Yield Monitors and Soil Fertility: Where Are We Now?

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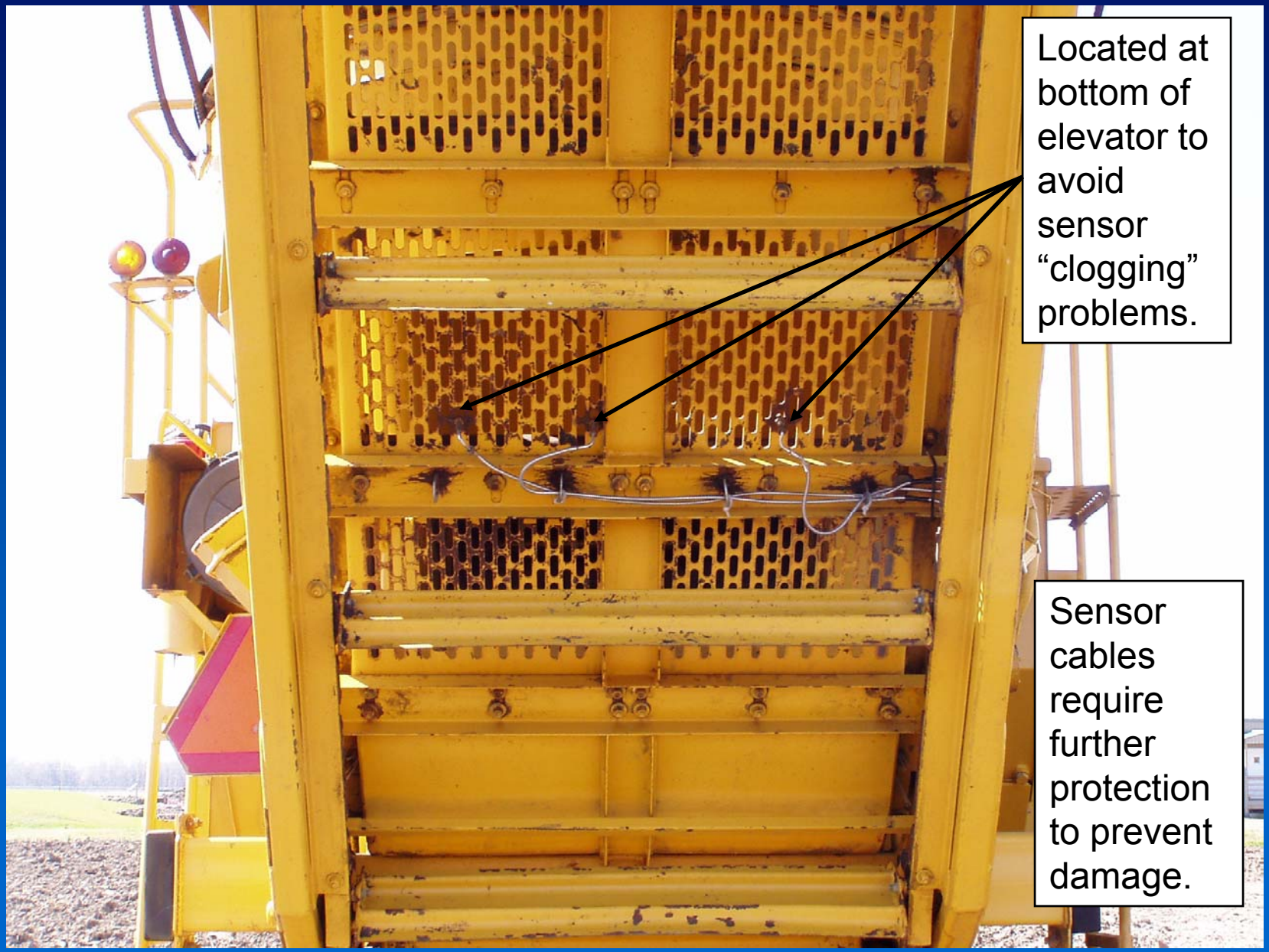
Yield Monitoring in Sugarcane

- Research Goals for 2009
  - –Upgrade Display and software.
    - Simplify data entry.
    - Enable entry of truck weights for grower calibration purposes.
    - Provide current and total yield estimate.
  - –Install monitors on grower combines and test under harvest conditions.
    - Ellendale Plantation
    - Ouachita Fertilizer (White Star Farms)
  - –Test accuracy of monitor at estimating truck/wagon weights.
  - –Develop yield maps for several locations.
  - –Determine durability of monitor.

Experimental Yield Monitor (Optical Sensor Location)



Experimental Yield Monitor (Optical Sensor Location)

Experimental Yield Monitor (Optical Sensor Location)

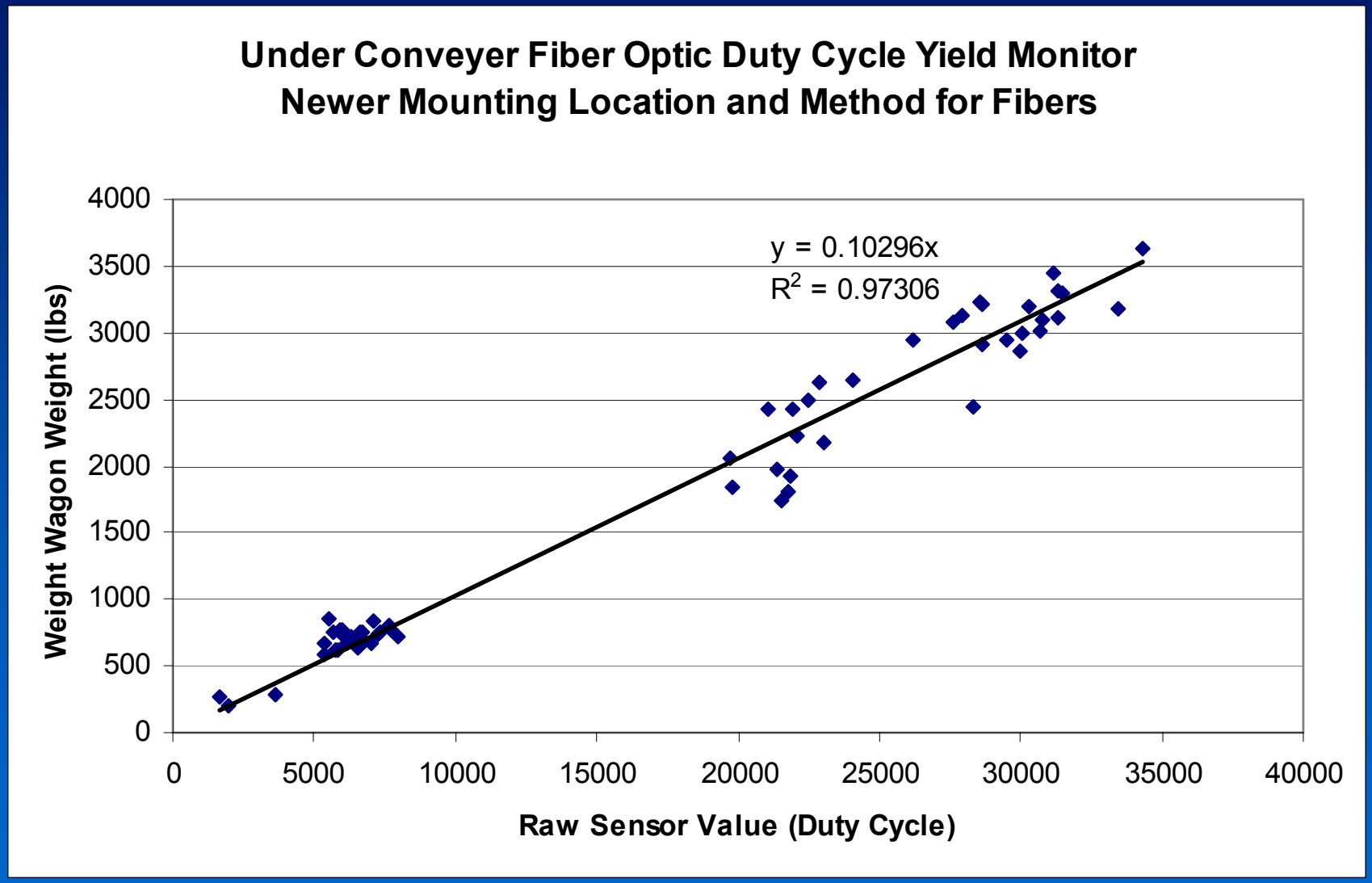
Experimental Yield Monitor (Original Display Monitor)

