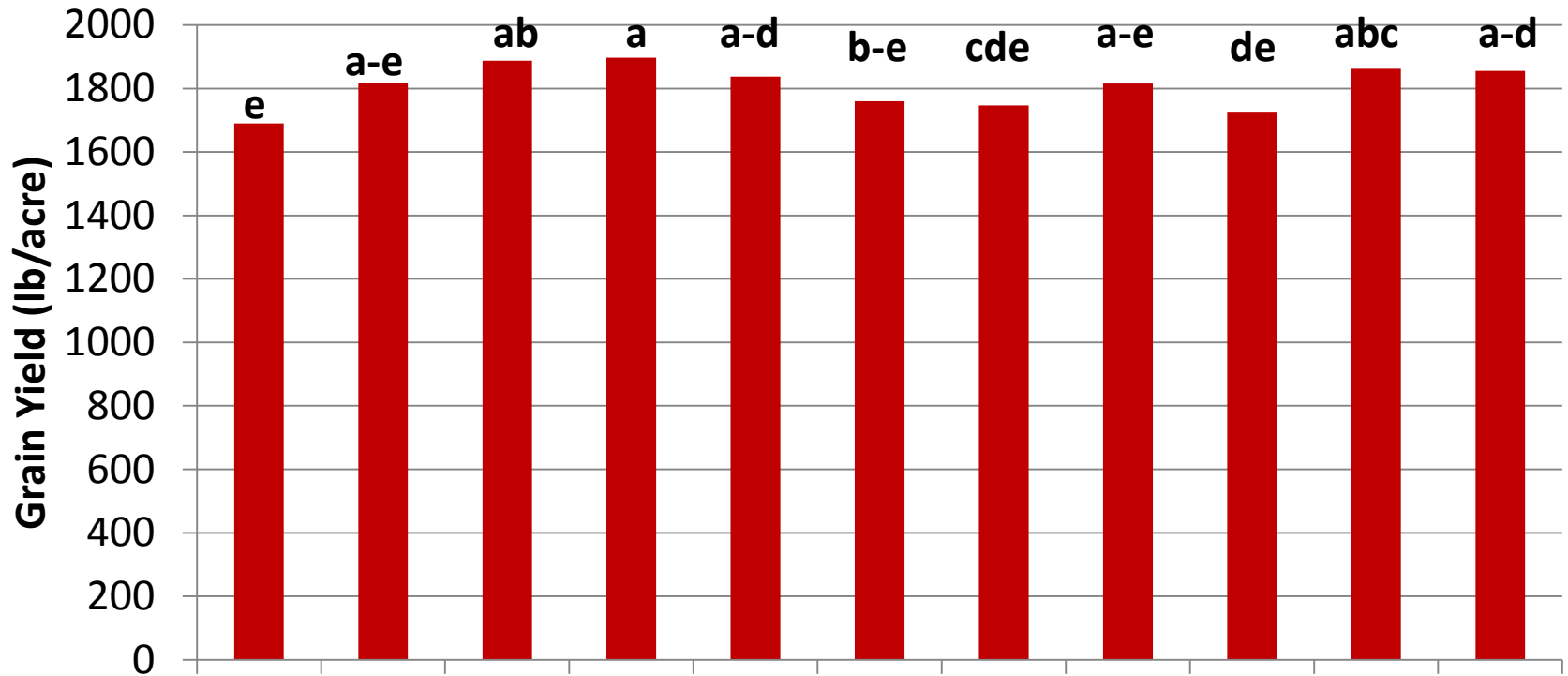
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|--------------|---|----|----|----|----|----|----|----|----|-----|-----|-----|------|
| N | 0 | 15 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 90 | 60 | 60 |
| P | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| CL | | 18 | 18 | 18 | 18 | 18 | 0 | 18 | 18 | 18 | 18 | KCl | CaCl |
| S | | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Cu | | | | | | | | 3 | | | | | |
| Zinc | | | | | | | | | 3 | | | | |
| Cu, Z, Mg, B | | | | | | | | | | Yes | Yes | | |

Swift Current - 2014



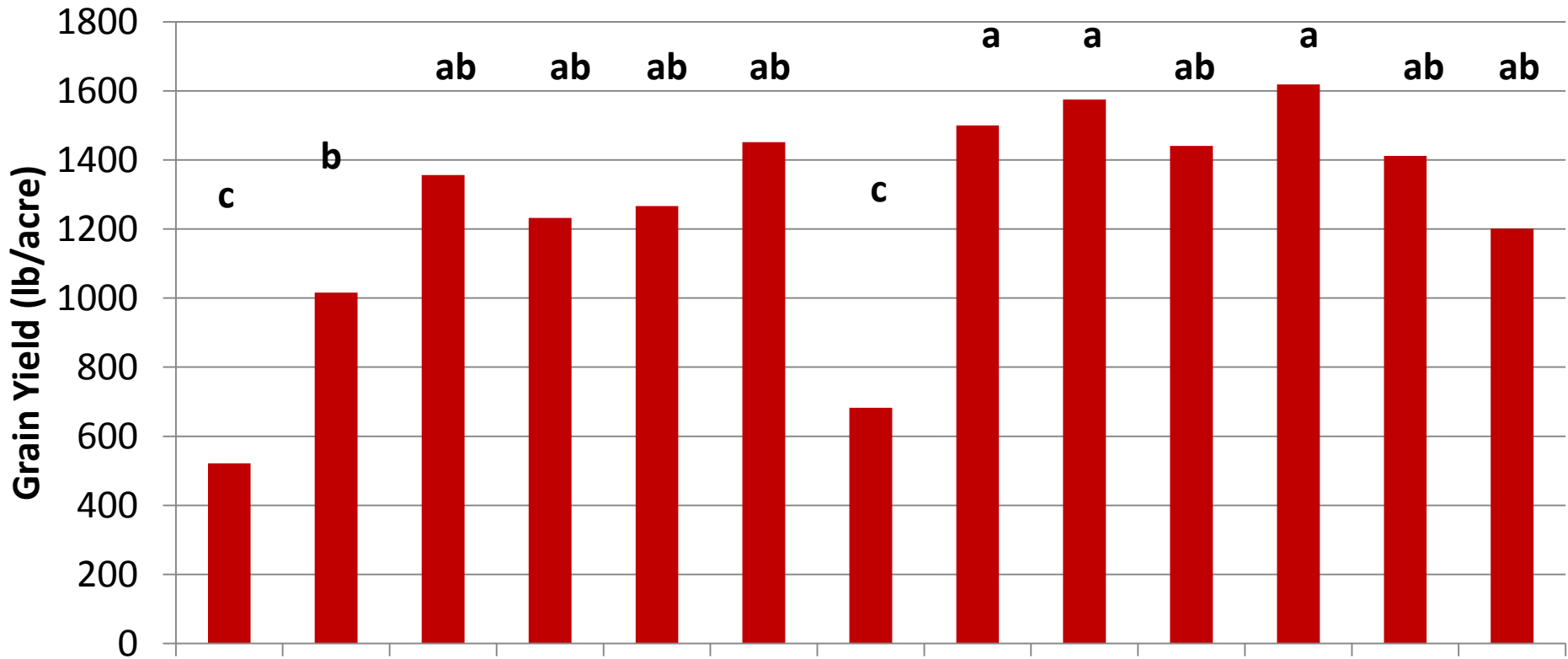
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|--------------|---|----|----|----|----|----|----|----|----|-----|-----|
| N | 0 | 15 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 90 |
| P | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| CL | | 18 | 18 | 18 | 18 | 18 | 0 | 18 | 18 | 18 | 18 |
| S | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Cu | | | | | | | | 3 | | | |
| Zinc | | | | | | | | | 3 | | |
| Cu, Z, Mg, B | | | | | | | | | | Yes | Yes |

Melfort - 2014



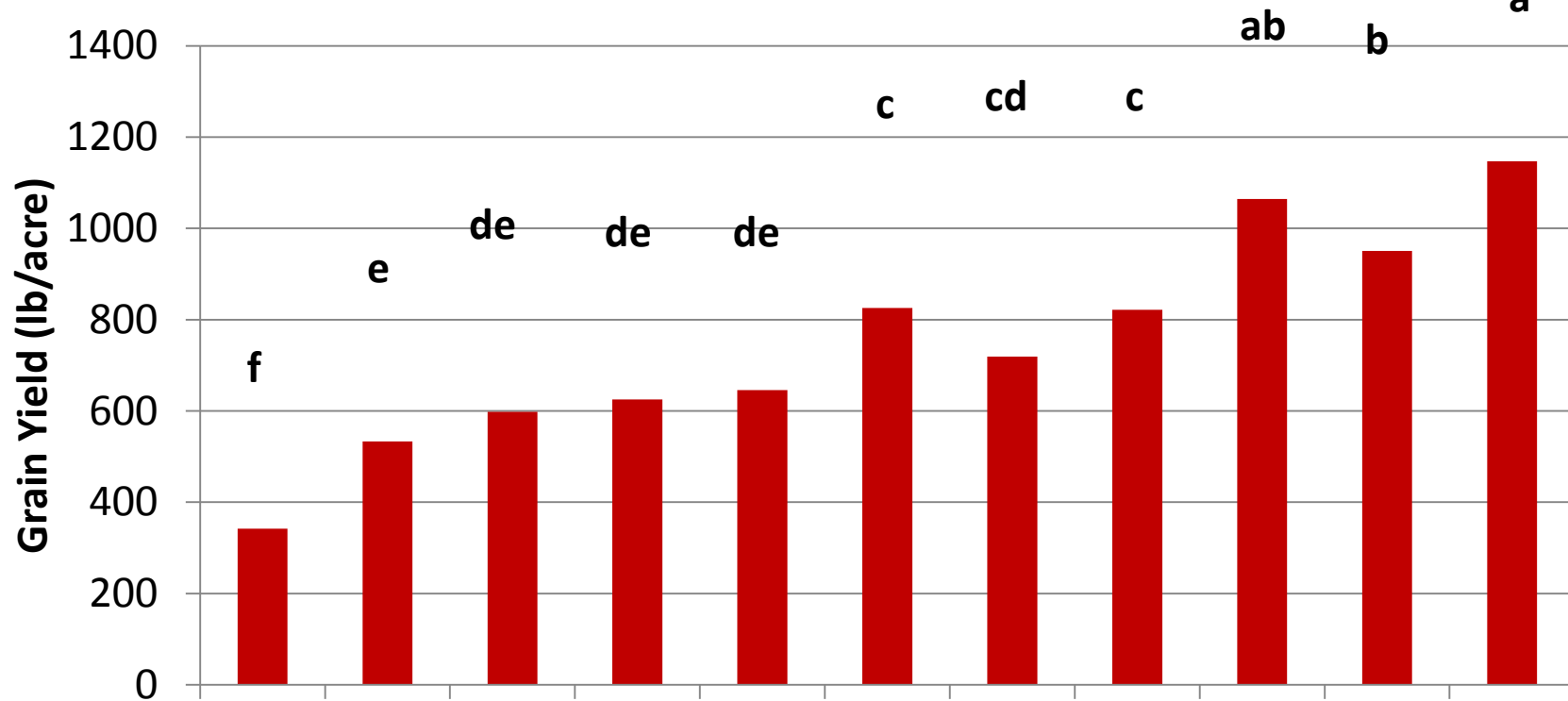
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|---------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|
| N | 0 | 15 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 90 |
| P | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| CL | | 18 | 18 | 18 | 18 | 18 | 0 | 18 | 18 | 18 | 18 |
| S | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Cu | | | | | | | | 3 | | | |
| Zinc | | | | | | | | | 3 | | |
| Cu, Z, Mg, B | | | | | | | | | | Yes | Yes |

Melfort - 2015



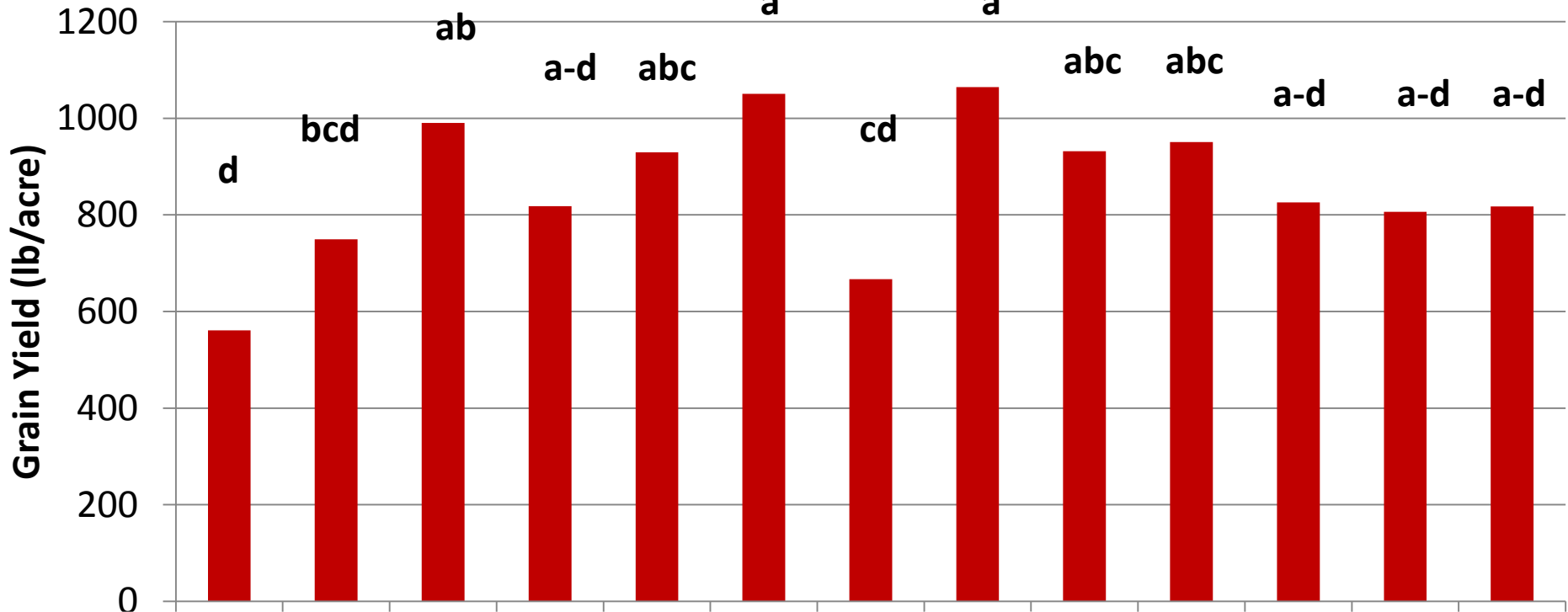
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|--------------|---|----|----|----|----|----|----|----|----|-----|-----|-----|------|
| N | 0 | 15 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 90 | 60 | 60 |
| P | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| CL | | 18 | 18 | 18 | 18 | 18 | 0 | 18 | 18 | 18 | 18 | KCl | CaCl |
| S | | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Cu | | | | | | | | 3 | | | | | |
| Zinc | | | | | | | | | 3 | | | | |
| Cu, Z, Mg, B | | | | | | | | | | Yes | Yes | | |

Scott - 2014



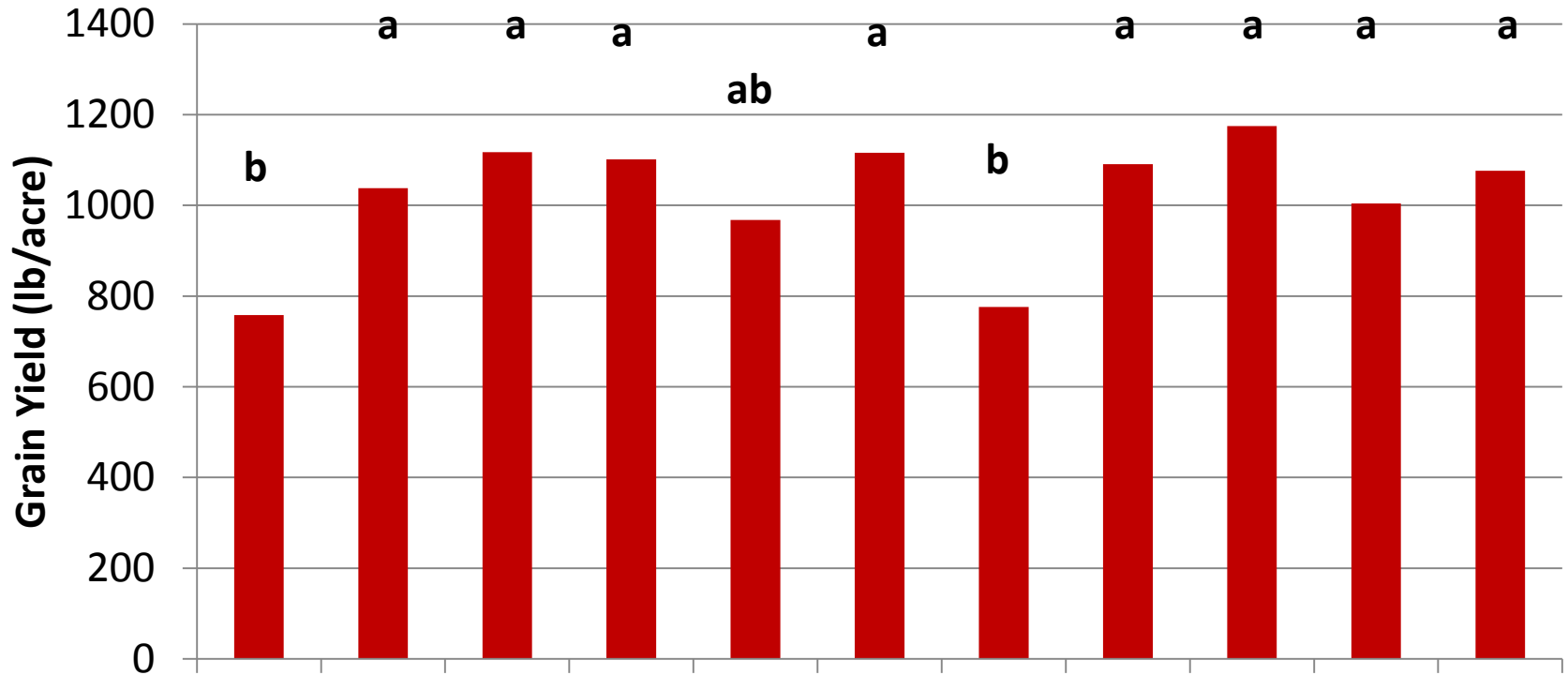
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|--------------|---|----|----|----|----|----|----|----|----|-----|-----|
| N | 0 | 15 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 90 |
| P | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| CL | | 18 | 18 | 18 | 18 | 18 | 0 | 18 | 18 | 18 | 18 |
| S | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Cu | | | | | | | | 3 | | | |
| Zinc | | | | | | | | | 3 | | |
| Cu, Z, Mg, B | | | | | | | | | | Yes | Yes |

