Crop Rotation or Continuous Corn?
Agronomic Considerations

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Wisconsin Fertilizer, Aglime & Pest Management Conference

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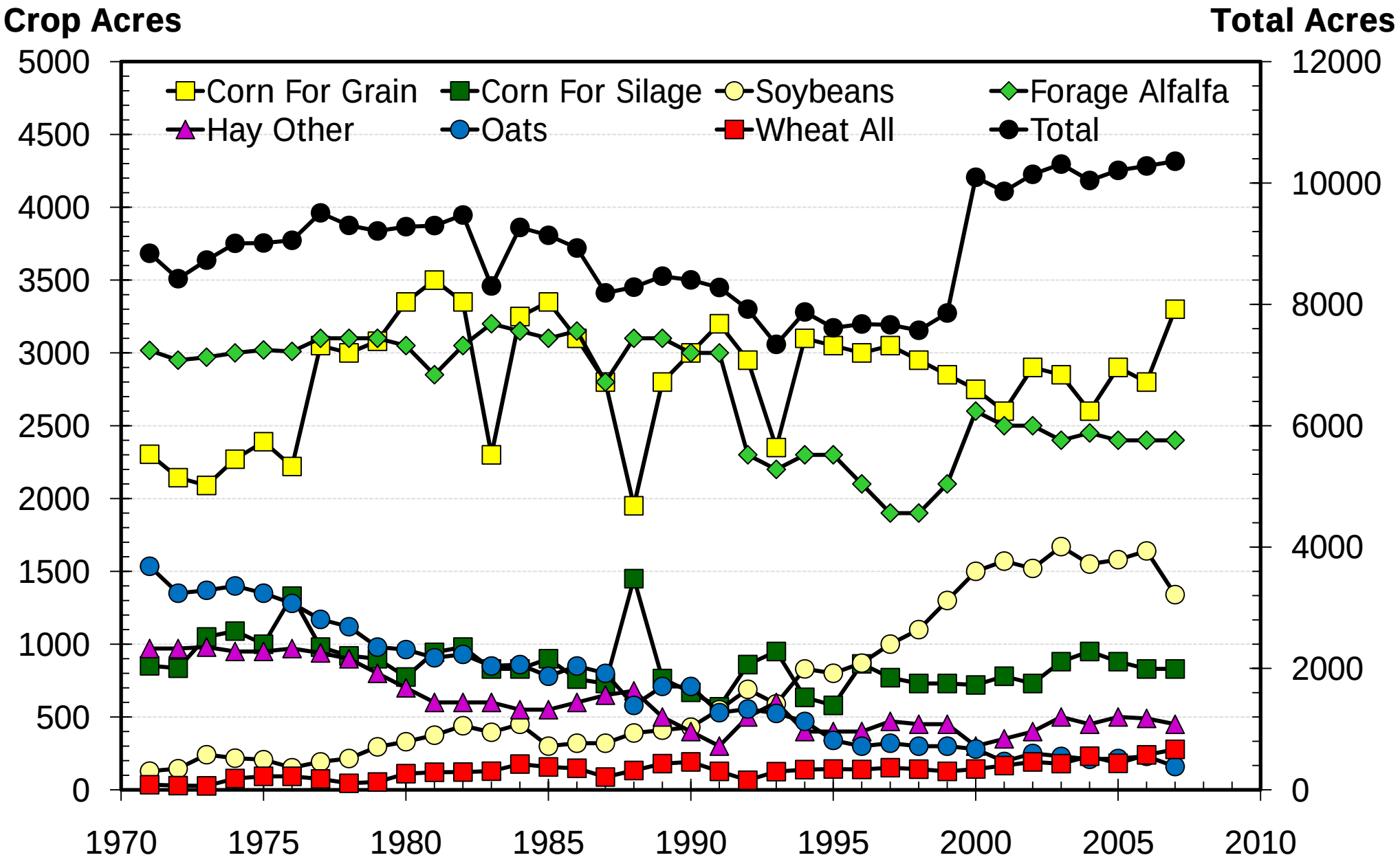
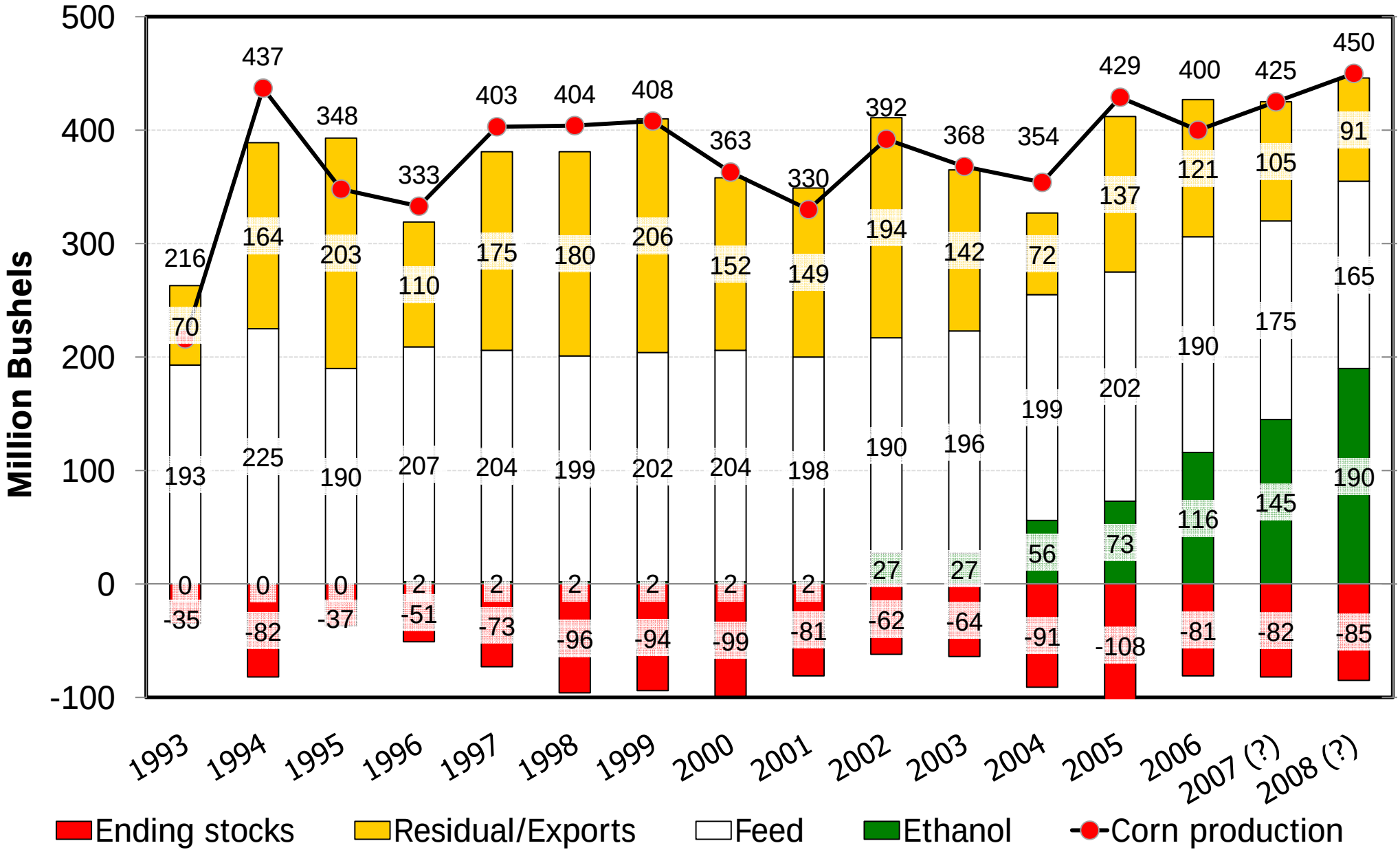
Continuous corn? Or rotate in 2008?
Wisconsin Corn Acreage