(C)

Experimental Yield Monitor (Field Testing)

Experimental Yield Monitor (Field Testing)

Experimental Yield Monitor (Under Elevator Optical Sensor)



Experimental Yield Monitor (New Display Monitor)

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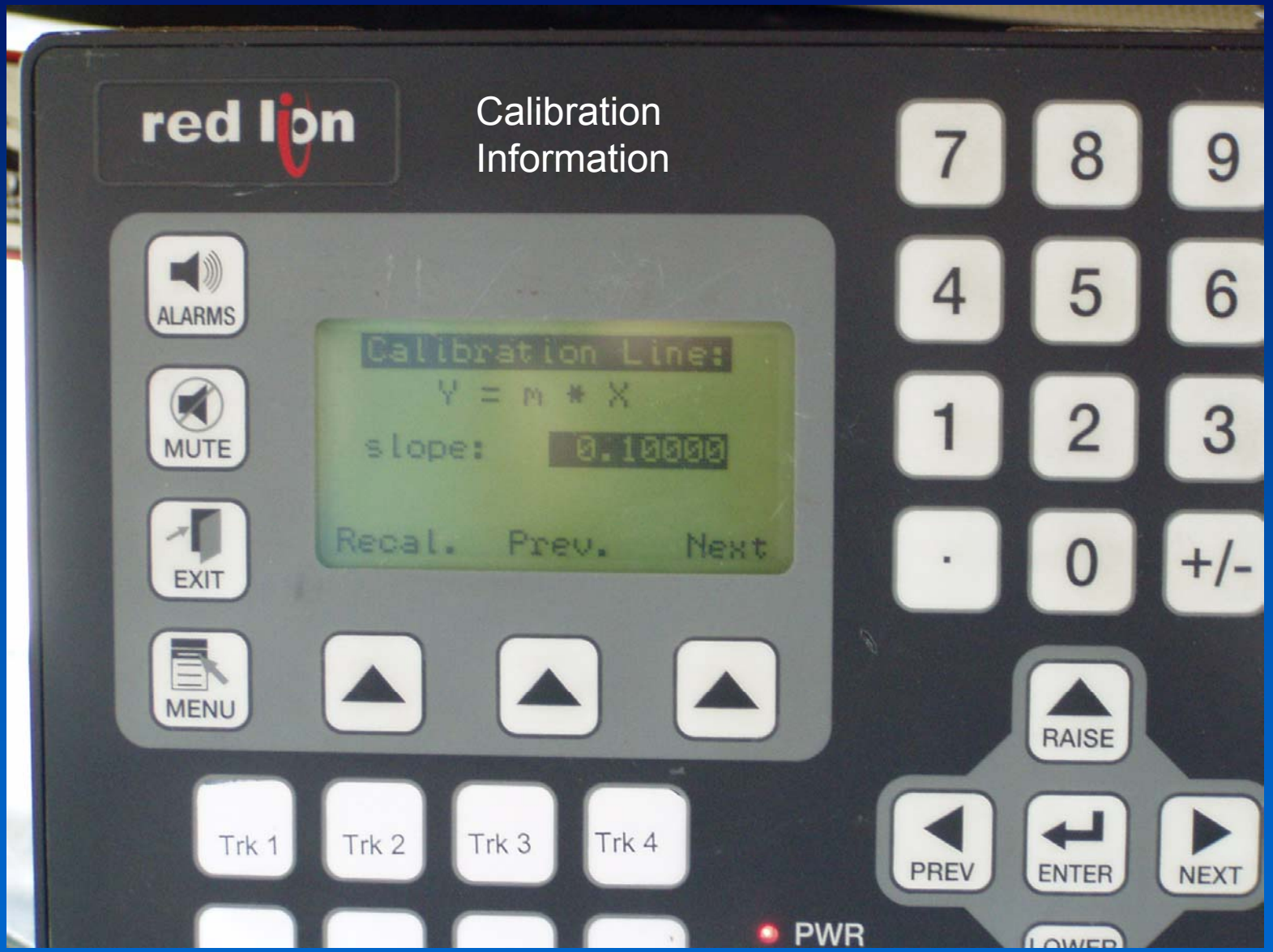

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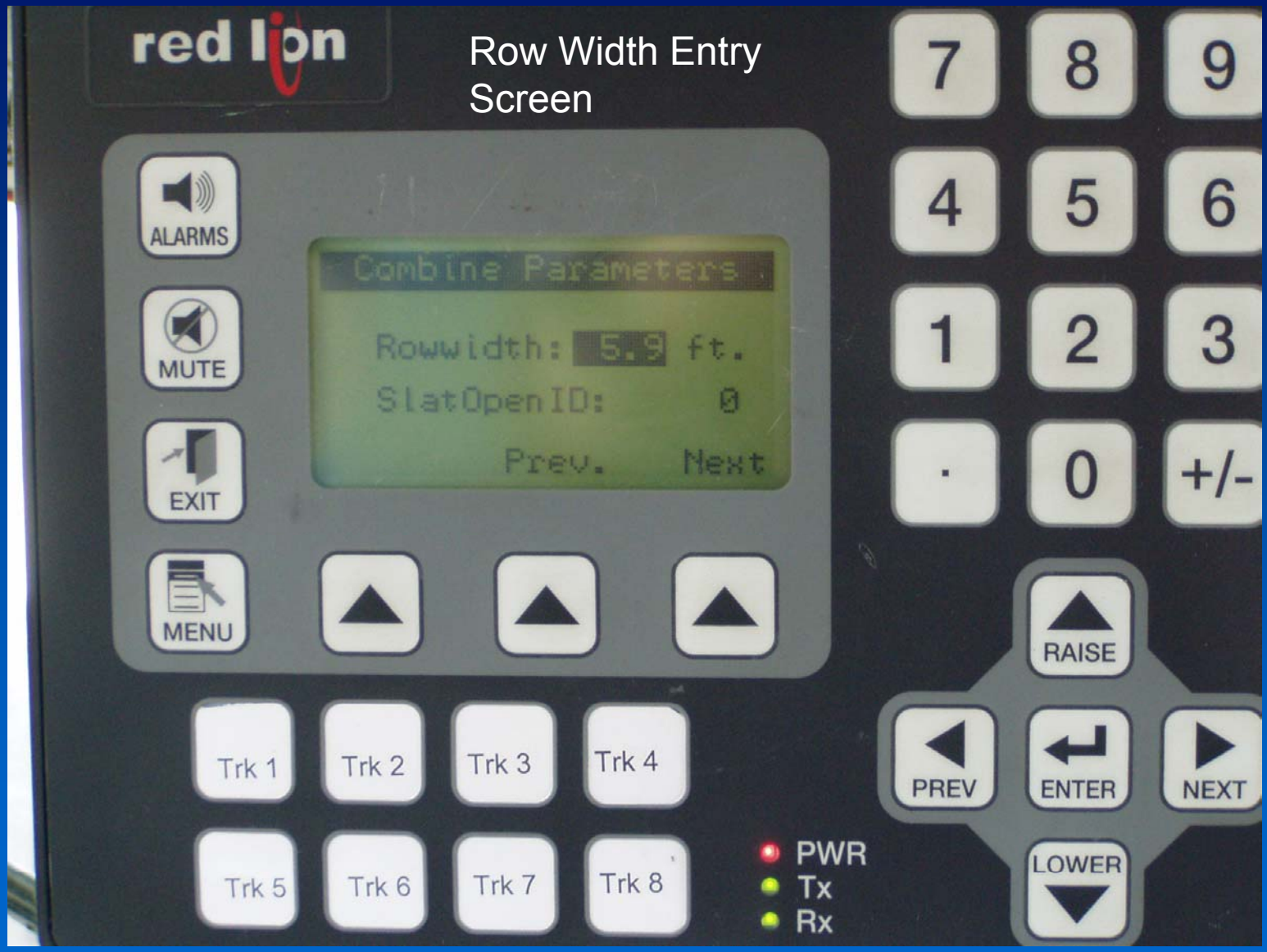