Scott - 2015



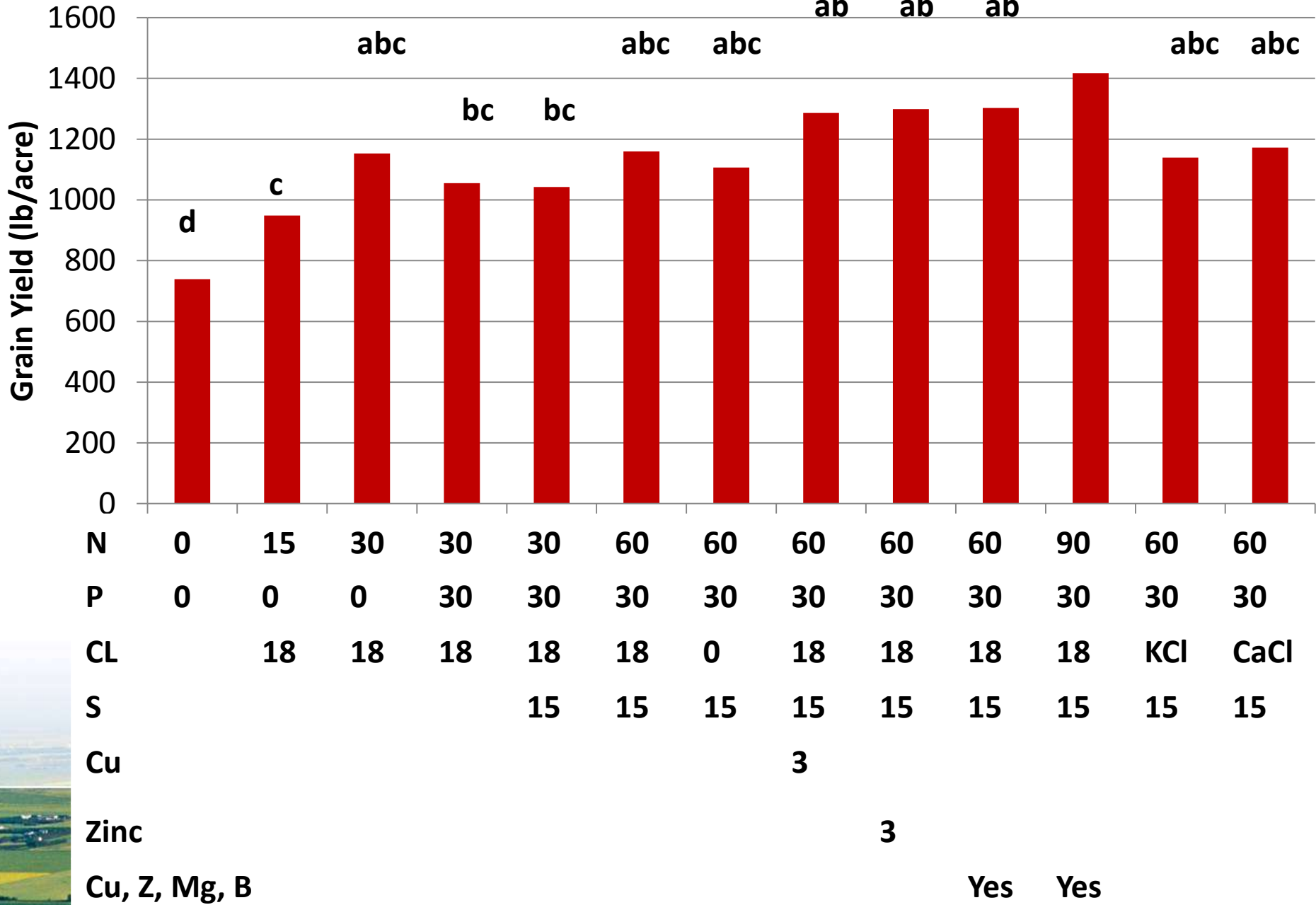
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|--------------|---|----|----|----|----|----|----|----|----|-----|-----|-----|------|
| N | 0 | 15 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 90 | 60 | 60 |
| P | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| CL | | 18 | 18 | 18 | 18 | 18 | 0 | 18 | 18 | 18 | 18 | KCl | CaCl |
| S | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Cu | | | | | | | | 3 | | | | | |
| Zinc | | | | | | | | | 3 | | | | |
| Cu, Z, Mg, B | | | | | | | | | | Yes | Yes | | |

Yorkton - 2014

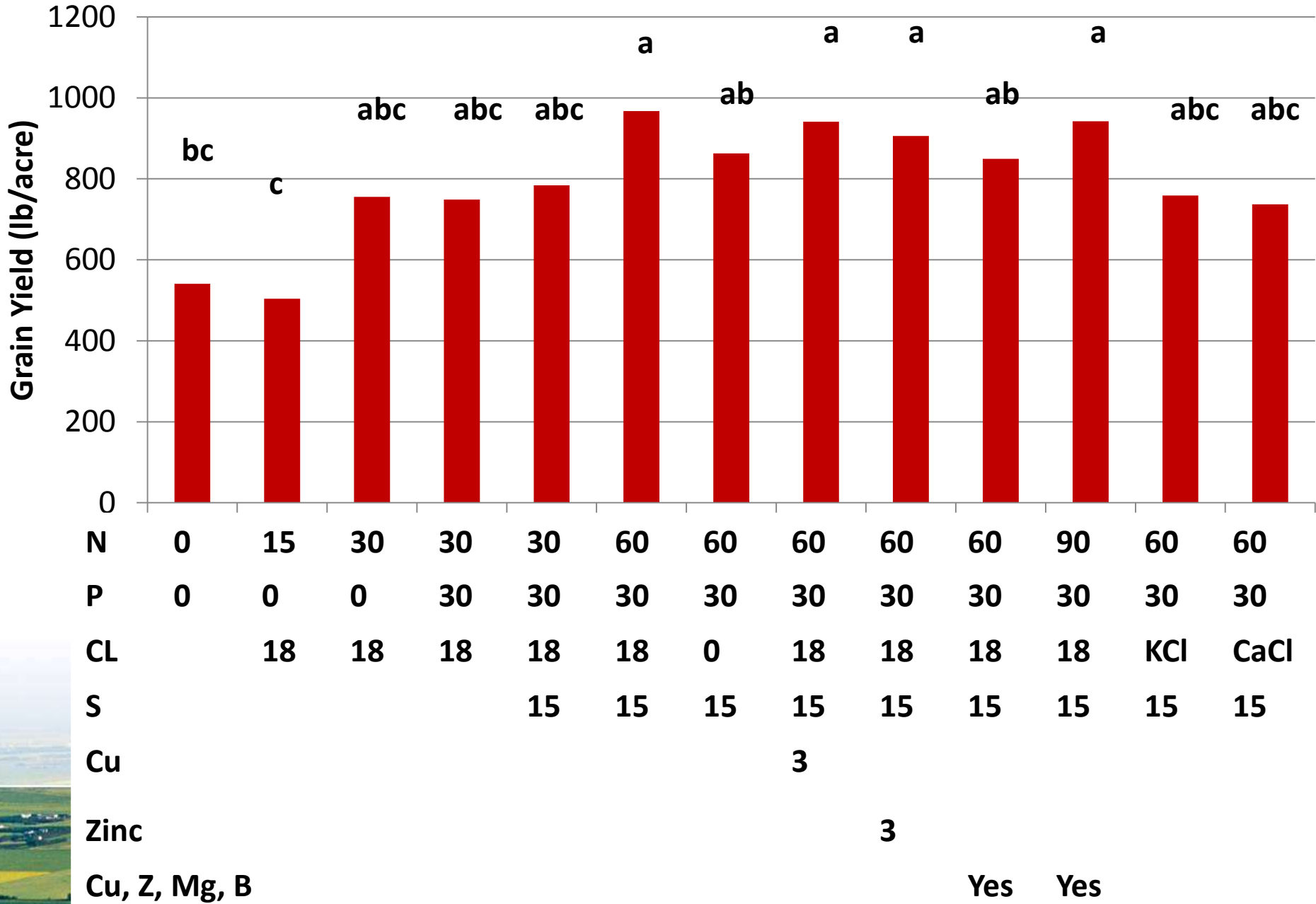


| | | | | | | | | | | | |
|--------------|---|----|----|----|----|----|----|----|----|-----|-----|
| N | 0 | 15 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 90 |
| P | 0 | 0 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| CL | | 18 | 18 | 18 | 18 | 18 | 0 | 18 | 18 | 18 | 18 |
| S | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Cu | | | | | | | 3 | | | | |
| Zinc | | | | | | | | 3 | | | |
| Cu, Z, Mg, B | | | | | | | | | | Yes | Yes |

Yorkton - 2015



Redvers - 2015



Overall Results

- N Fertilizer: response at all 10 site-years
Optimum amount (eyeing the trend)
 - 30 kg/ha - 5 out of 10
 - 60 kg/ha – 2 out of 10
 - 90 kg/ha – 3 out of 10



Overall Results

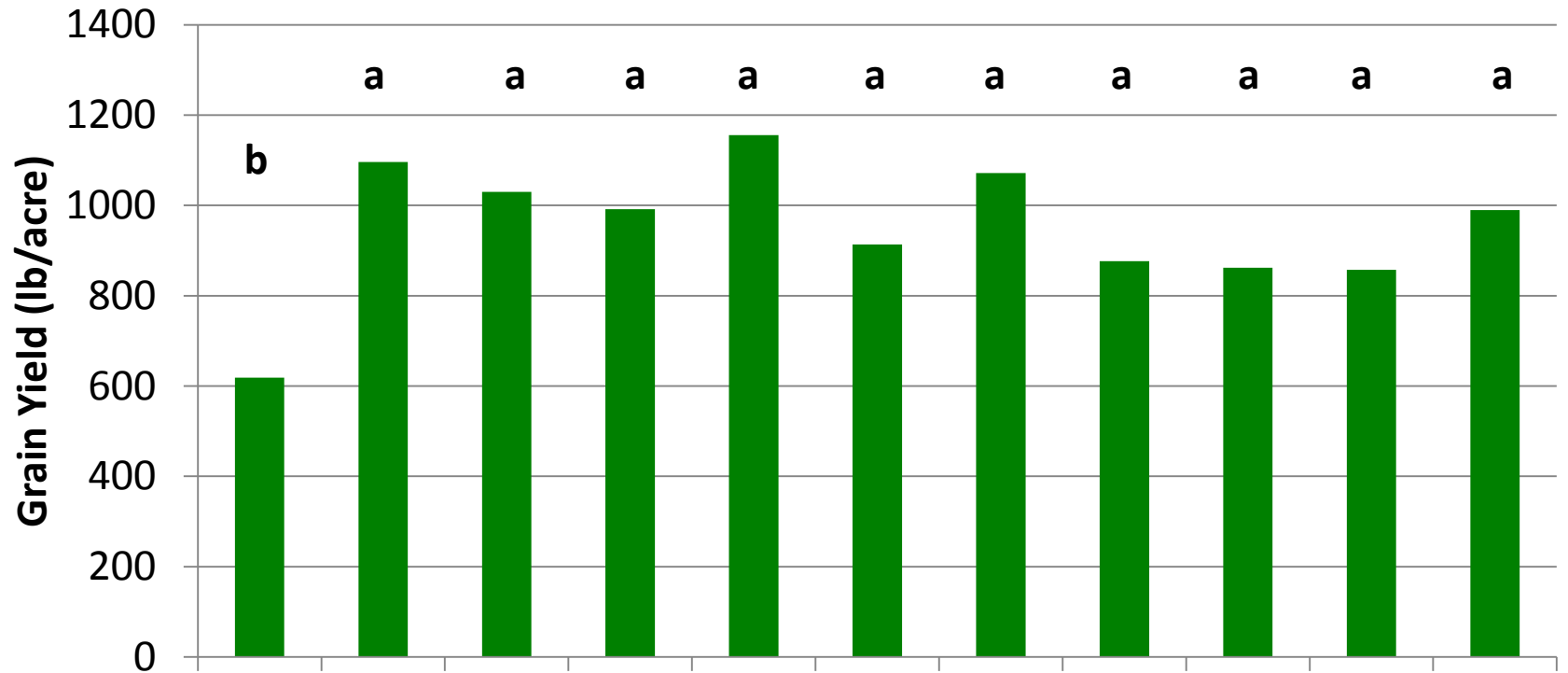
- Chloride: response at 5 out of 10
- Phosphate: response at 1 out of 10
- Zinc: response at 1 out of 10 locations



Foliar Micronutrients

| Treatment | Copper | Zinc | Mg | Boron |
|-----------|--|------|------|-------|
| | Kg/ha of nutrient | | | |
| 1 | No fertilizer | | | |
| 2 | 60, 30, 24, 18.1, 15 of N, P, K, Cl, and S | | | |
| 3 | 3 | 3 | 3 | 3 |
| | Foliar at 3-6 leaf | | | |
| 4 | 0.25 | | | |
| 5 | | 0.35 | | |
| 6 | | | 0.55 | |
| 7 | | | | 0.5 |
| | Foliar at Flag leaf | | | |
| 8 | 0.25 | | | |
| 9 | | 0.35 | | |
| 10 | | | 0.55 | |
| 11 | | | | 0.5 |

Foliar Indian Head 2015



N, P, Cl, S

0 60 60 60 60 60 60 60 60 60 60

3 leaf

Flag leaf

Cu

0.25

0.25

Zinc

0.35

0.35

Mg

0.55

0.55

Boron

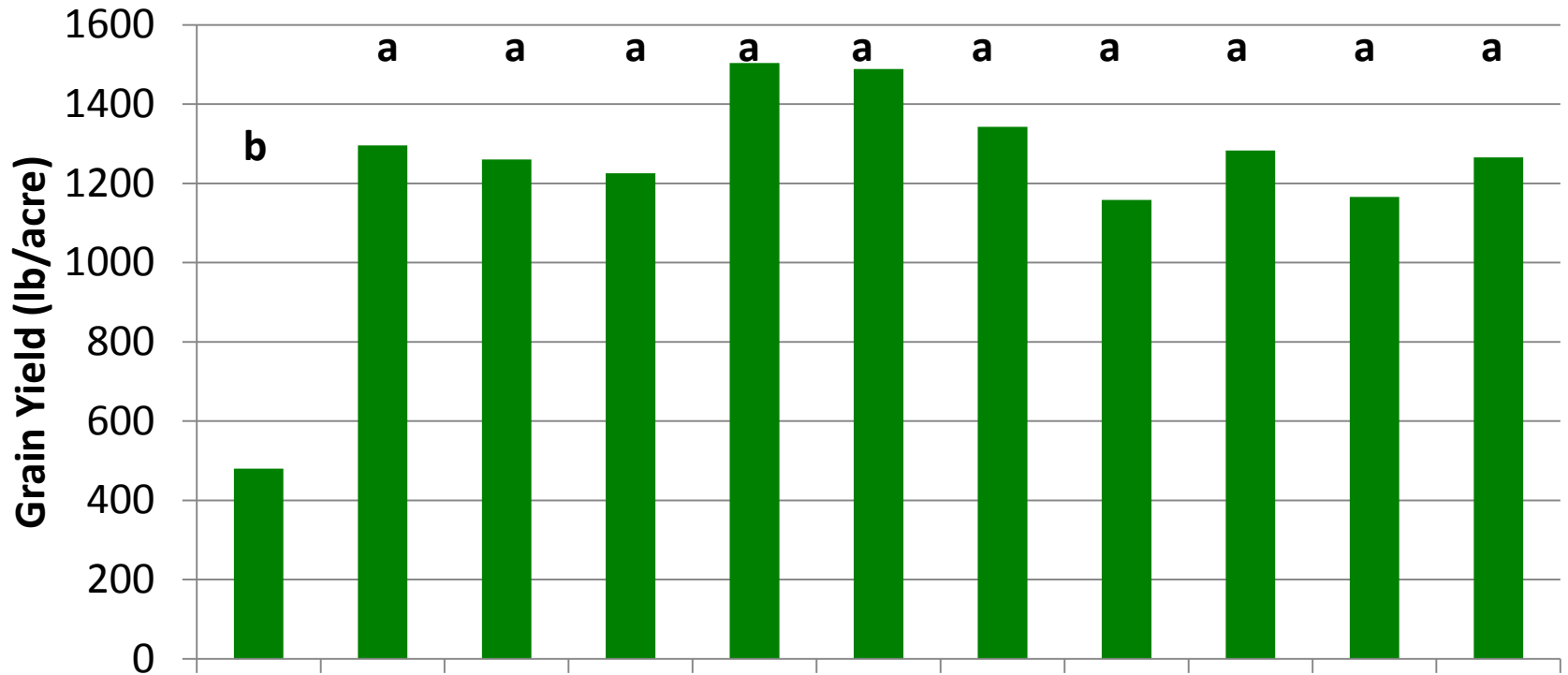
0.5

0.5

Cu, Z, Mg, B

Yes

Foliar Melfort 2015



N, P, Cl, S

0 60 60 60 60 60 60 60 60 60 60

3 leaf

Flag leaf

Cu

0.25

0.25

Zinc

0.35

0.35

Mg

0.55

0.55

Boron

0.5

0.5

Cu, Z, Mg, B

Yes

Septoria Leaf Mottle

To spray or not to spray that is the question



W.E. May

Agriculture and Agri-food Canada



Septoria Leaf Mottle

Plot Size (ft)