Source: USDA-NASS



Continuous corn, or rotate in 2008?
Wisconsin Corn Use

Sources: USDA-NASS
NCGA: The World of Corn



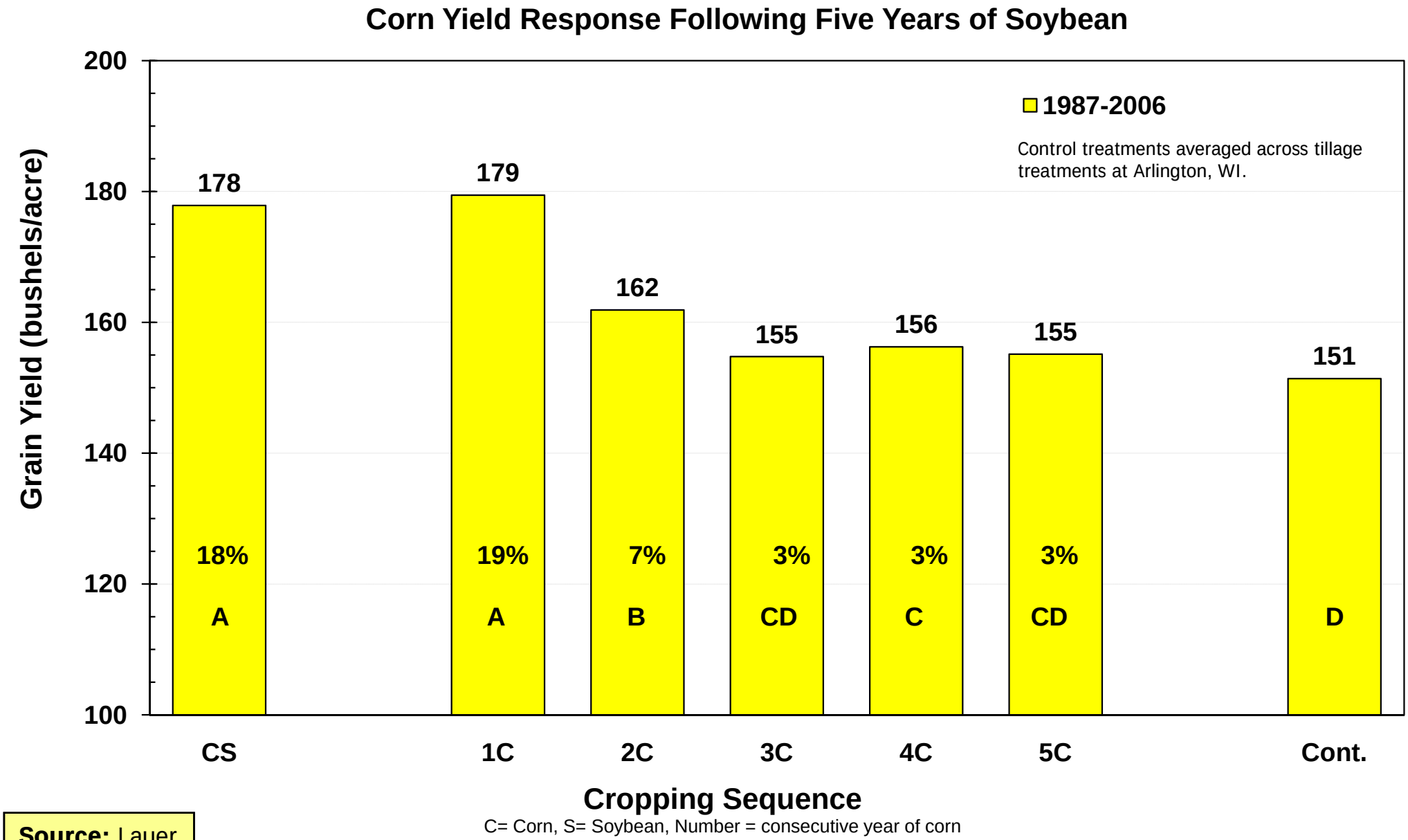
Overview

- **The Rotation Effect – What is it?**
- **Interactions to watch out for …**

The Rotation Effect – What is it?