Percent Error for Wagon Weights Using Same Day Calibration

Raw Sensor Reading	Actual Weight (lbs)	Estimated Weight (lbs)	Error (%)
411000	43200	42000	2.78
460000	46222	47007	1.70
437000	45420	44657	1.68
475000	47560	48540	2.06
		Aver. Error	2.05
		St. dev.	0.51

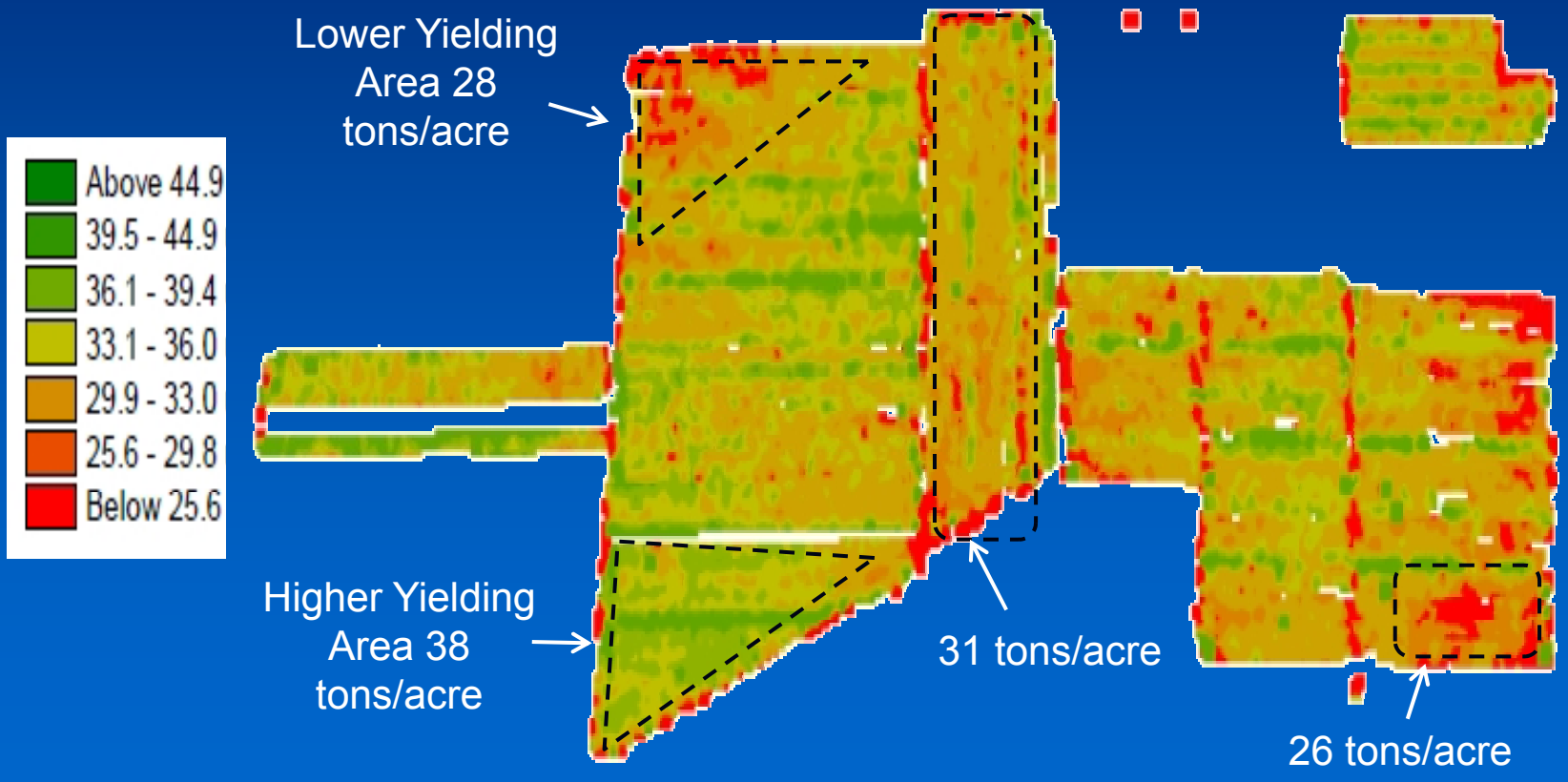
Yield Monitor Errors for 1 Week of Operation

- Individual errors averaged to determine one error value (since each additional load updated the calibration equation and gave a new % error for each load).
- Average Error: 2.53%

  Stdev = 2.55

Date	Actual Weight	Estimated Weight	Error (%)
11/9/2009	44380	45756.67	3.10
11/9/2009	46980	45394.72	3.37
11/9/2009	45840	48119.58	4.97
11/9/2009	49300	43175.13	12.42
11/10/2009	49080	48819.5	0.53
11/10/2009	46100	44392.45	3.70
11/10/2009	46900	46748.94	0.32
11/10/2009	46420	45578.87	1.81
11/10/2009	46480	46850.31	0.80
11/10/2009	45100	44559.46	1.20
11/10/2009	48040	50727.44	5.59
11/10/2009	47960	45719.53	4.67
11/10/2009	50020	49127.42	1.78
11/10/2009	44300	42580.2	3.88
11/10/2009	46900	49215.67	4.94
11/11/2009	47000	47499.8	1.06
11/11/2009	44860	45616.29	1.69
11/11/2009	44380	44283.93	0.22
11/11/2009	45080	43707.78	3.04
11/11/2009	46420	47269.5	1.83
11/11/2009	49220	51283	4.19
11/11/2009	51200	51842.86	1.26
11/11/2009	51084	51578.6	0.97
11/11/2009	45260	45000.90	0.57
11/11/2009	45380	45658.79	0.61
11/13/2009	44660	45242.46	1.30
11/13/2009	46320	46532.50	0.46
11/15/2009	46140	45929.4	0.46
		Average:	**2.53**
		Stdev	**2.55**