- 13 x 35
- 26 x 35
- 39 x 35
- 13 x 70
- 26 x 70
- 39 x 70

Test is conducted in Two fields one with no canaryseed and the other with the rest of the field seeded to canaryseed



Fungicide Treatments

- **Check**
- **Tilt**
- **Twinline**
- **Prosaro**
- **Prosaro late**



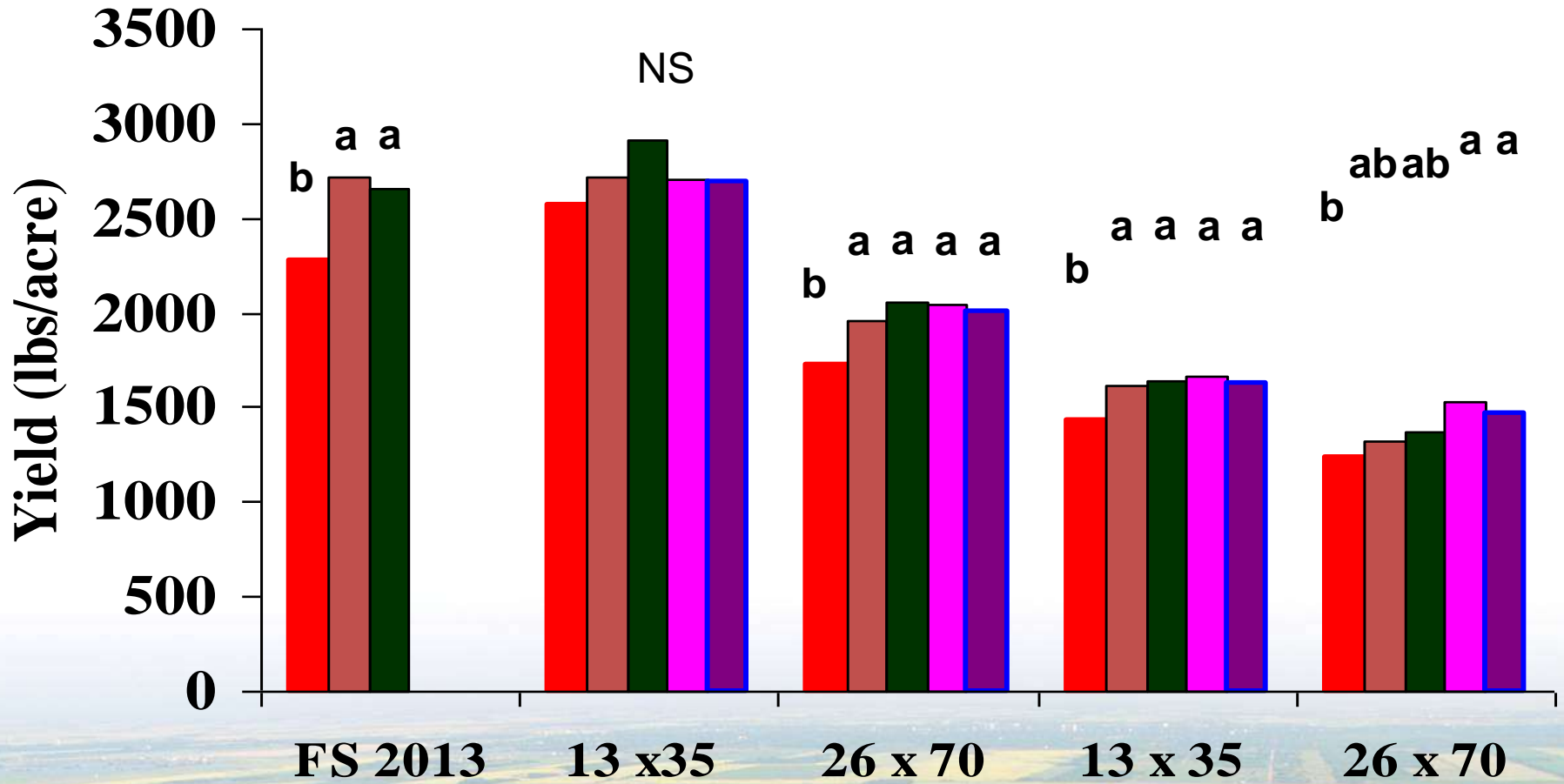
Plot Size and Septoria Leaf Mottle

| Plot Size | 2013 | | 2014 | | 2015 | |
|----------------|--------------------------------------|------------|---------------------|------------|---------------------|------------|
| | In Canaryseed Field | | In Canaryseed Field | | In Canaryseed Field | |
| | No | Yes | No | Yes | No | Yes |
| | Least Significant Difference (kg/ha) | | | | | |
| 13 x 35 | 323 | 136 | 166 | 99 | 311 | 402 |
| 26 x 35 | 246 | 104 | 491 | 268 | 251 | 375 |
| 39 x 35 | 341 | 84 | 225 | 261 | 193 | 776 |
| 13 x 70 | 219 | 109 | 101 | 132 | 191 | 280 |
| 26 x 70 | 178 | 114 | 179 | 170 | 185 | 211 |
| 39 x 70 | 239 | 141 | 123 | 164 | 242 | 183 |



Septoria Leaf Mottle and Yield

■ Check
 ■ Tilt
 ■ Twinline
 ■ Prosaro
 ■ Prosaro late



Conclusions

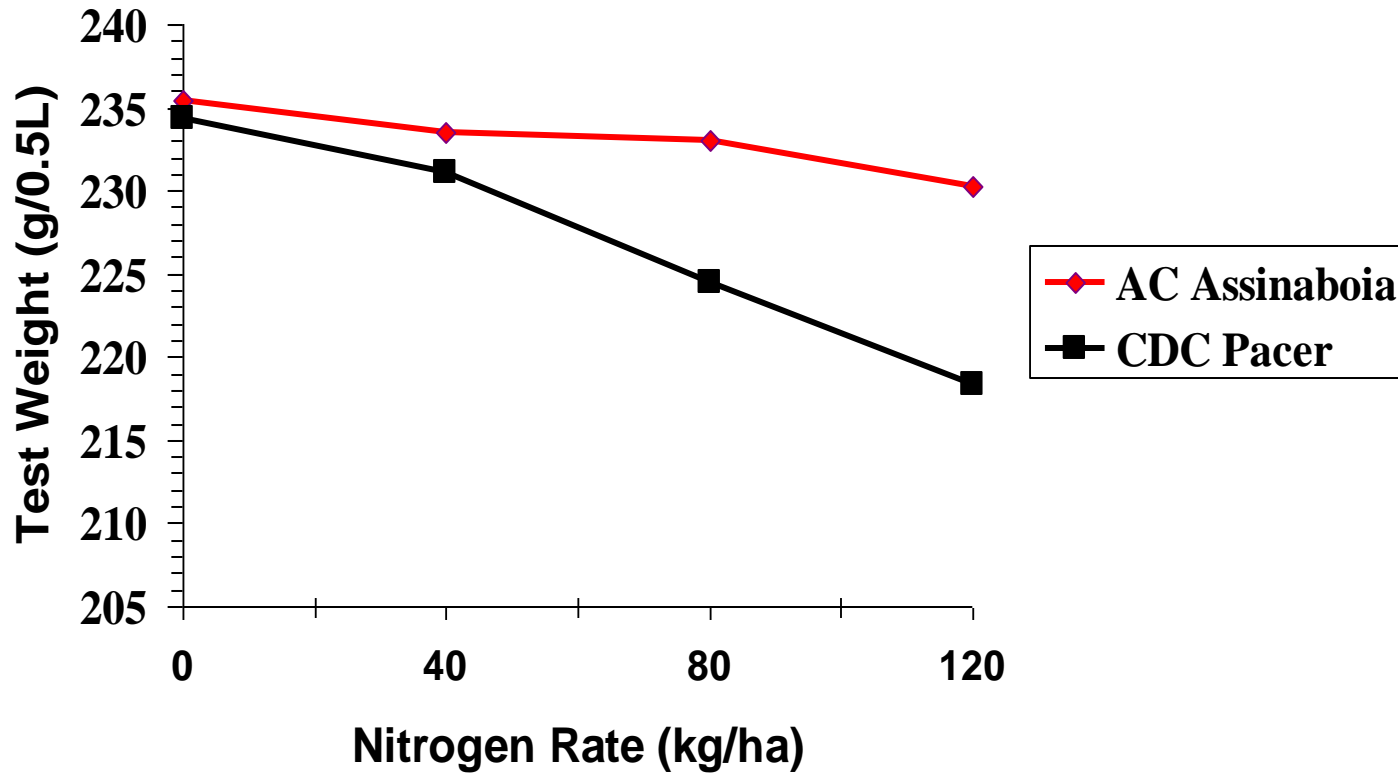
After two years the 70 ft plot length is producing more consistent results than the 35 ft plots