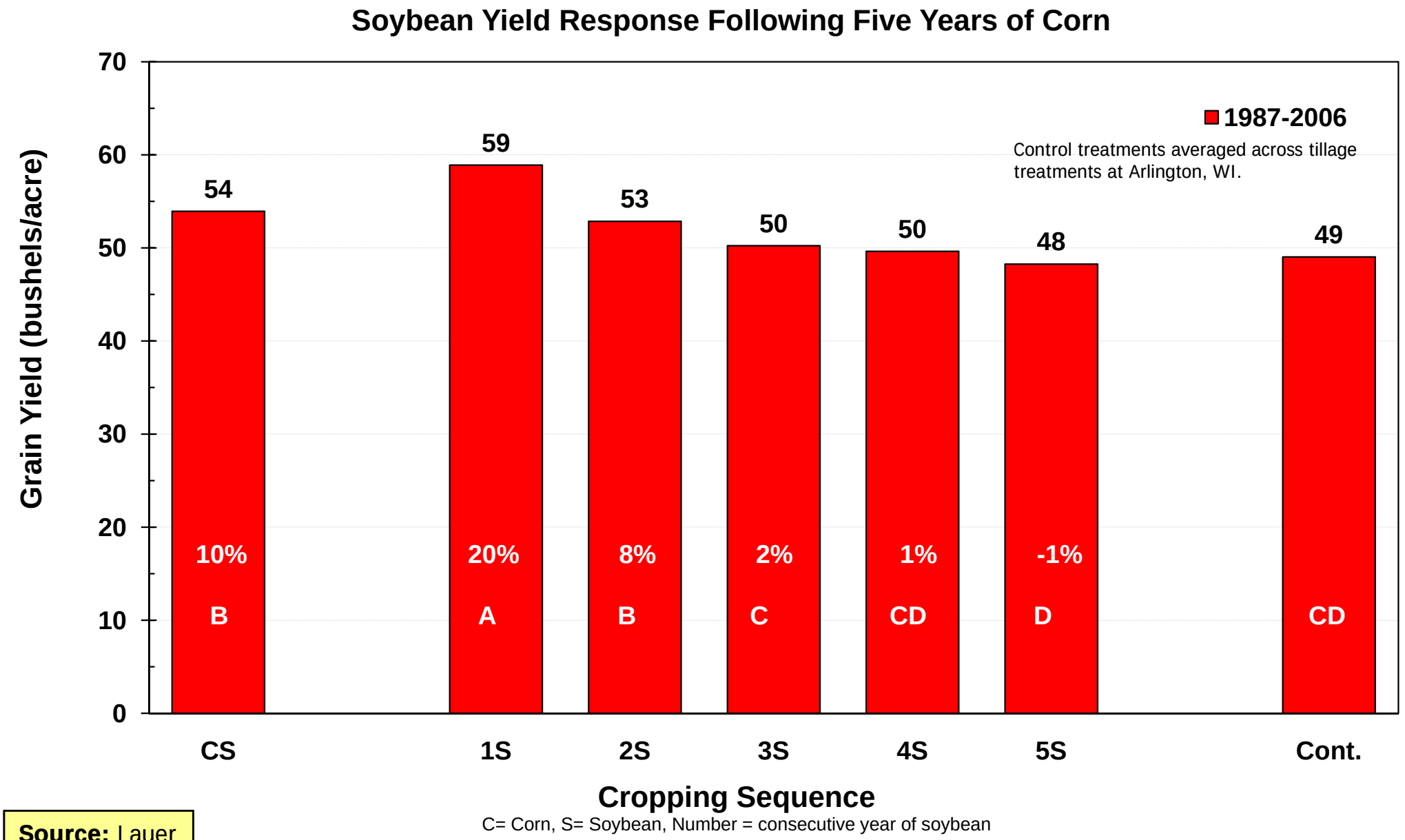
- **Crop Rotation**
  - ✓ Universal management practice
  - ✓ Proven management decision that increases crop yields
  - ✓ Currently, increased economic benefit for monoculture
- **Rotation Effect**
  - ✓ The effect of all conditions, other than N, supplied by legumes in a rotation (Baldock et al. 1981)
  - ✓ Other non-legume crops can provide benefits as well (Robinson, 1966; Langer and Randall, 1981; Crookston et al., 1988)
  - ✓ Additional benefits of rotating crops
    - ❑ All production inputs can be optimized
    - ❑ Typical problems associated with monoculture are not apparent.
- **Mechanism for effect is unknown**

The rotation effect lasts two years increasing corn grain yield 10 to 19% for 1C and 0 to 7% for 2C ...