Field Yield Maps



Summary Yield Monitor Trials

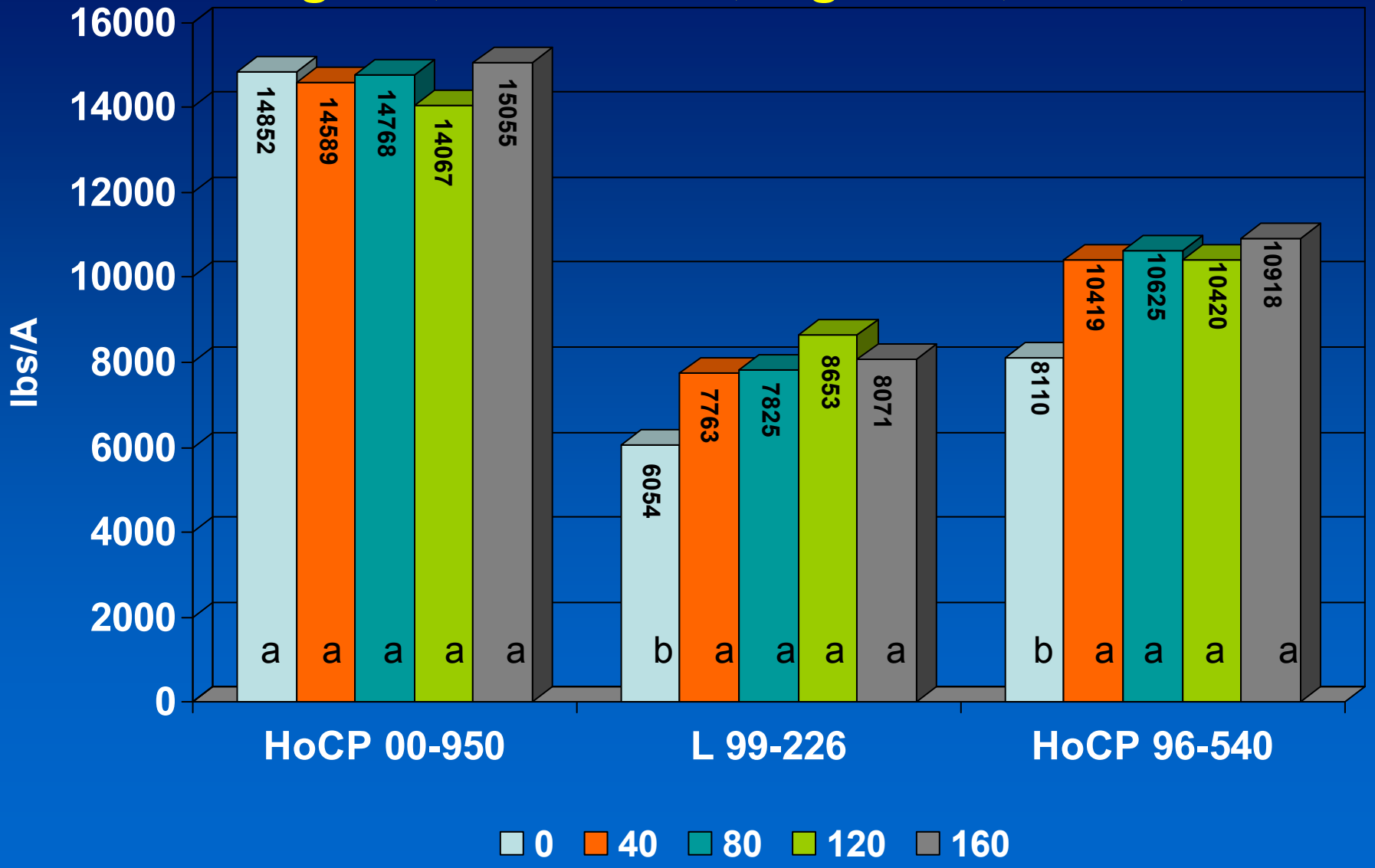
- Linear calibration results were obtained for the below conveyor yield monitor using raw sensor readings and weigh wagon weights.
- The average errors were 3.5% (+/- 10%) for the below conveyor monitor on weigh wagon loads. The error decreased as load weight increased.
- The below conveyor monitor achieved a 2.0% accuracy per day on wagon weights near 46,000 lbs and maintained a 2.5% overall accuracy (standard deviation 2.55) for one week when calibration loads were added per day.
- The monitor could be used to develop yield maps that could be used to identify low yielding areas of the field requiring further management inputs.


Nitrogen
Experiments 2009

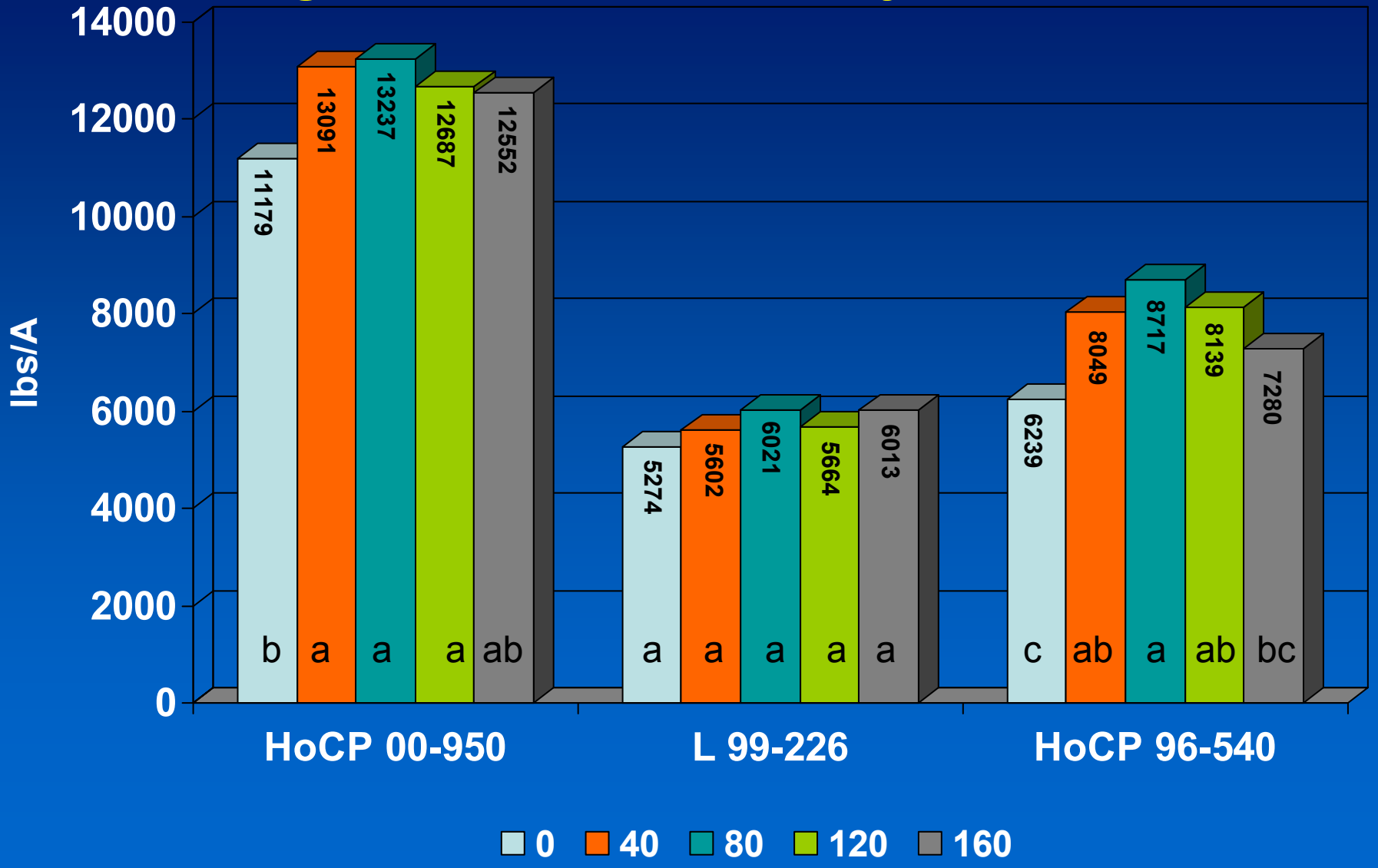
USDA & LSU Cooperative Nitrogen Fertilizer Experiments (2007-2009)

- Varieties: HoCP 96-540, L 97-128, Ho 95-988, CP 89-2143, L 99-226, Ho 00-950, L01-283, L 79-1002.
- Crop Age: PC, 1R, 2R, 3R
- Soil Type: Light, Heavy
- Harvest Date Effects: HoCP 96-540, PC, 1R (Nov. 1, Dec. 4, Jan. 4)
- N rates: 0, 40, 80, 120, 160 lbs N/A (32% UAN)
- A total of 35 studies