Funding

ADF – Saskatchewan Ministry of Agriculture

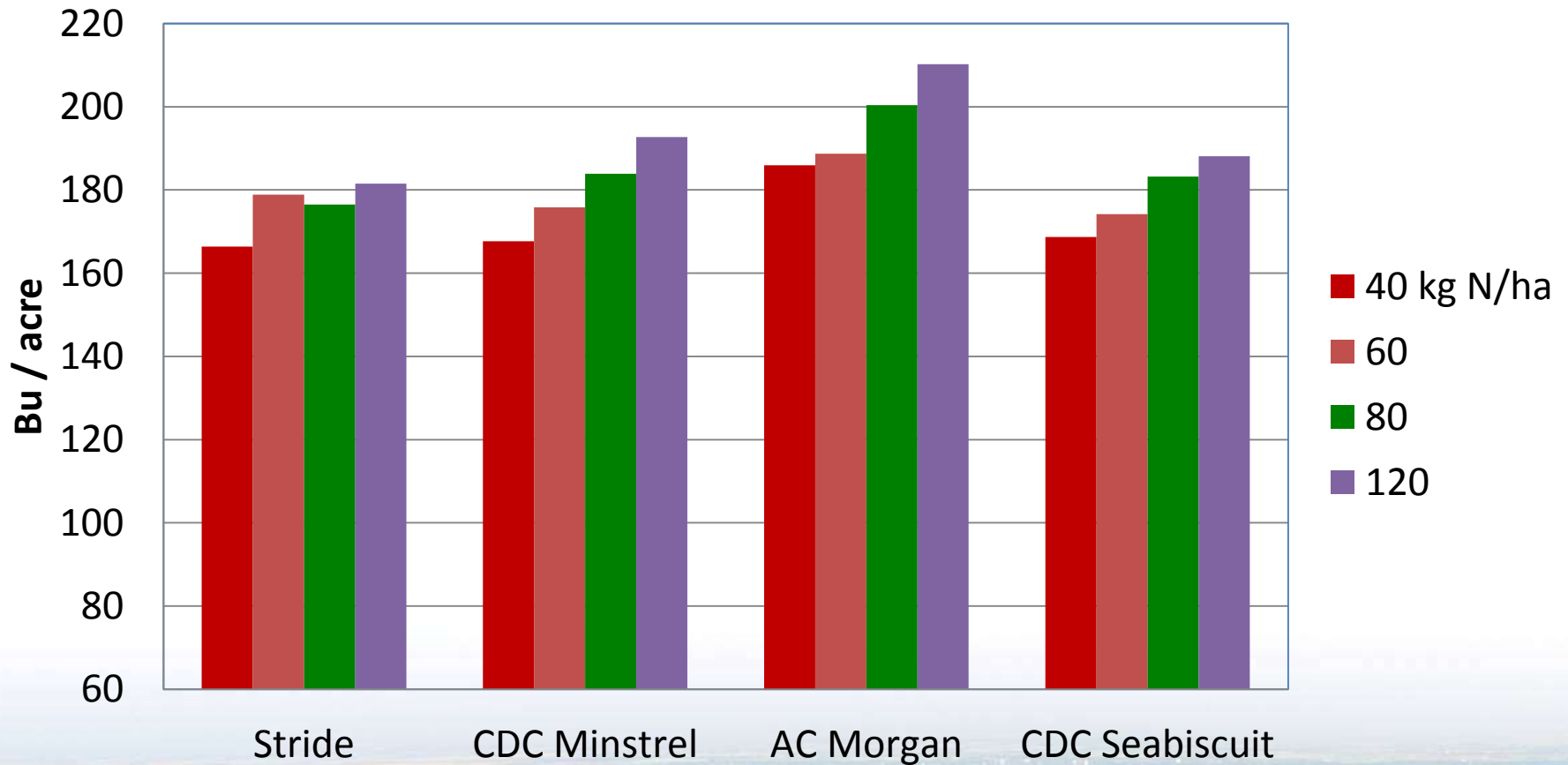


Nitrogen Rate and Cultivars



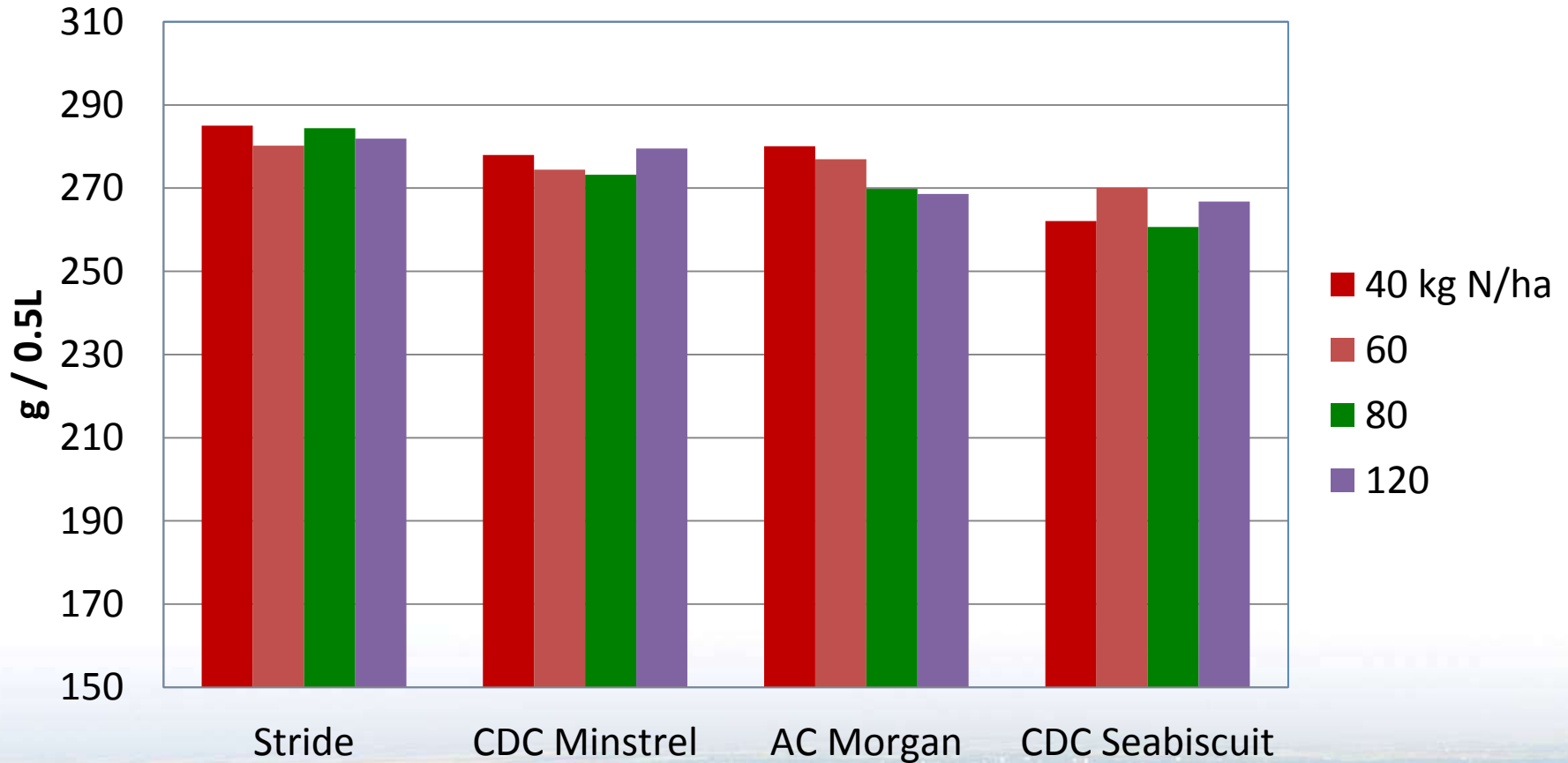
Yield - N x Cultivar

Melfort -2014



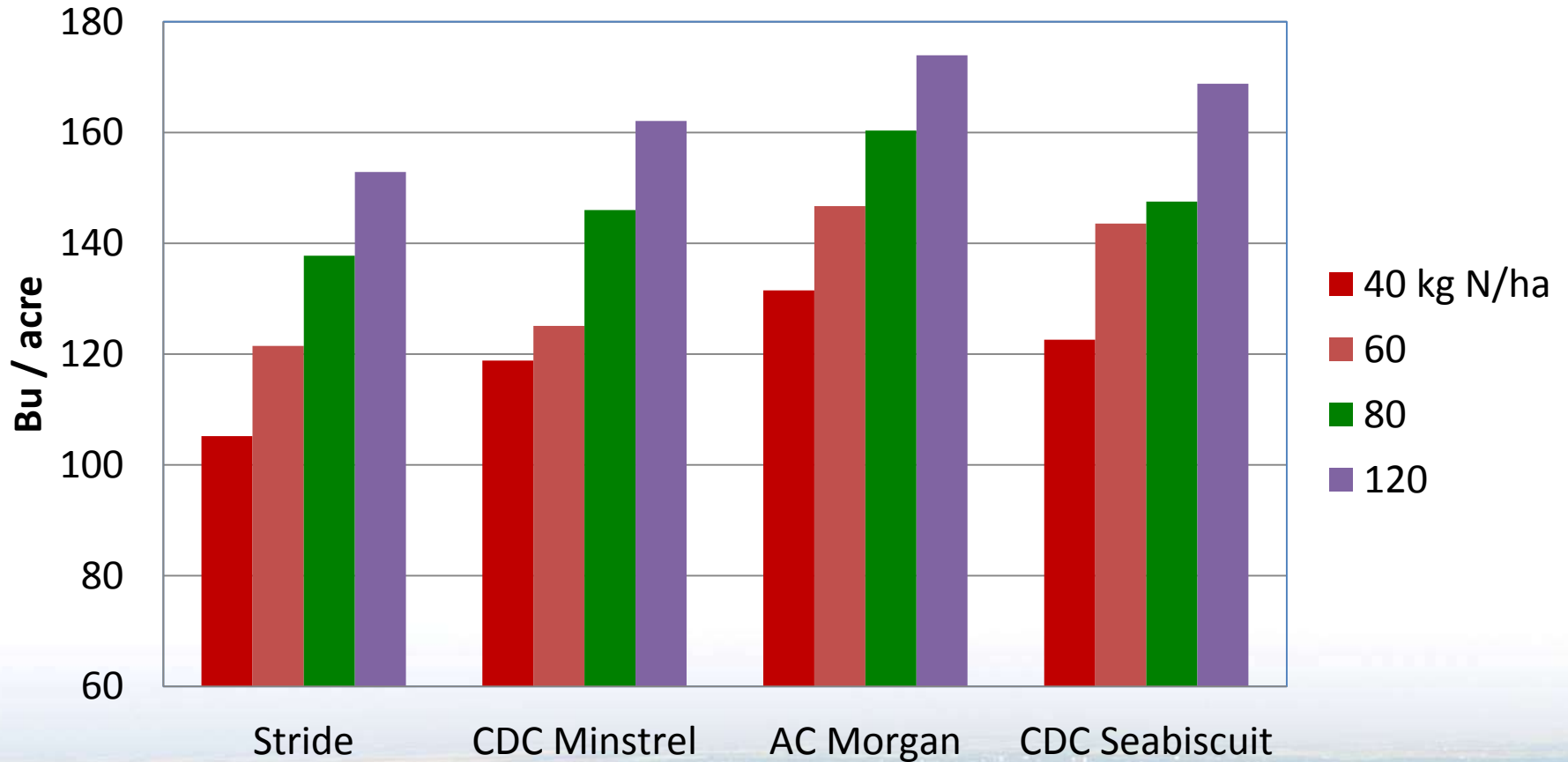
Test weight - N x Cultivar

Melfort - 2014



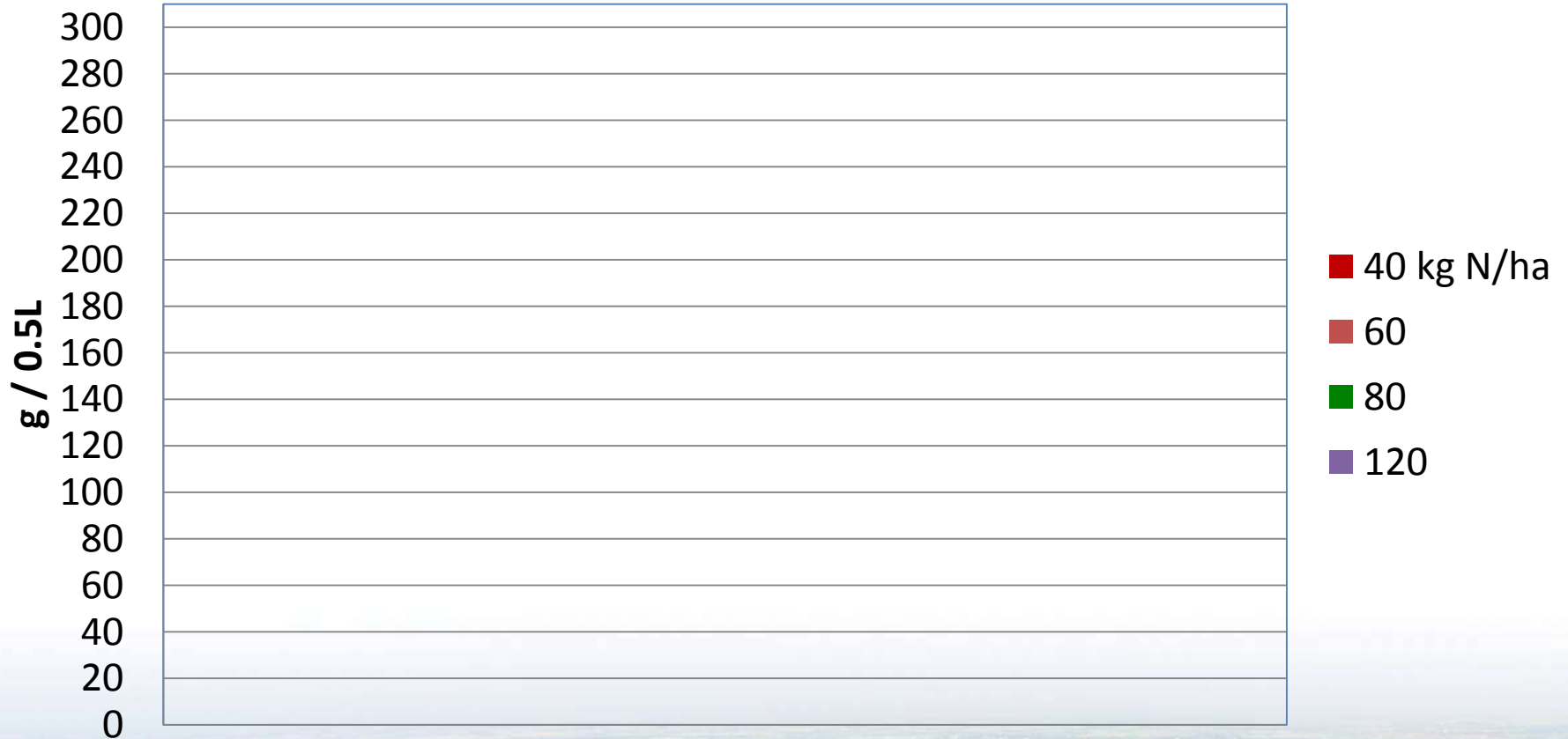
Yield - N x Cultivar

Melfort -2015



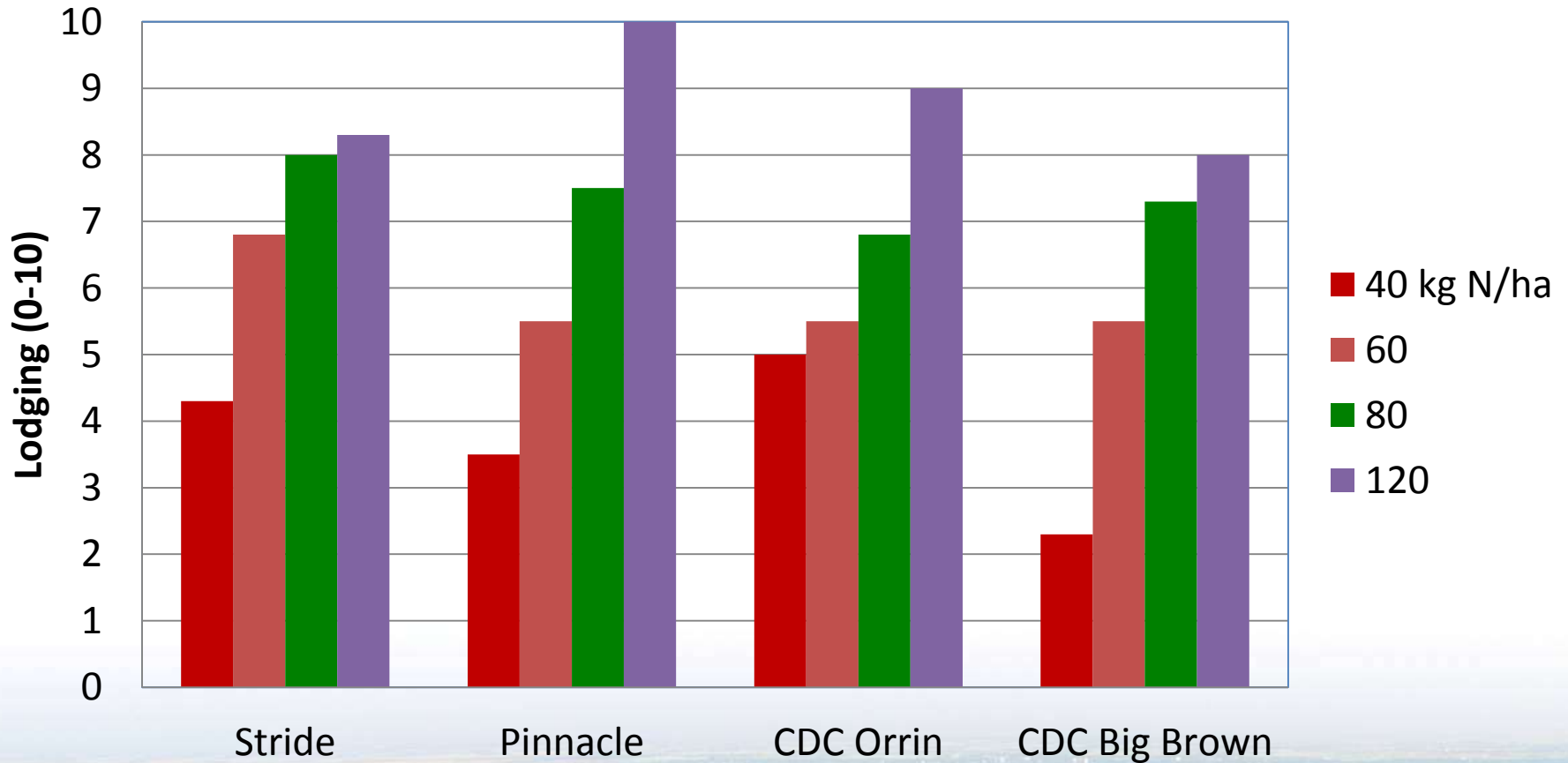
Test weight - N x Cultivar

Melfort - 2015



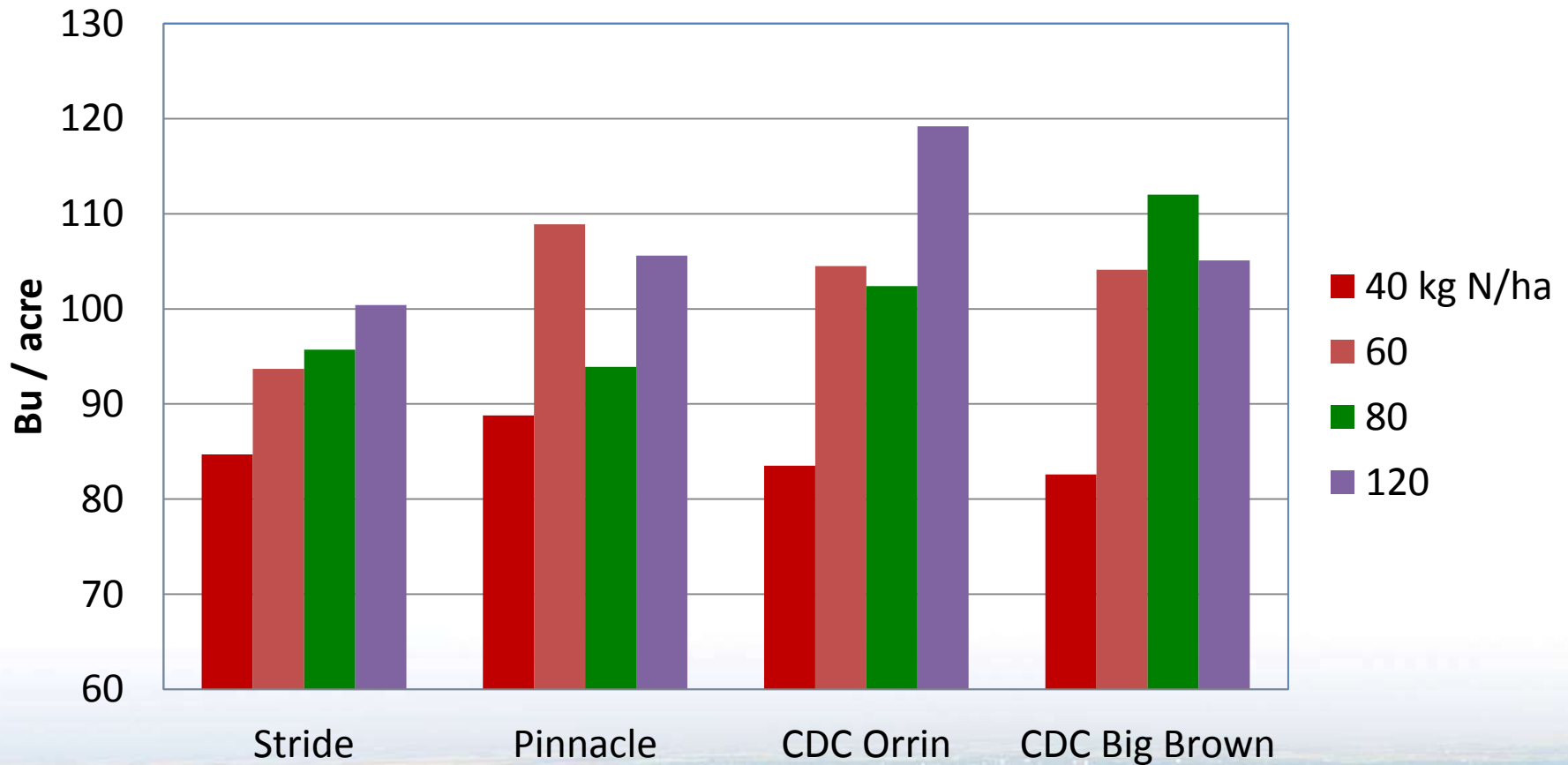
Lodging - N x Cultivar

Indian Head - 2014



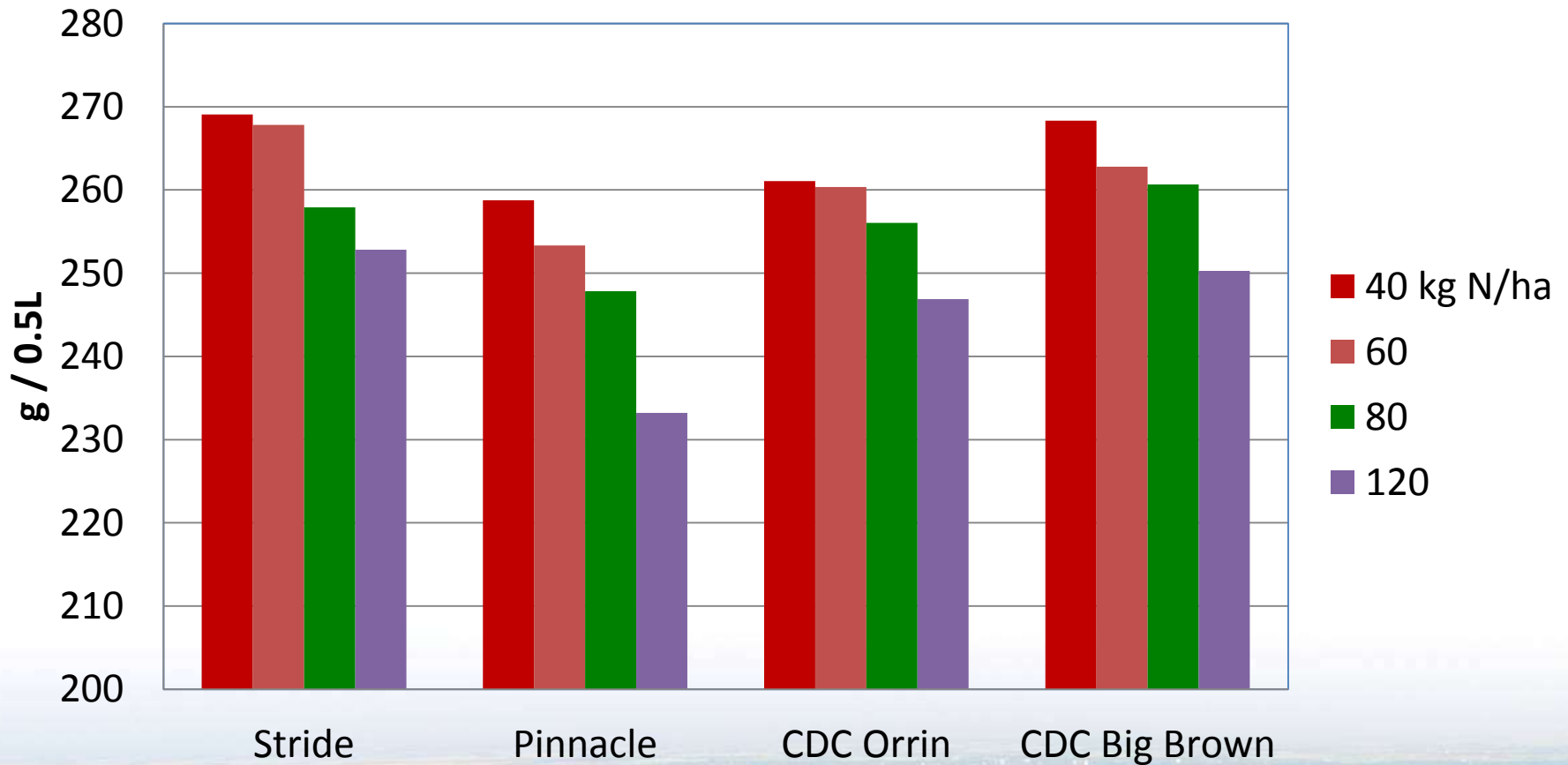
Yield - N x Cultivar

Indian Head - 2014



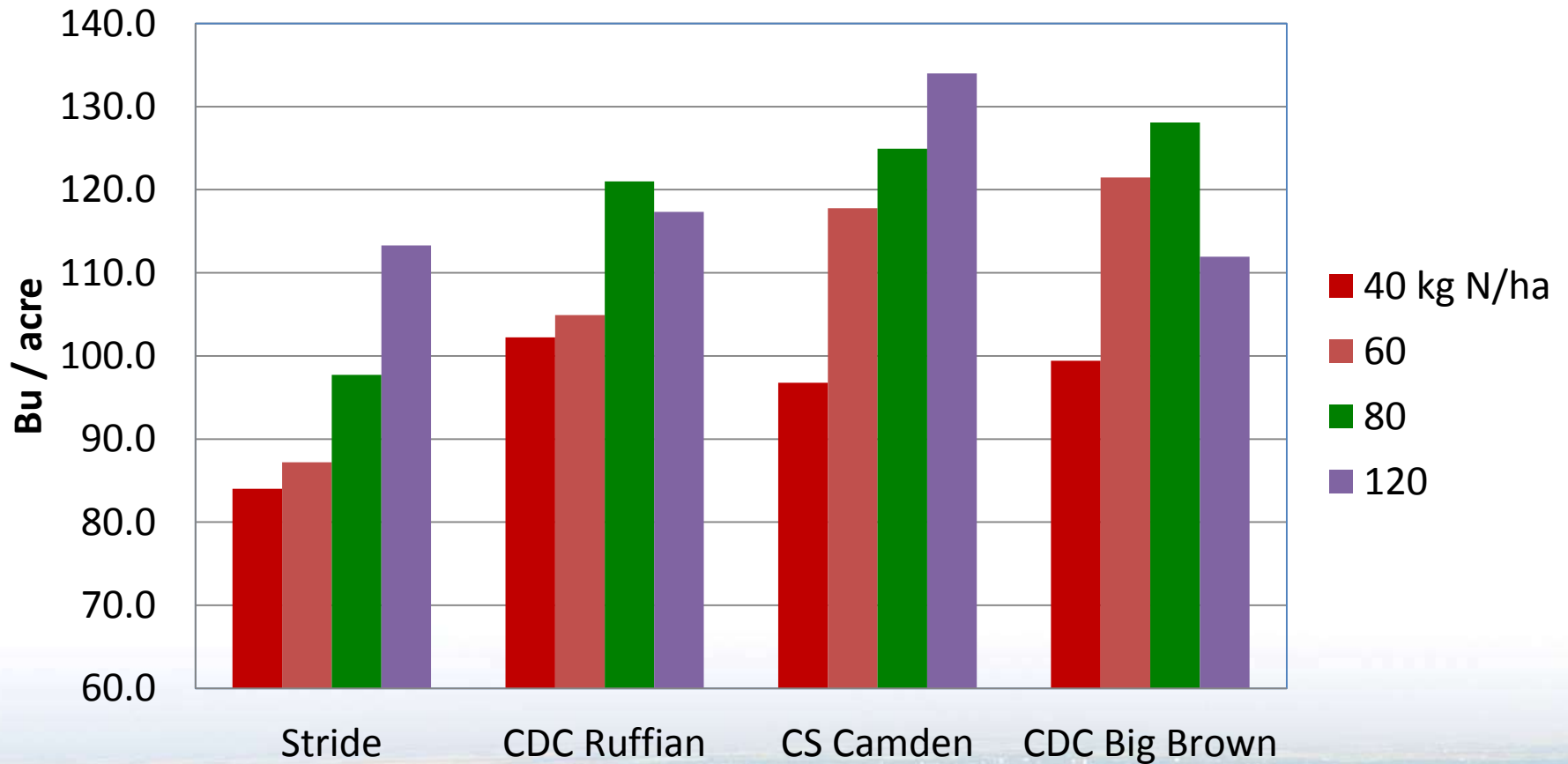
Test weight - N x Cultivar

Indian Head 2014



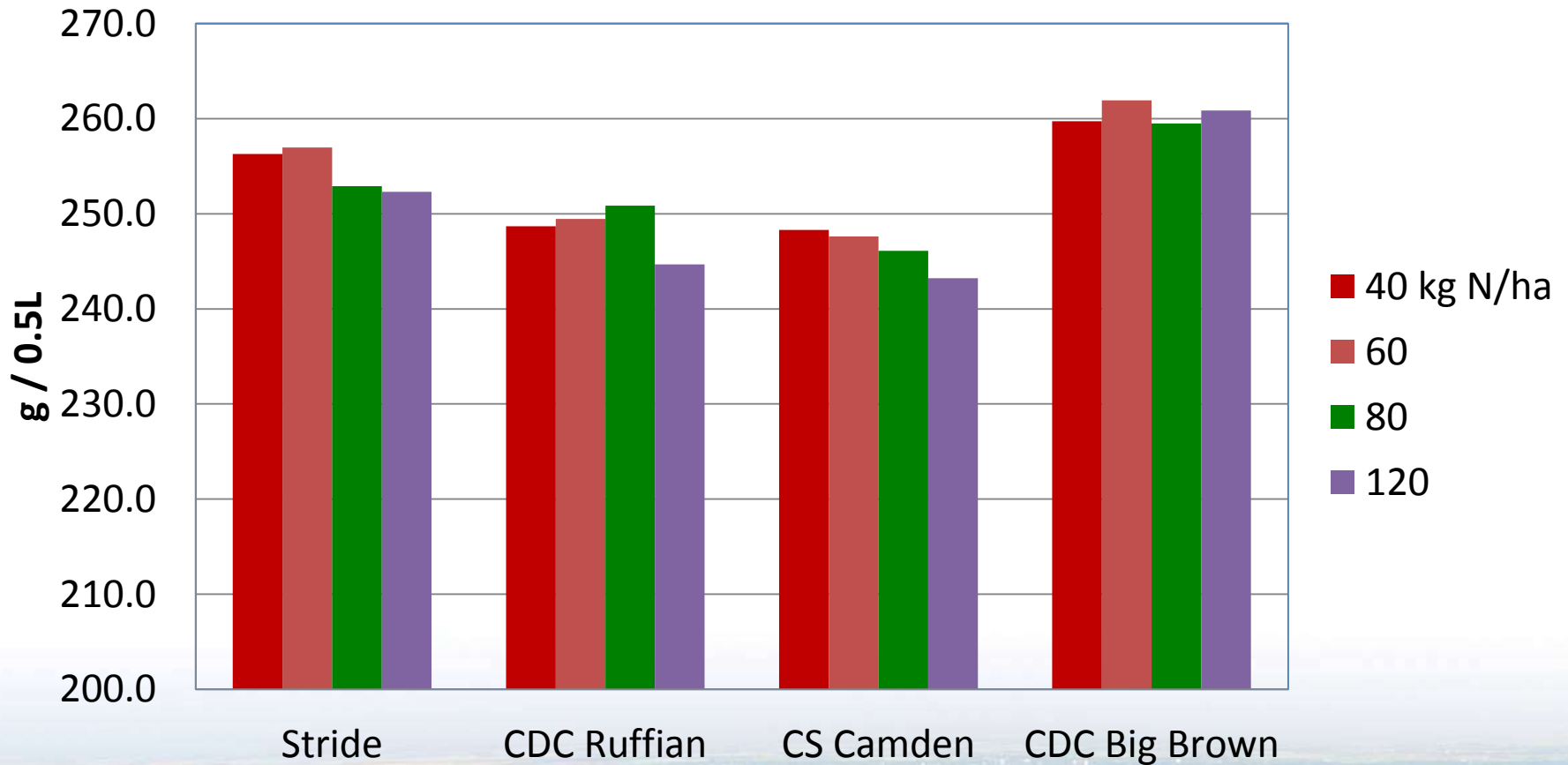
Yield - N x Cultivar

Indian Head - 2015



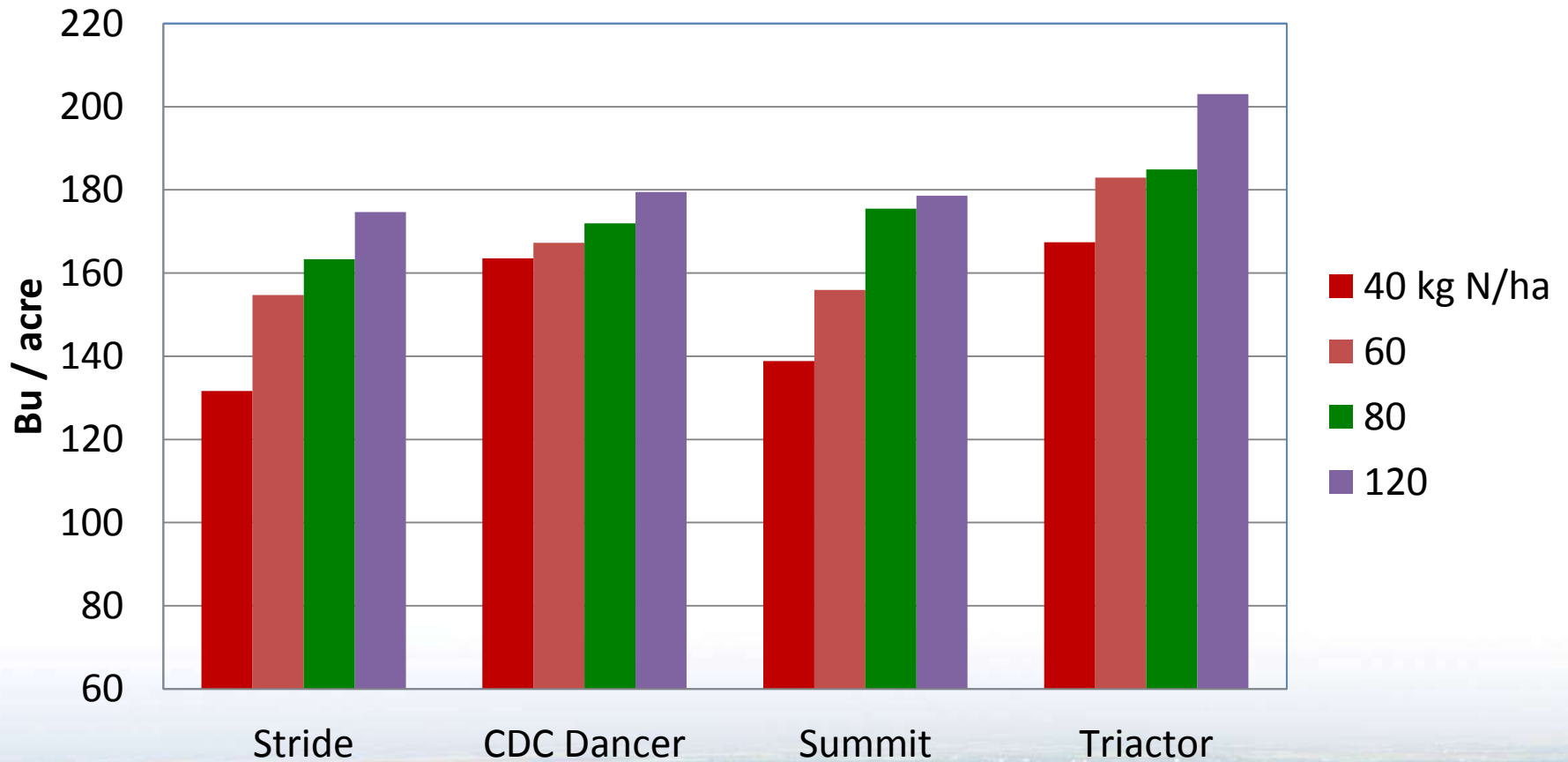
Test weight - N x Cultivar

Indian Head 2015



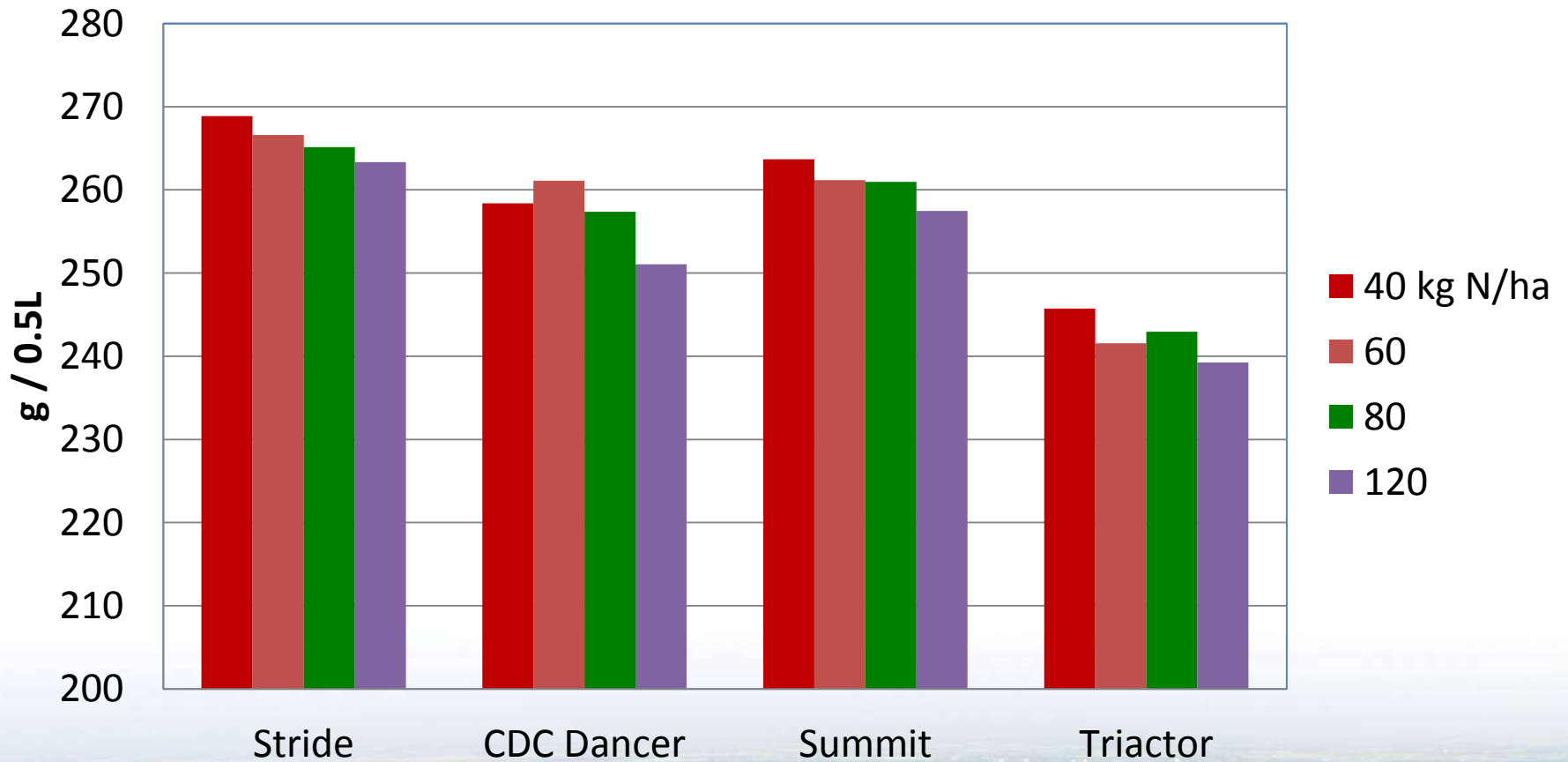
Yield - N x Cultivar

Yorkton- 2014