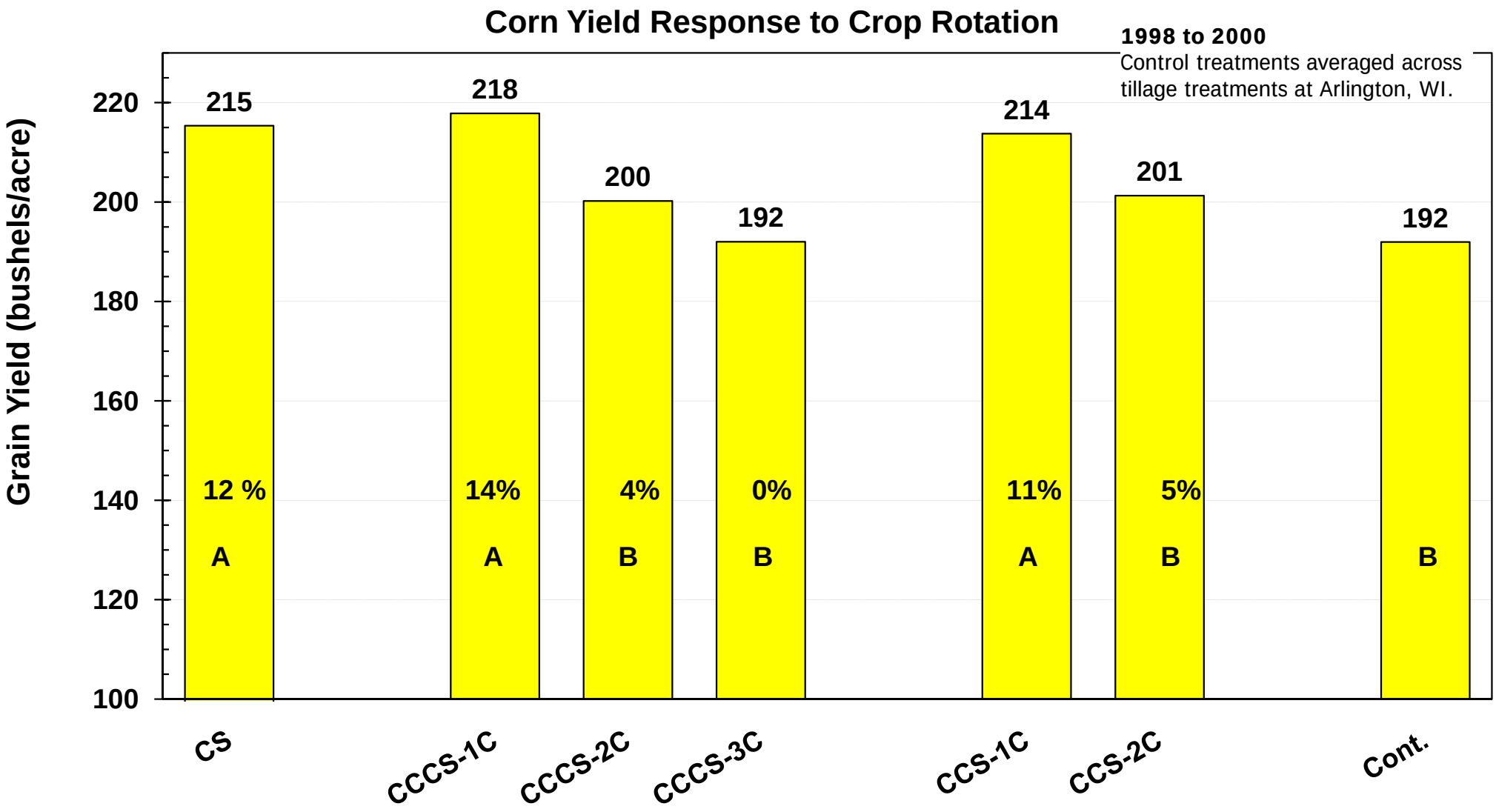
Source: Lauer

The rotation effect lasts two years increasing soybean grain yield 10 to 20% for 1S and 8% for 2C ...