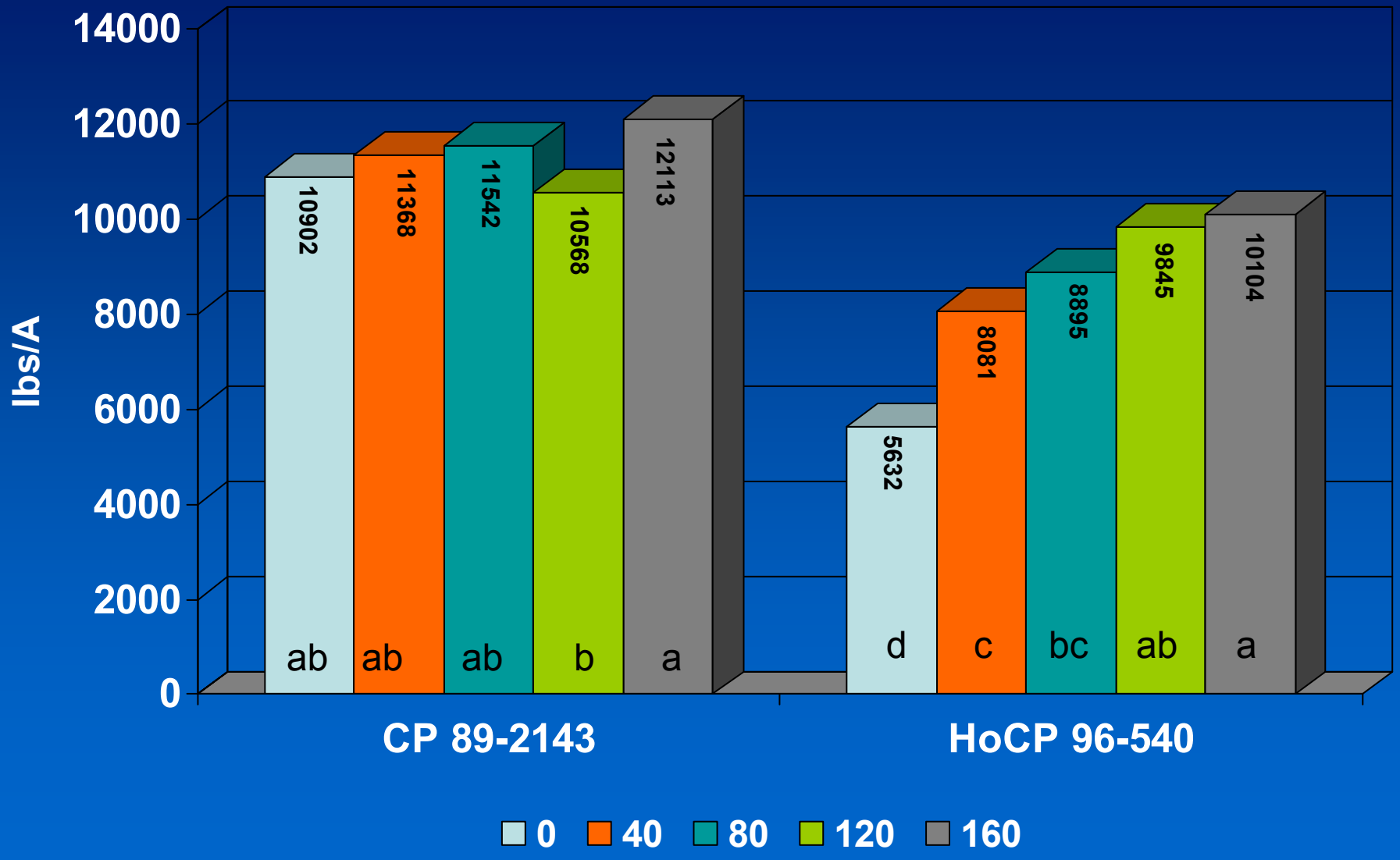
Varietal Response to Nitrogen Fertilizer
Sugar/A, Plant Cane, Light Soil, USDA, 2009



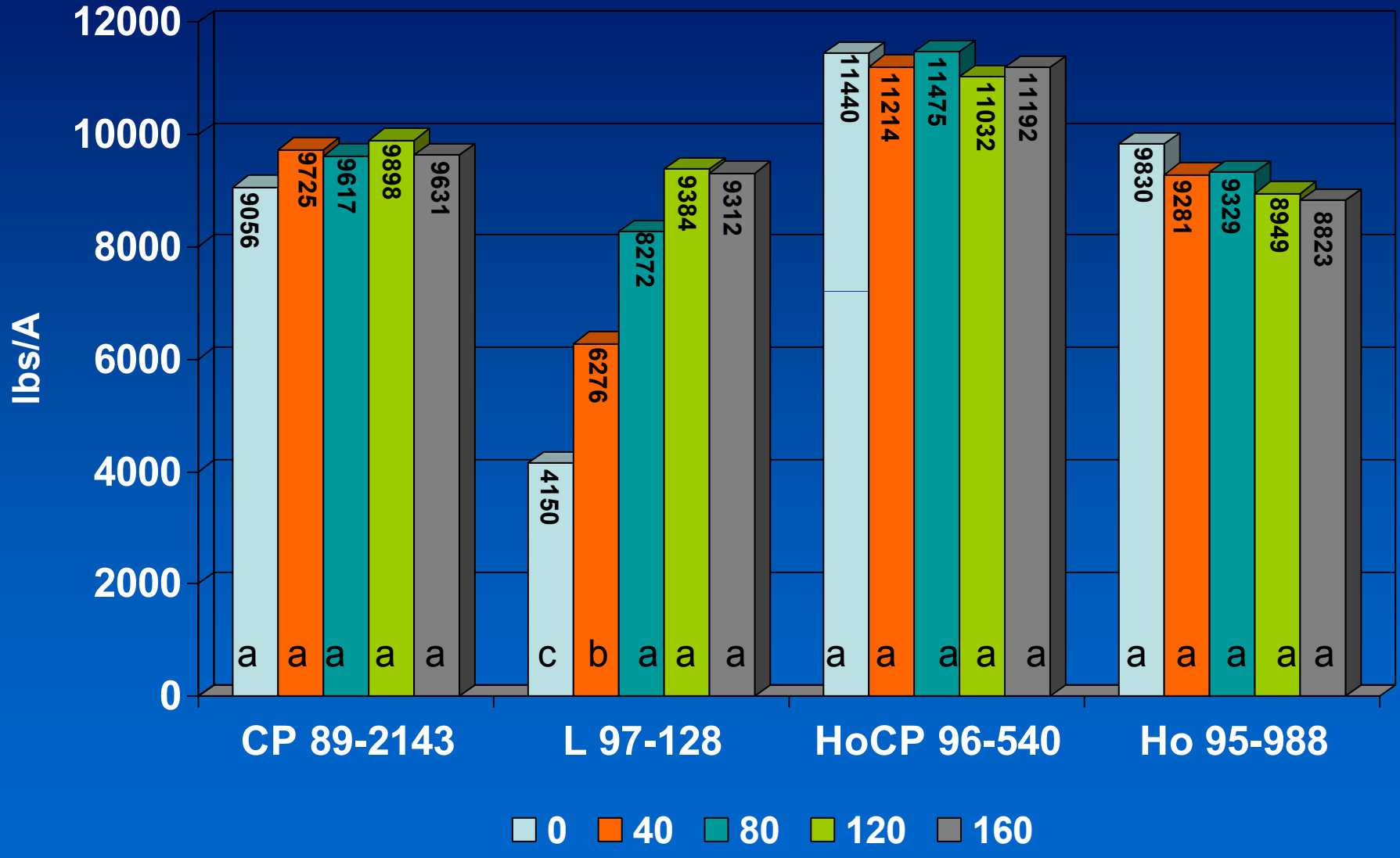
Varietal Response to Nitrogen Fertilizer
Sugar/A, Plant Cane, Heavy Soil, USDA, 2009