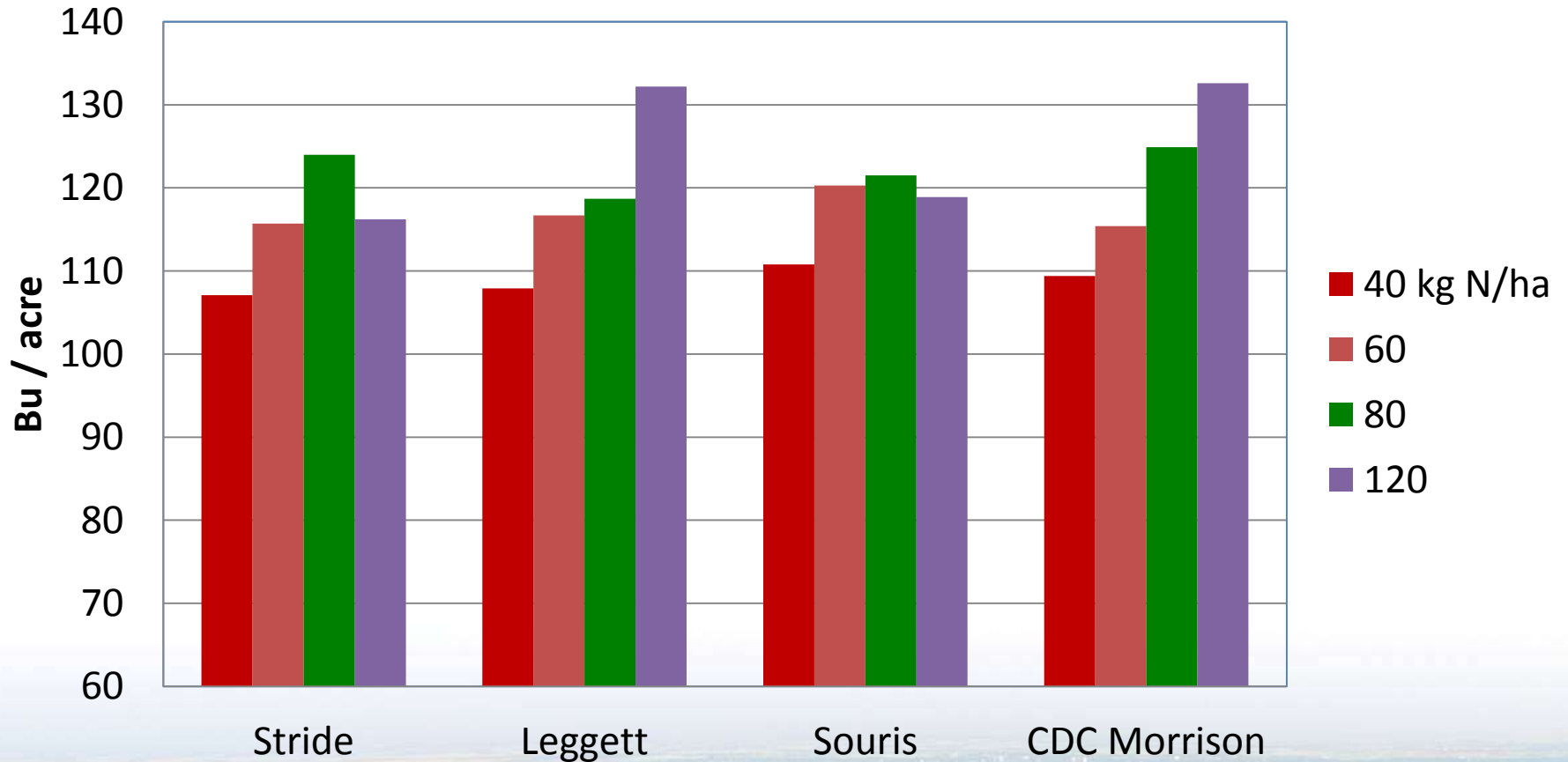
Test weight - N x Cultivar

Yorkton 2015



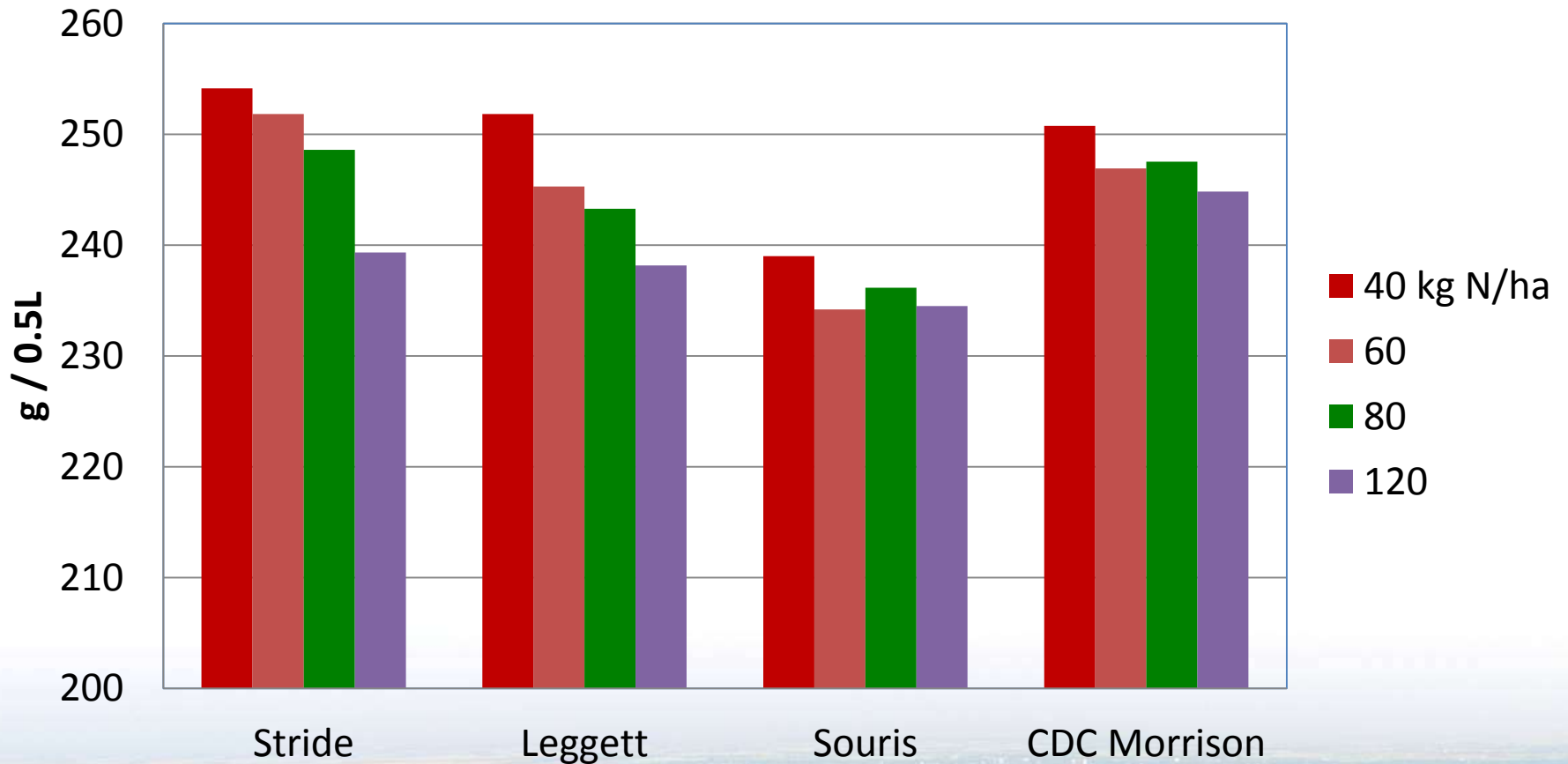
Yield - N x Cultivar

Redvers - 2015

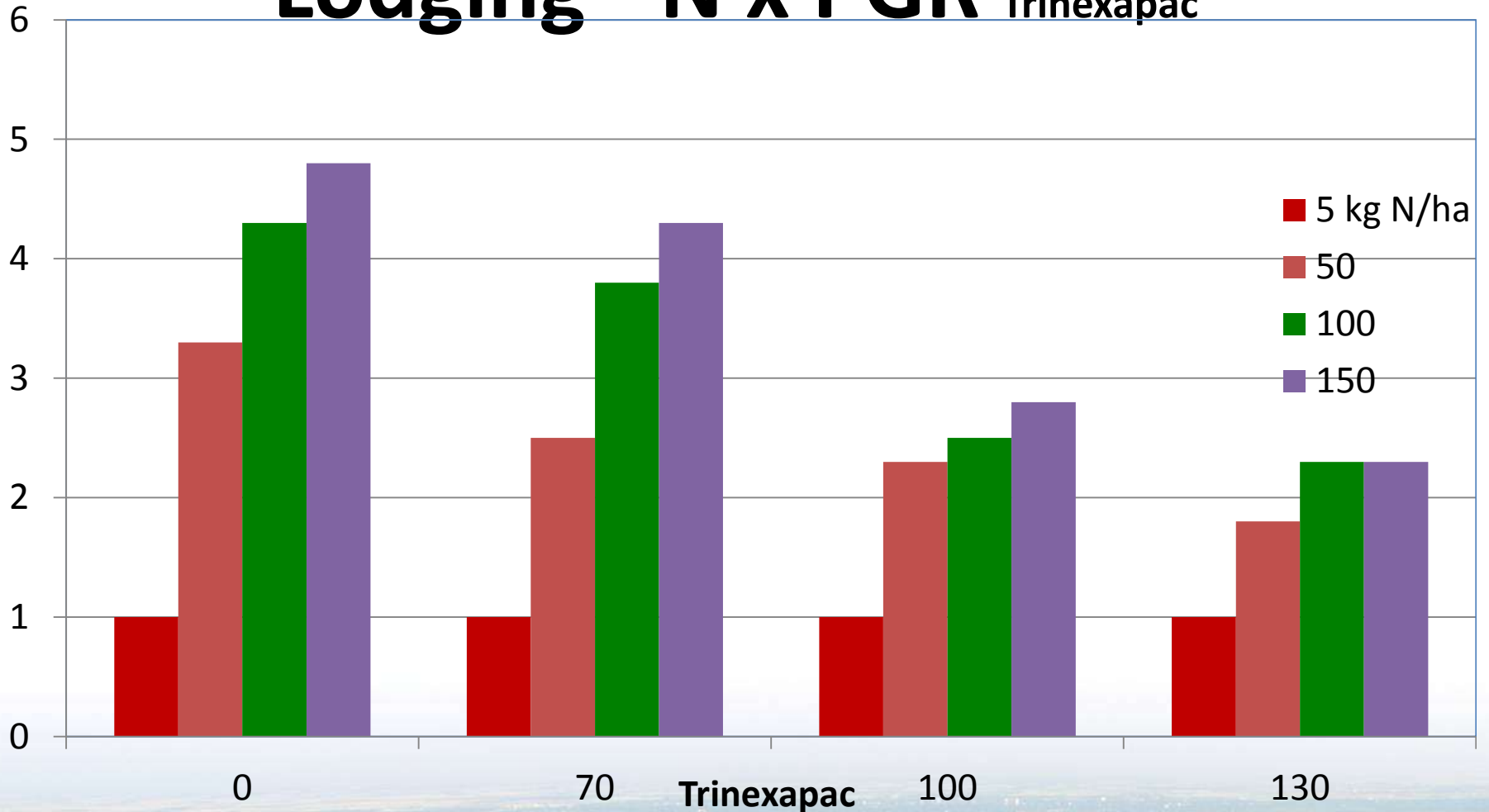


Test weight - N x Cultivar

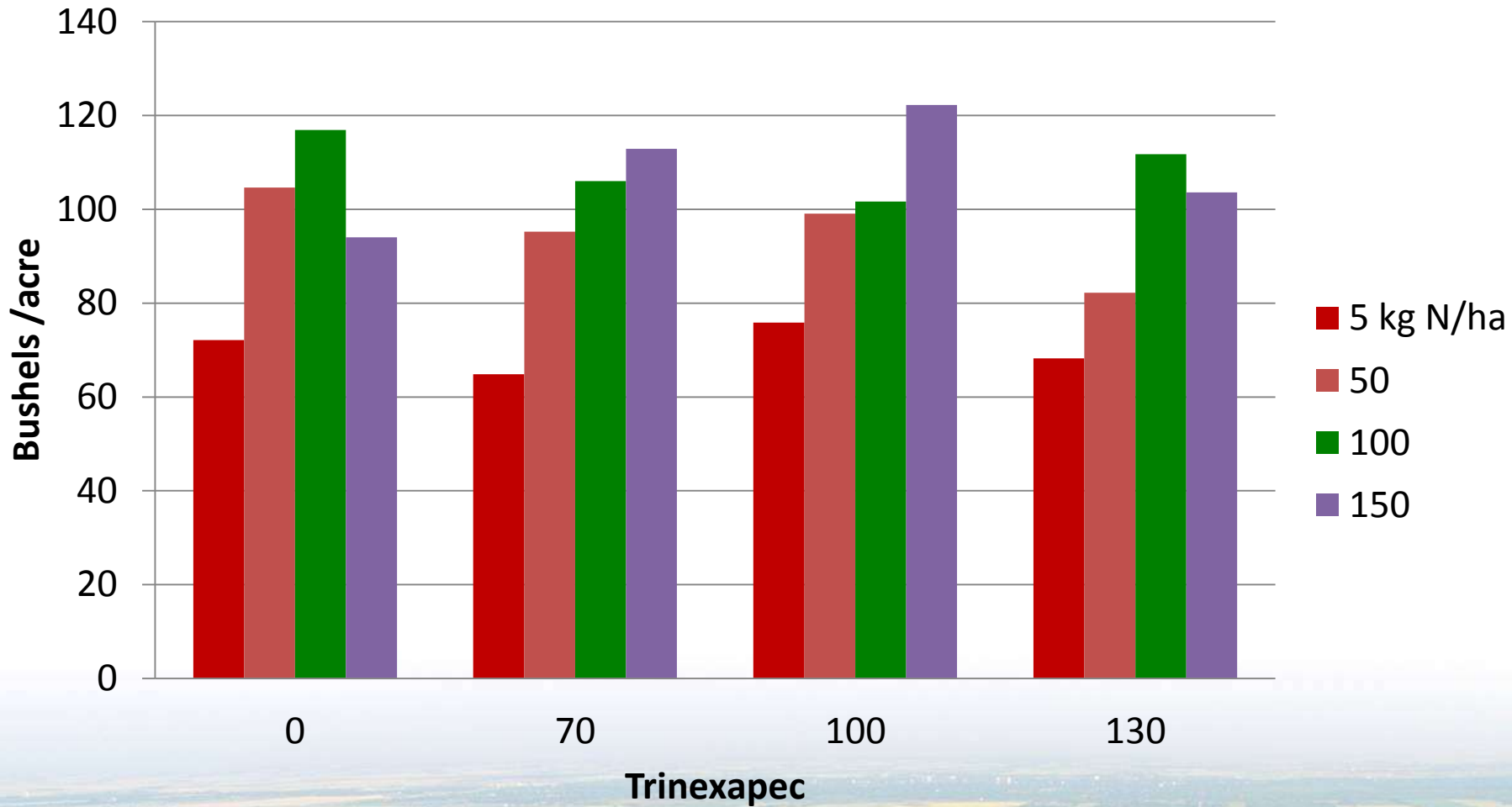
Redvers 2015



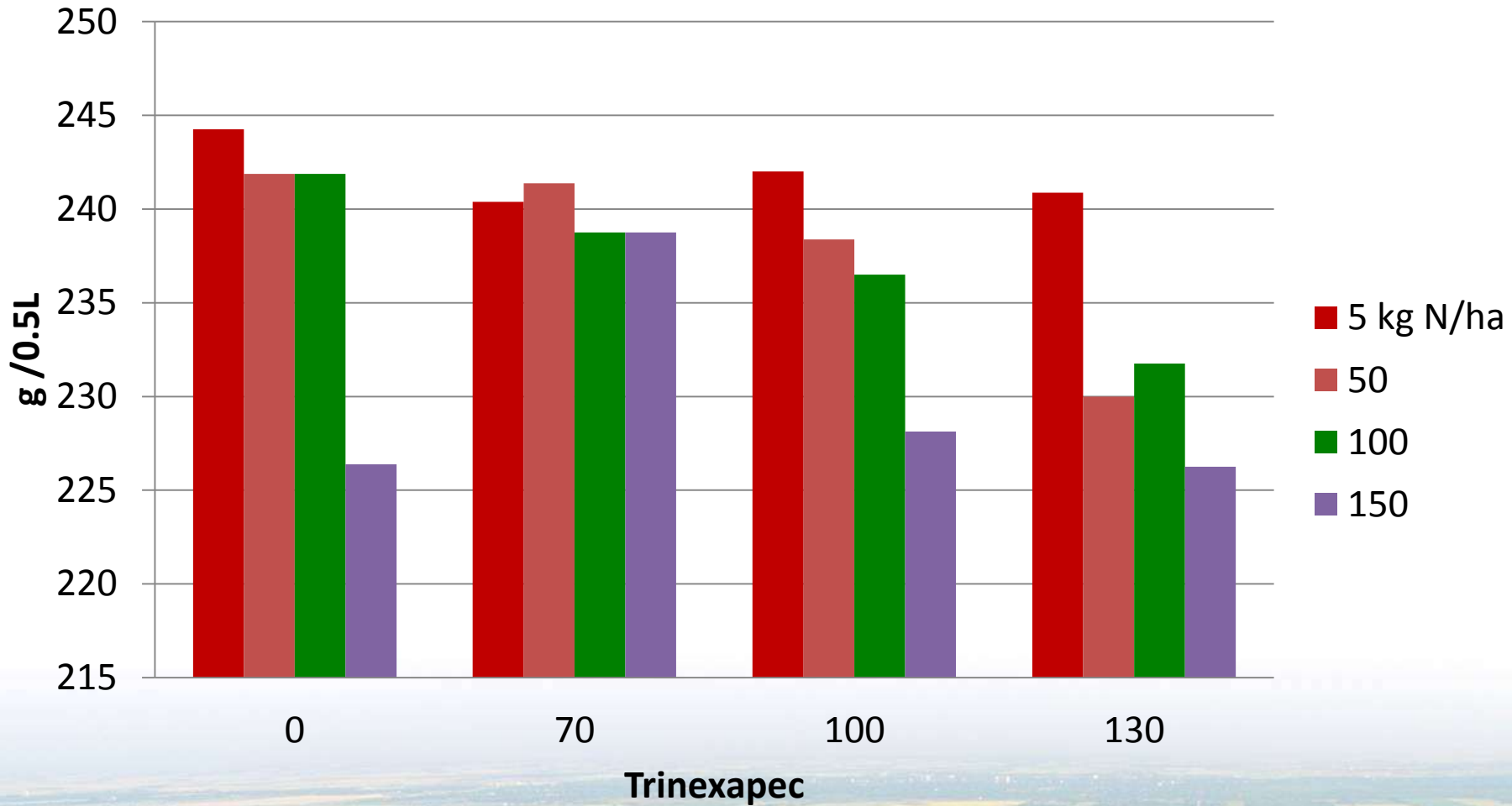
Lodging - N x PGR Trinexapac



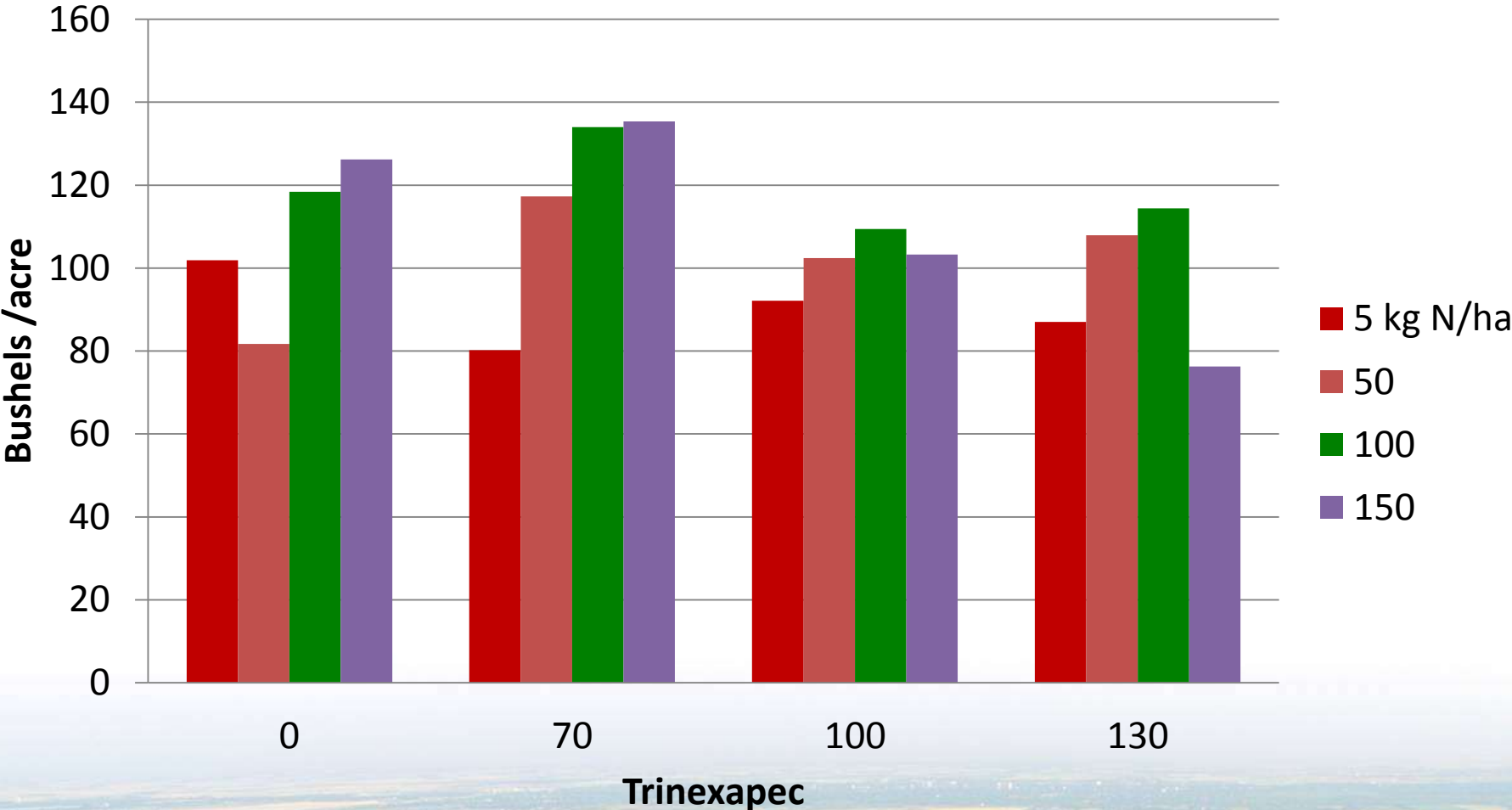
Yield - N x PGR Trinexapac



Test Weight - N x PGR Trinexapac



Yield 2015 - N x PGR Trinexapac



Barley Research

- Beta-Glucan in Hull-less Barley
- Preharvest Glyphosate
- N rate x cultivar
- PGR + seed treatment +fung at flag + fung at anthesis
- PGR's
 - Chlormequat chloride
 - Ethephon (Ethrel)
 - Trinexapac-Ethyl (Palisade 2EC USA, Moddus UK, Primo Maxx -turfgrass)

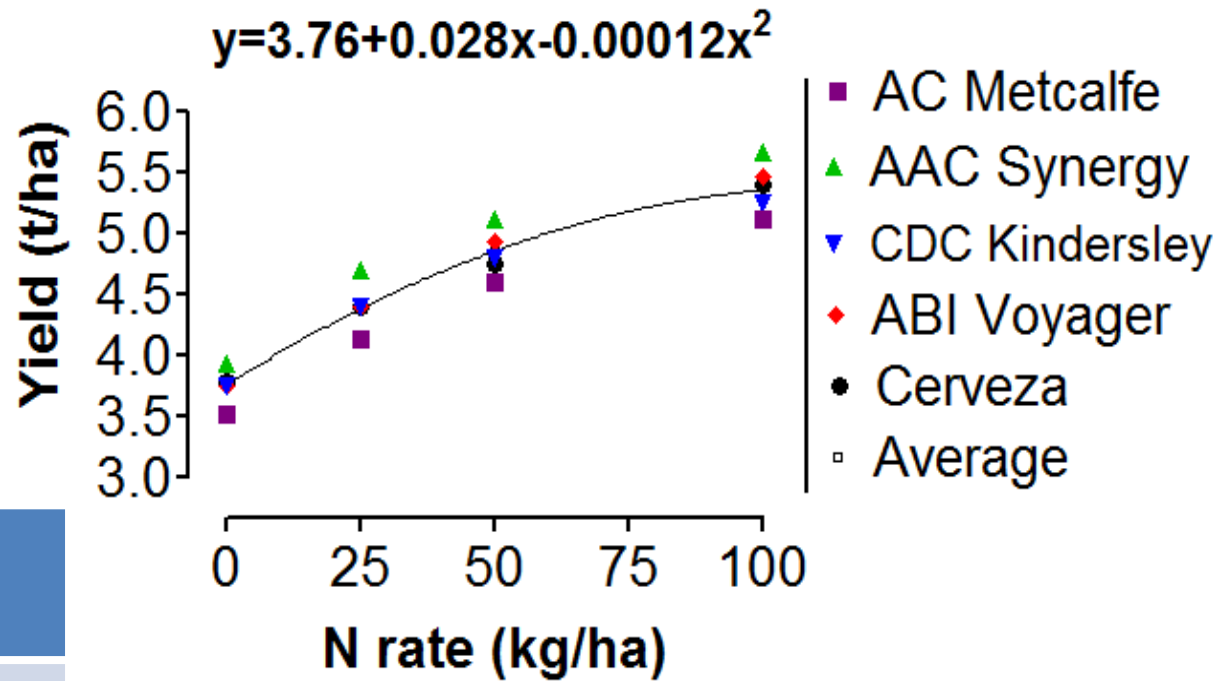


Effect of N rate and Cultivar on Barley

- N rate
 - 5, 25, 50 and 100 kg/ha
- Cultivars
 - AC Metcalfe
 - AAC Synergy
 - CDC Kindersley
 - Voyageur