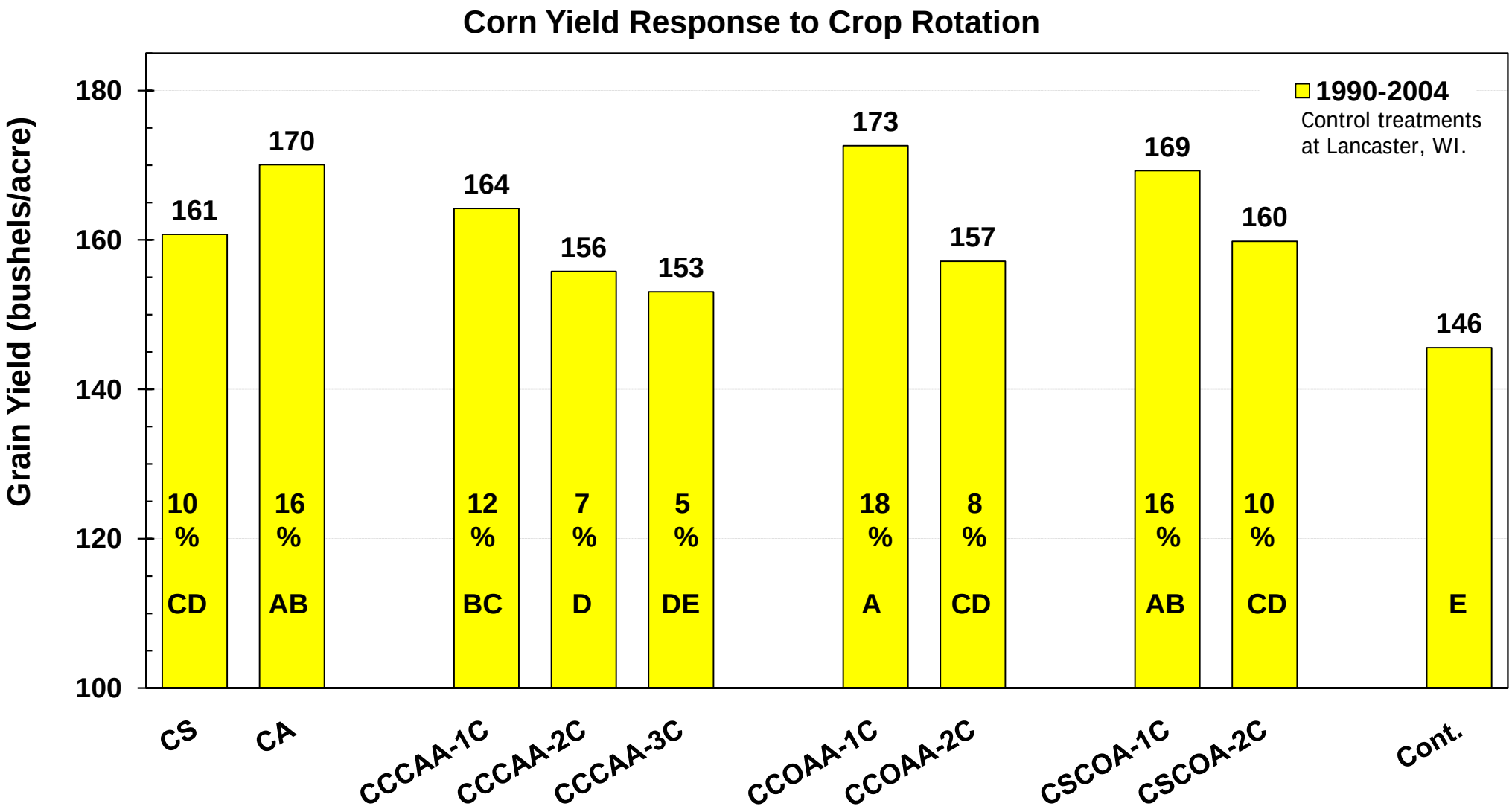
Source: Lauer

A one year break using soybean reduces the rotation effect in the second phase (NS to CC) ...