Varietal Response to Nitrogen Fertilizer
Sugar/A, Plant Cane, USDA, 2008

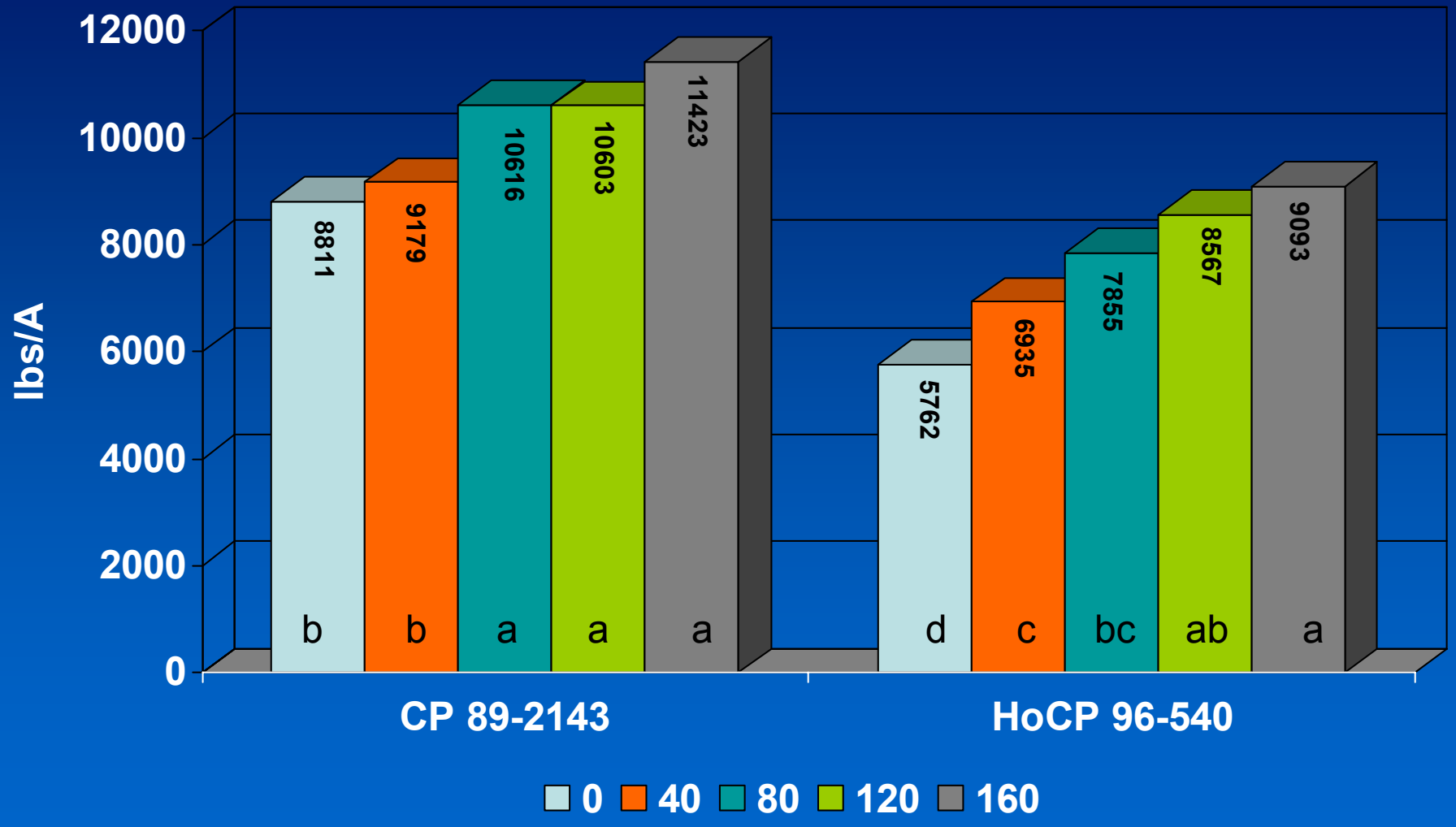


Varietal Response to Nitrogen Fertilizer
Sugar/A, Plant Cane, USDA, 2007



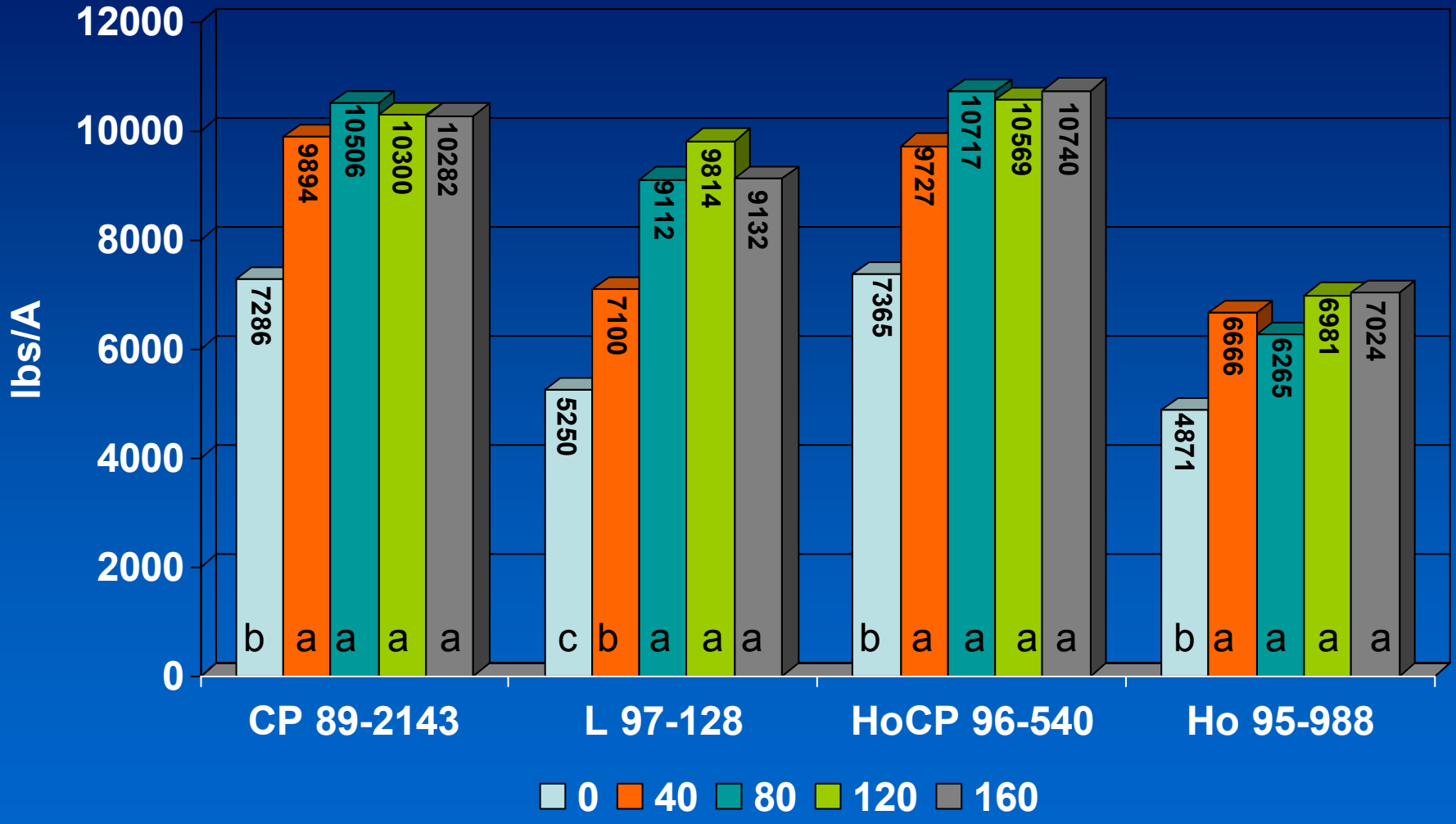
Varietal Response to Nitrogen Fertilzier