 - Cerveza



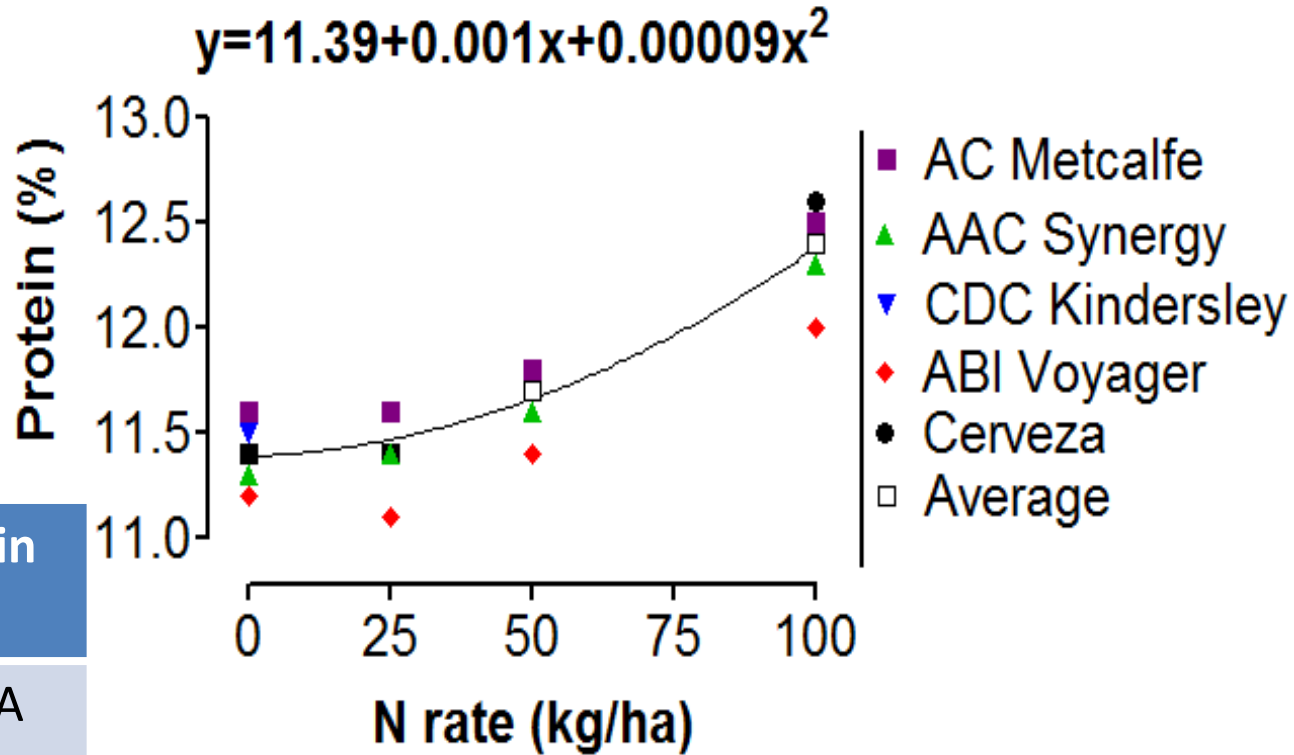
Barley Yield response to N



| Cultivar | Yield (t/ha) |
|----------------|--------------|
| AC Metcalfe | 4.35 C |
| AAC Synergy | 4.86 A |
| CDC Kindersley | 4.55 B |
| ABI Voyager | 4.64 B |
| Cerveza | 4.59 B |



Barley Protein Response to N



| Cultivar | Protein (%) |
|----------------|-------------|
| AC Metcalfe | 11.9 A |
| AAC Synergy | 11.7 B |
| CDC Kindersley | 11.9 A |
| ABI Voyager | 11.4 B |
| Cerveza | 11.8 A |



Barley PGR 2013

| | Plant Height | Lodging | Grain yield | Test Wt |
|--------------------|---------------------|----------------|--------------------|----------------|
| | cm | Belgian | Bu/ac | g/0.5 L |
| none | 87.88 a | 0.81 a | 89.02 a | 335.8 a |
| Chlormequat | 85.78 a | 0.45 a | 91.95 a | 336.6 a |
| Ethephon | 82.00 b | 0.21 a | 90.95 a | 330.9 b |



Barley PGR 2014

| | Height | Lodging | Grain yield | Test weight |
|-------------|---------|---------|-------------|-------------|