Sugar/A, 1st Stubble, USDA, 2008



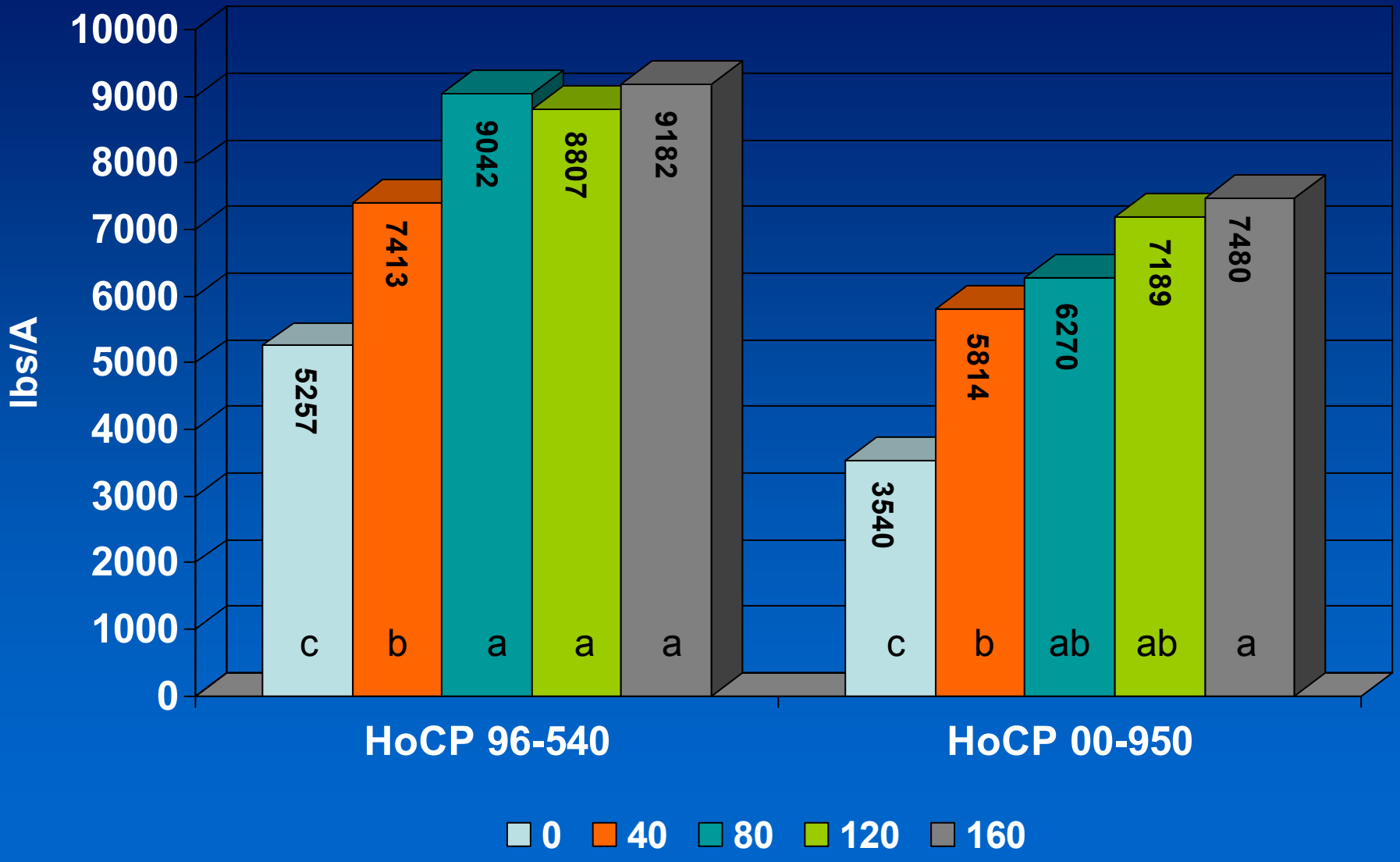
Varietal Response to Nitrogen Fertilzier