| | | Belgian | | |
| | cm | Scale | bu/ac | g/0.5 L |
| none | 87.71 a | 1.19 a | 61.27 a | 303.53 a |
| Ethephon | 73.96 c | 0.20 b | 58.40 b | 301.52 a |
| Chlormequat | 85.67 a | 0.57 ab | 61.75 a | 302.21 a |
| Trinexapec | 82.83 b | 0.31 b | 61.95 a | 302.01 a |



Barley PGR 2015

| | Height | Lodging | Grain yield | Test weight |
|-------------|--------|---------|-------------|-------------|
| | | Belgian | | |
| | cm | Scale | bu/ac | g/0.5 L |
| none | 78 a | 0.3 a | 99 a | 316 a |
| Ethephon | 73 bc | 0.2 a | 98 a | 309 b |
| Chlormequat | 76 ab | 0.3 a | 100 a | 316 a |
| Trinexapec | 71 c | 0.2 a | 100 a | 308 b |

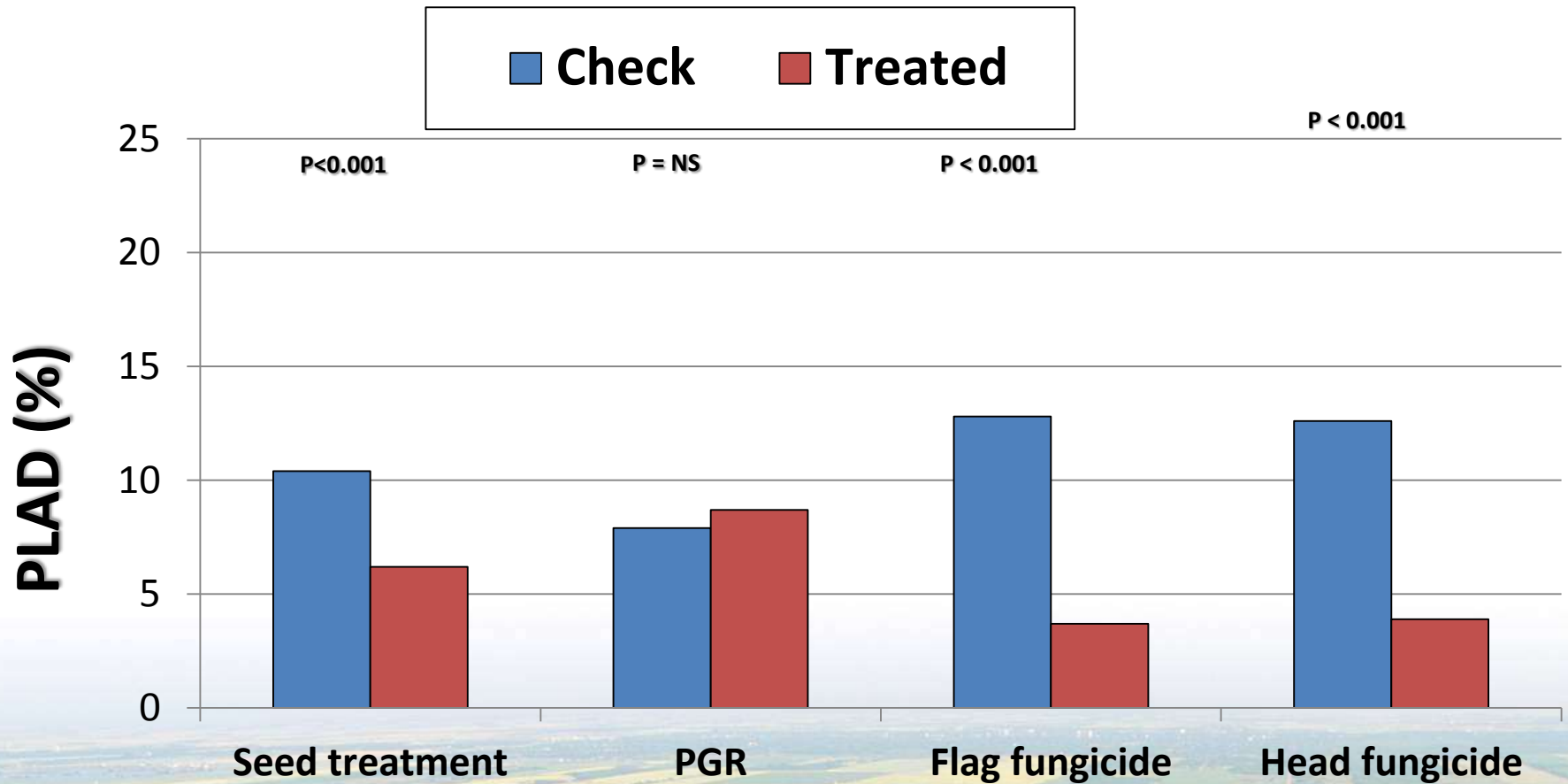


Barley Seed treatment, PGR and fungicide timing

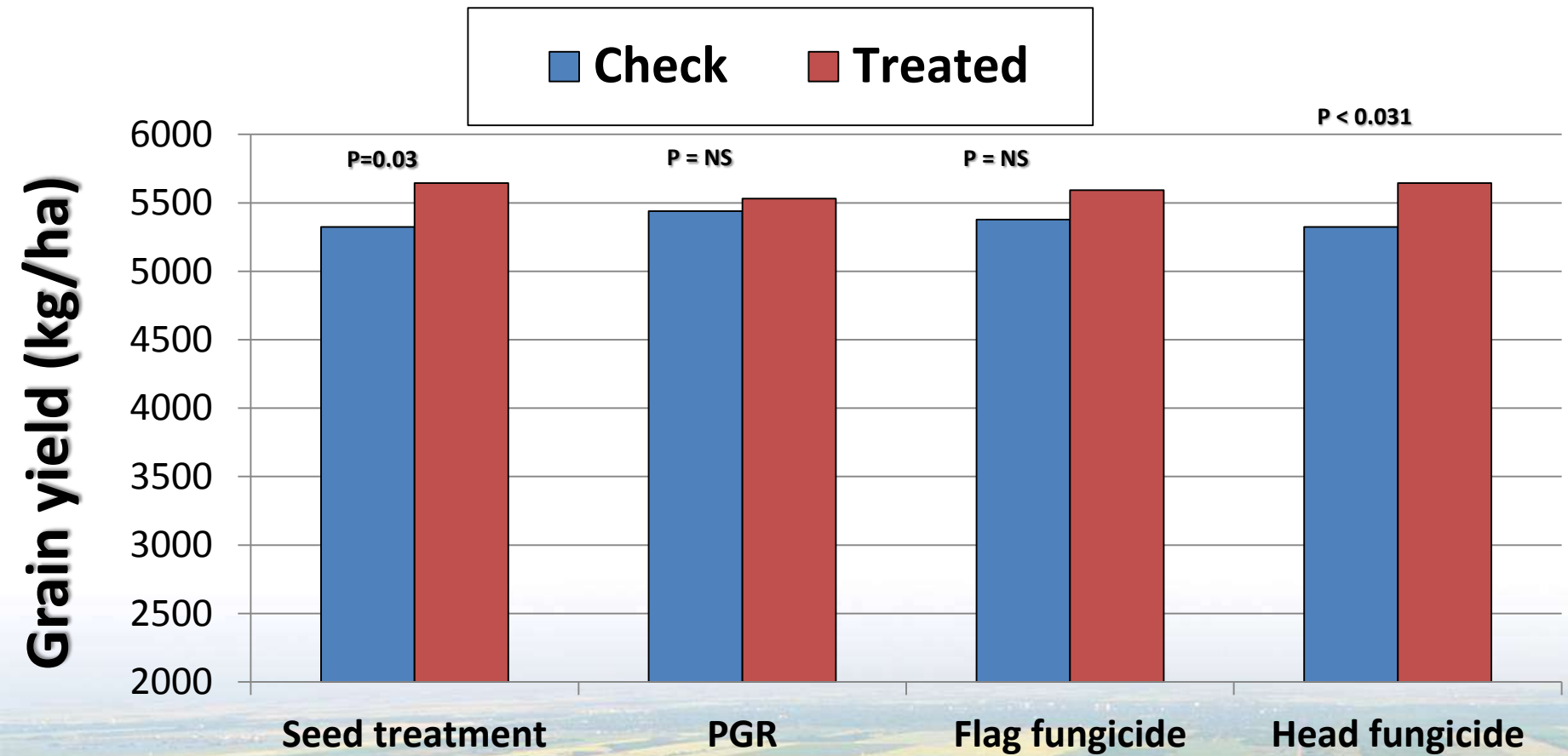
- Seed treatment
 - Insure at 600 ml/100 kg seed
- PGR
 - Ethrel (ethephon) at 300-400 ml/ac (Cerone)
- Flag leaf
 - Twinline at 202 ml/ac
- Head emergence
 - Prosaro at 324 ml/ac