Sugar/A, 1st Stubble, USDA, 2007

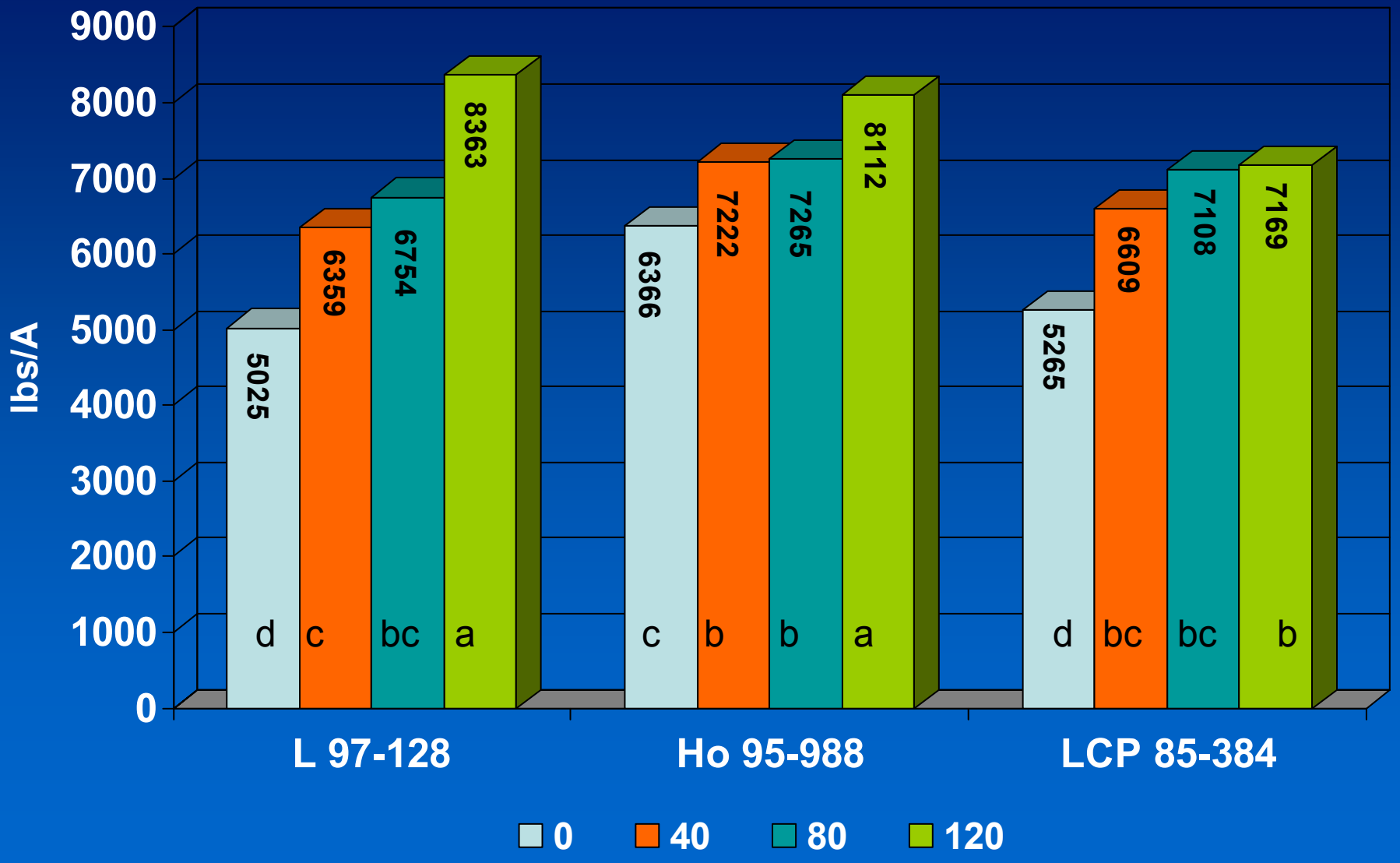


Varietal Response to Nitrogen Fertilizer

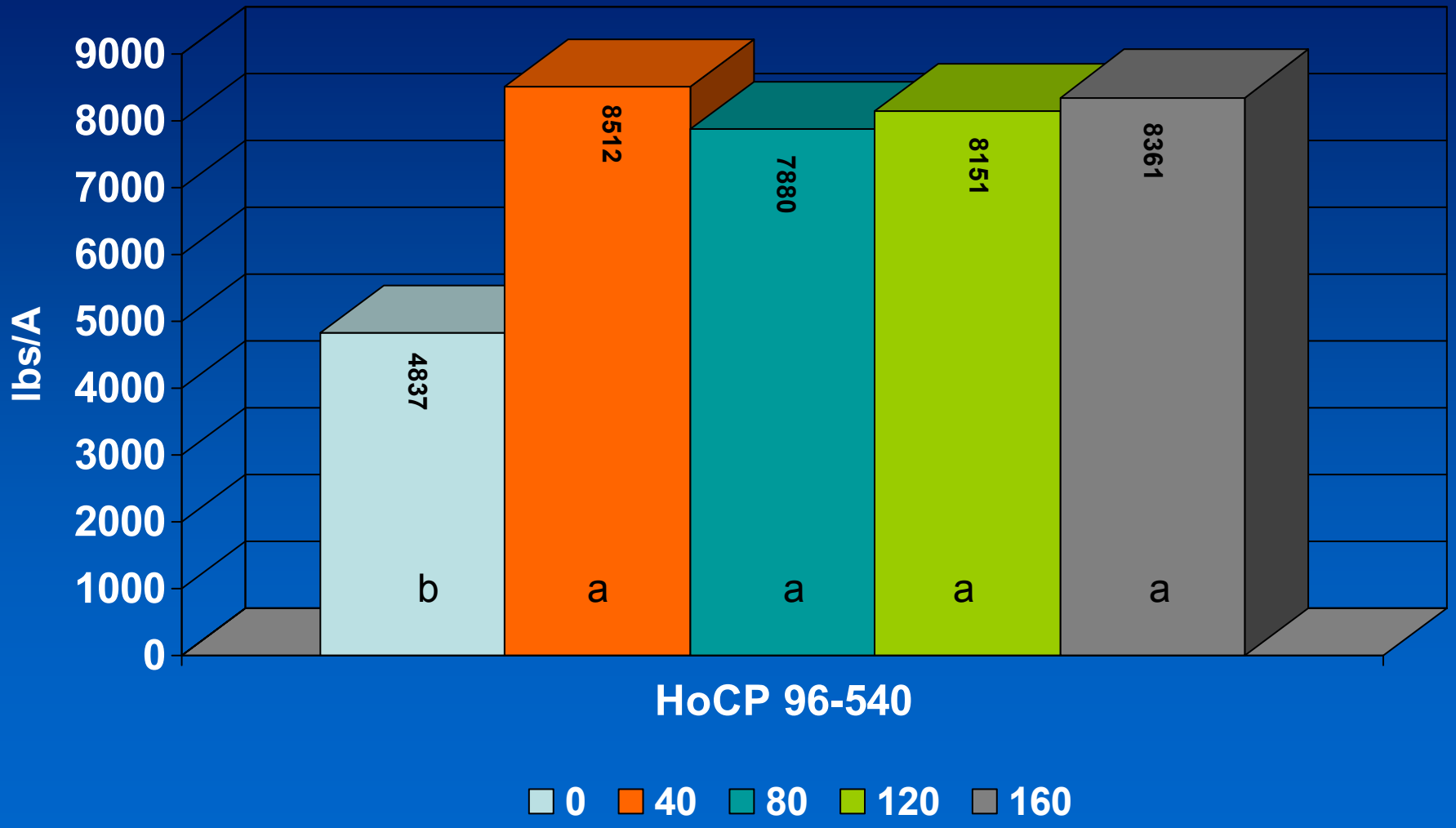
Sugar/A, 2nd Stubble, USDA & LSU, 2008



Varietal Response to Nitrogen Fertilizer
Sugar/A, 2nd Stubble, St. Gabriel, 2007



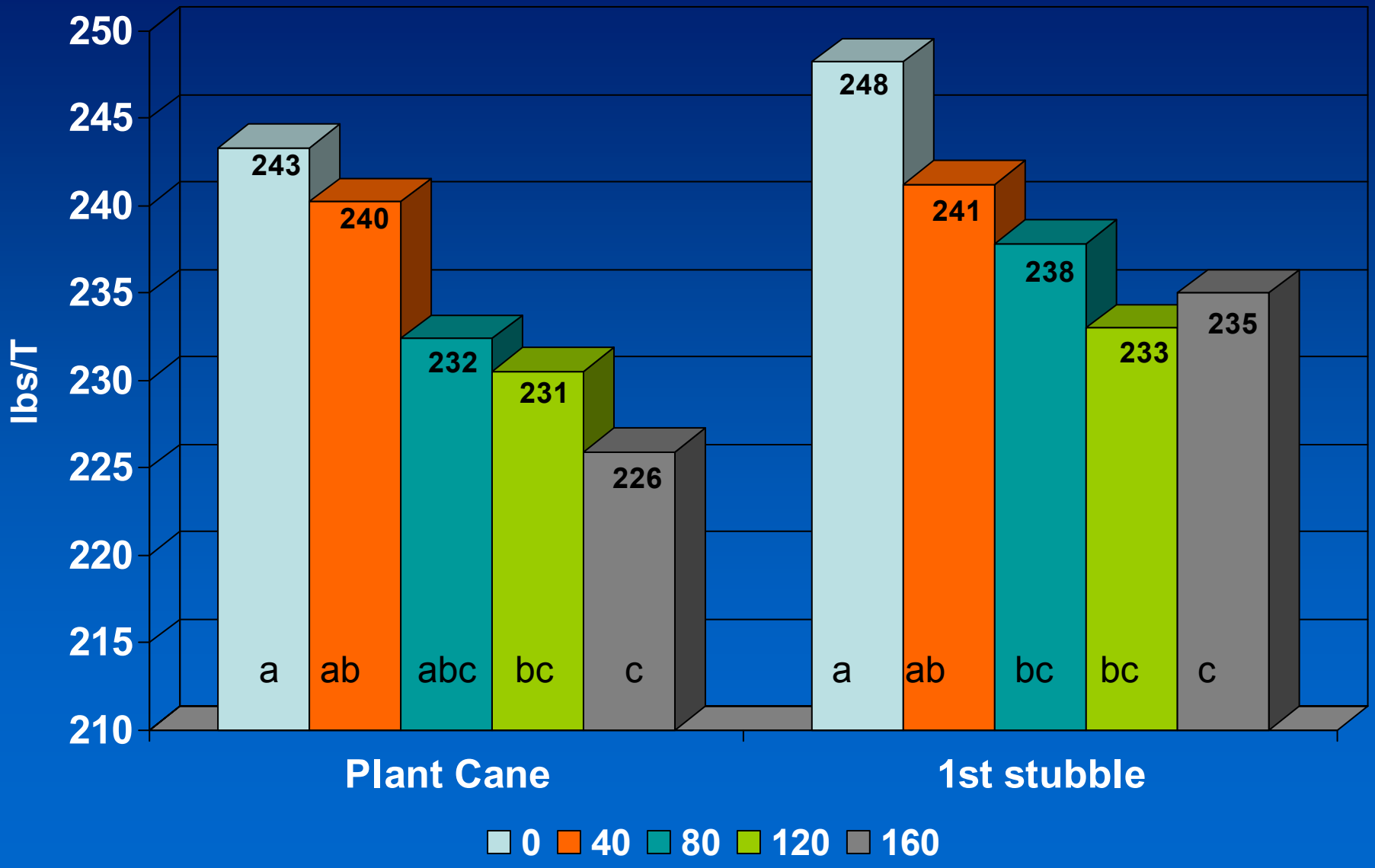
Varietal Response to Nitrogen Fertilizer
Sugar/A, USDA, 3rd Stubble, 2009



Summary of Nitrogen Studies (2007-2009)

- Optimum N Rate – 80-100 lb N/A, HoCP 96-540, Plant cane, 1st, 2nd and 3rd stubble.
- Optimum N Rate - 80-120 lb N/A, L 97-128 & Ho 95-988, Plant cane, 1st and 2nd stubble.
- Optimum N Rate – 80 lb N/A, HoCP 00-950, PC, 2nd stubble.
- Optimum N Rate – 80 lb N/A, L 99-226 & L 01-283, PC.
- Optimum N Rate – 80 lb N/A, CP 89-2143 Plant cane and 1st stubble.
- Yields were higher on light soils and N requirements were slightly higher for heavy soils.

Effect of Nitrogen Rate on TRS in PC and 1R
HoCP 96-540



Nitrogen Fertilizer Recommendations for 2010

- **Plant cane:** light soils: 60-80 lb N/A
- **Plant cane:** heavy soils: 80-100 lb N/A
- **Stubble cane:** light soils: 80-100 lb N/A
- **Stubble cane:** heavy soils: 100-120 lb N/A
- **Recommendations take into account data from multiple years and soil types.**
- **Note that these recommendations assume a proper soil pH and an application date of April 1 - 30.**

Phosphorus and Potassium Fertilizers

- While it is true that money can be saved in the short term by not applying P & K, it is doubtful that this practice can be continued over the long term.

- Recent research has demonstrated a positive yield response to K fertilizer (Jim Wang et al., 2007 and 2008).

- Soil testing becomes **very** important when P & K fertilizers are not applied on a regular basis. This practice will “mine” soil P&K levels over time.

- Currently recommendations specify that P & K fertilizer **should** be applied to soils testing low or very low.


Questions ?