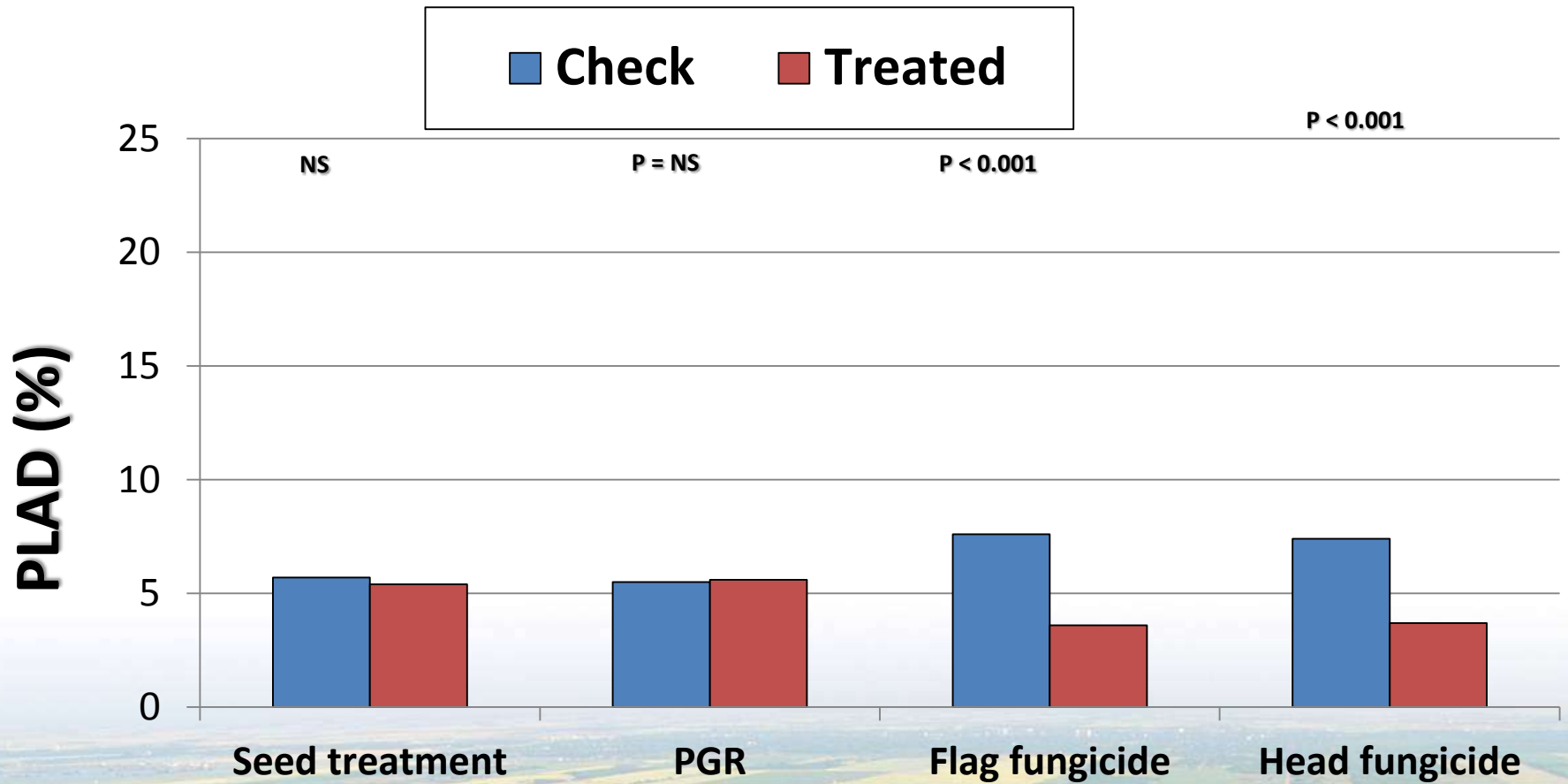
Test 62, Indian Head, SK, 2013, Percentage Leaf Area Diseased



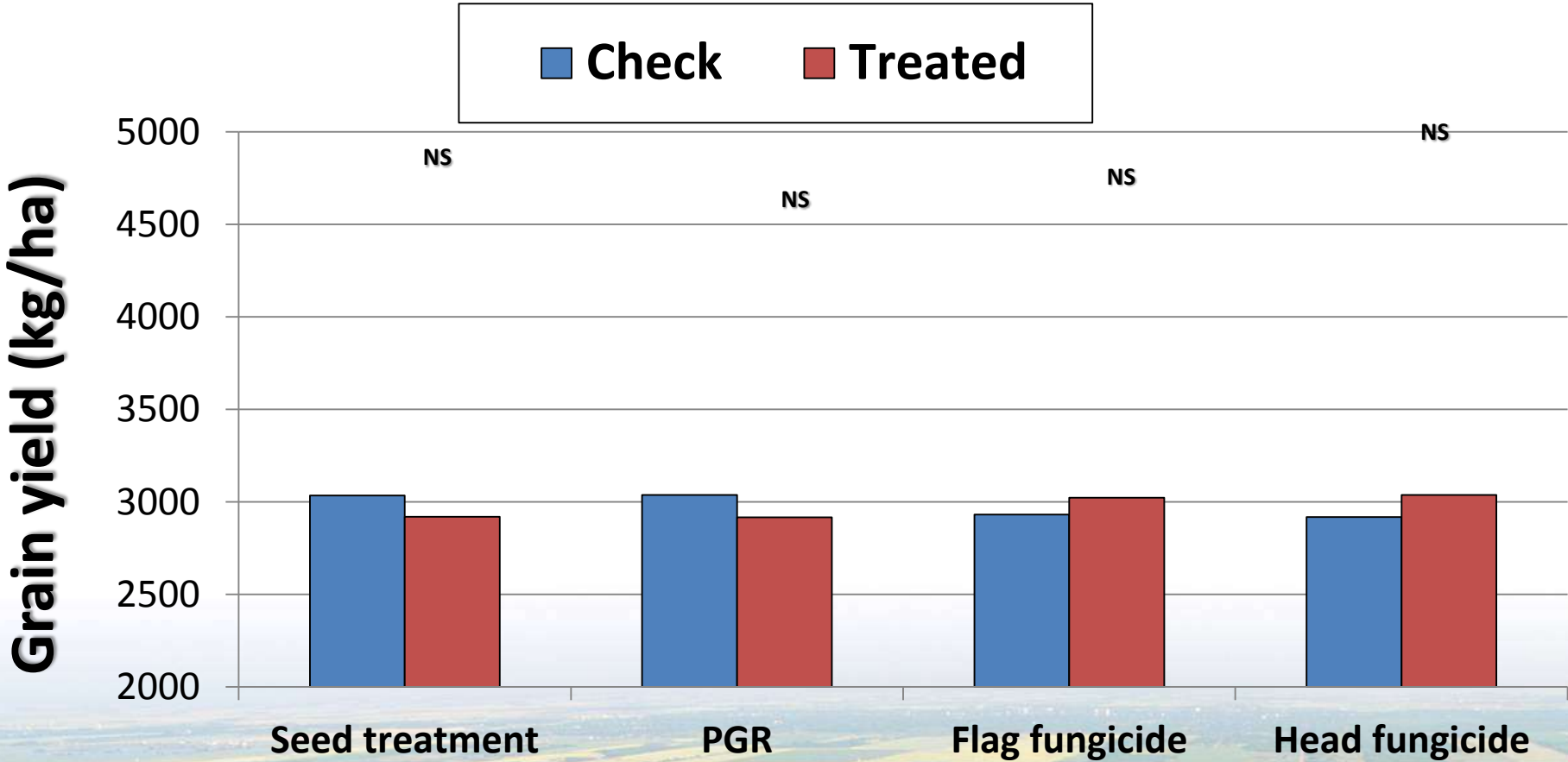
Test 62, Indian Head, SK, 2013, Grain Yield (kg/ha)



Test 62, Indian Head, SK, 2014, Percentage Leaf Area Diseased



Test 62, Indian Head, SK, 2014, Grain Yield (kg/ha)



Preliminary Conclusions

- Seed treatment
 - May have some impact/benefit (esp. 2013)
- PGR
 - Beneficial when there is a risk of increased lodging
- Flag/Head fungicide
 - Tended to give most consistent impact
 - Direct protection of upper canopy leaves



Crop Sequencing of Large acreage crops and special crops

- **First year** – all eight crops are seeded in strips
- **Second year** – all eight crops are seeded across the strips set up in the first year
- **Crops:**
 - 1) Wheat
 - 2) Oat
 - 3) Canola
 - 4) Pea
 - 5) Canaryseed
 - 6) Hemp
 - 7) Quinoa
 - 8) Coriander



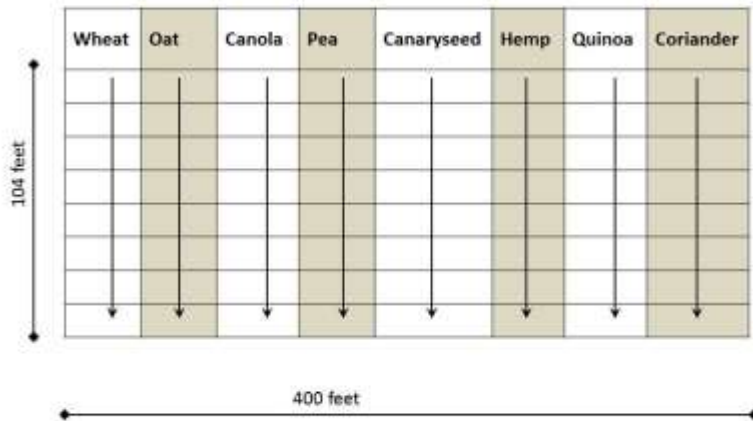
Crop Sequencing of Large acreage crops and special crops

- **First year** – 2015, 2016, 2017
- **Second year** – 2016, 2017, 2018
- **Locations:**
 - 1) Swift Current
 - 2) Saskatoon
 - 3) Indian Head
 - 4) Melfort

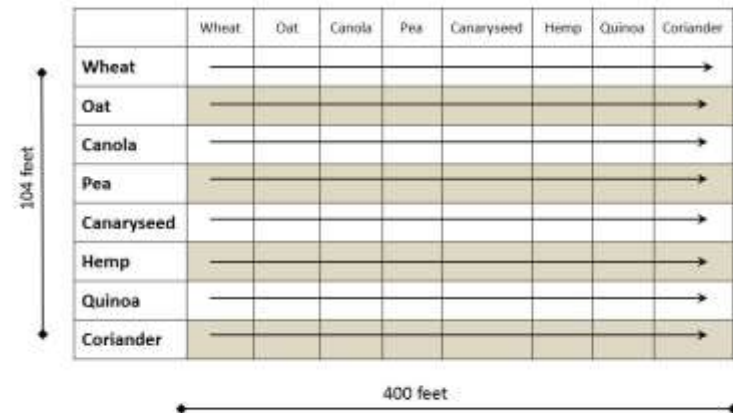


Crop Sequencing of Large acreage crops and special crops

Year A Replicate 1



Year B Replicate 1



Crop Sequencing of Large acreage crops and special crops

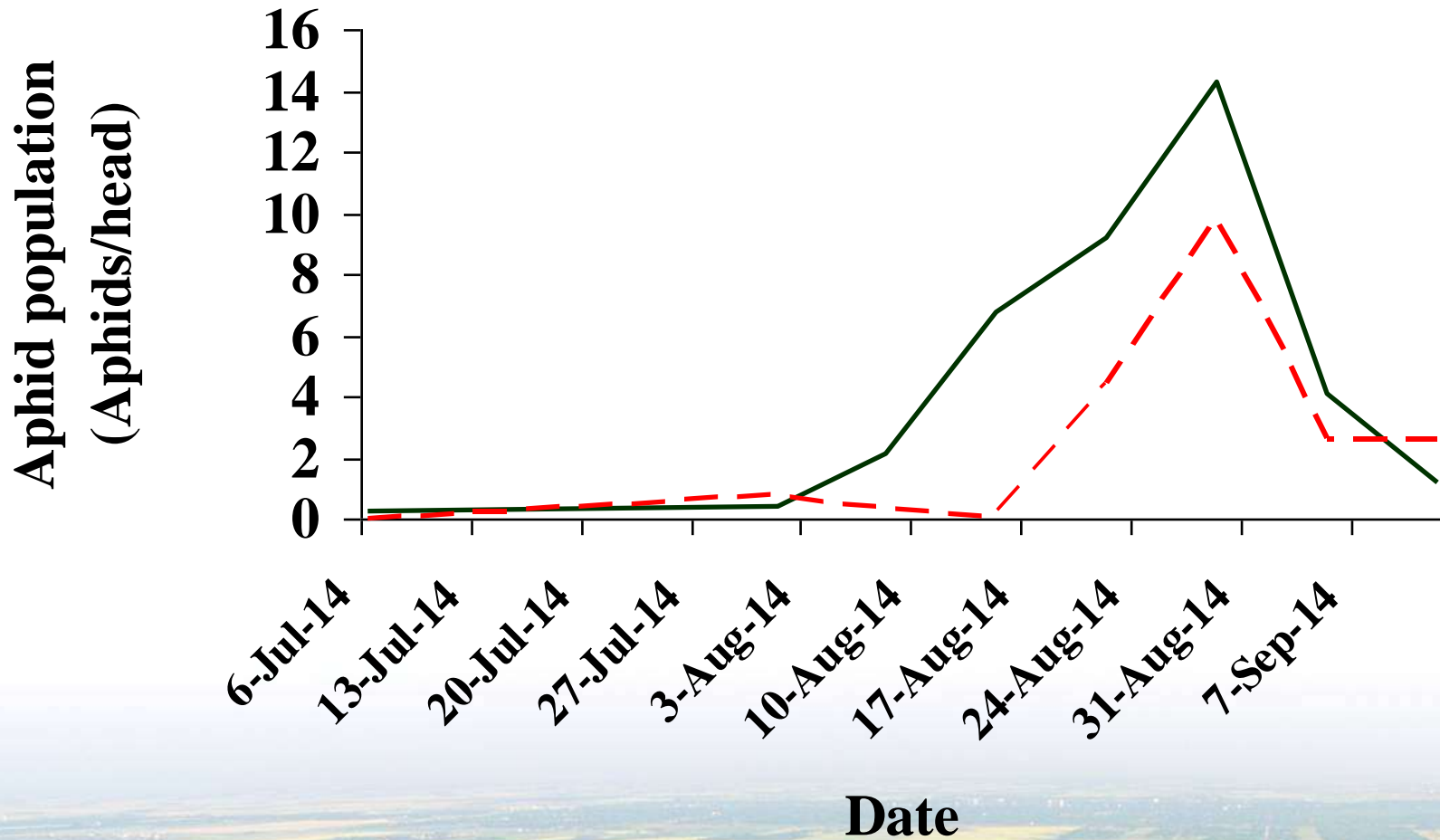
Funding

- 1) Government of Saskatchewan
- 2) Saskatchewan Wheat Development Commission
- 3) Western Grains Research Foundation
- 4) Canaryseed Development Commission of Saskatchewan
- 5) Prairie Oat Growers Association





Aphid Populations in Canaryseed



— Head - - Leaf Sheath