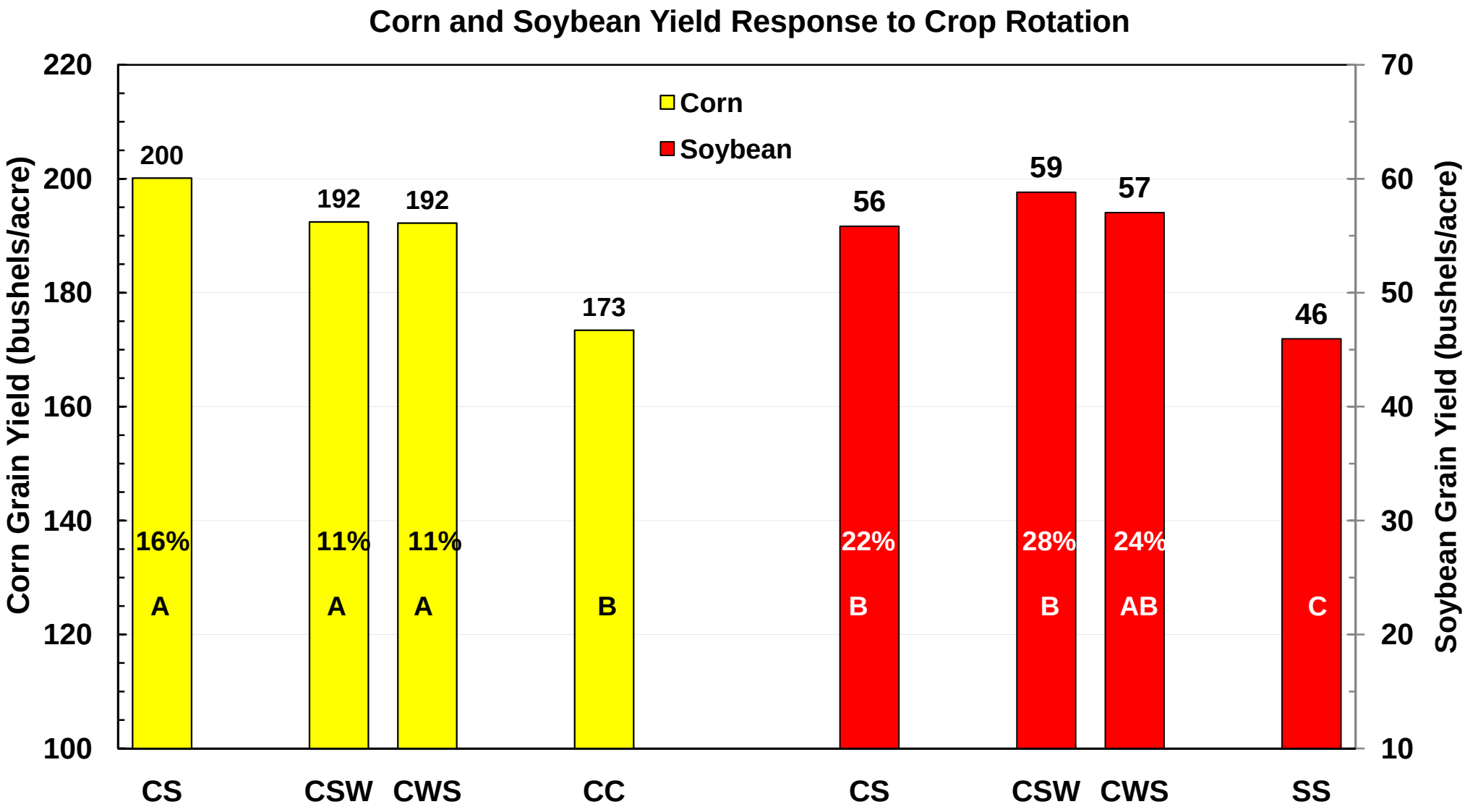
Source: Lauer

At least two break years are needed to measure a response in the second crop phase ...



Source: Stanger and Lauer, 2008

Adding a third crop does not increase corn grain yield, but does improve soybean grain yield ...



2004-2006: Values averaged across seed fungicide treatments at Arlington, WI.

Source: Lauer

UW Extension

http://corn.agronomy.wisc.edu

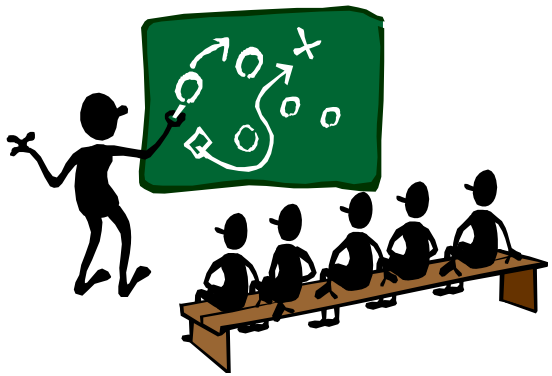
Management Decision Interactions with Rotation

Significant

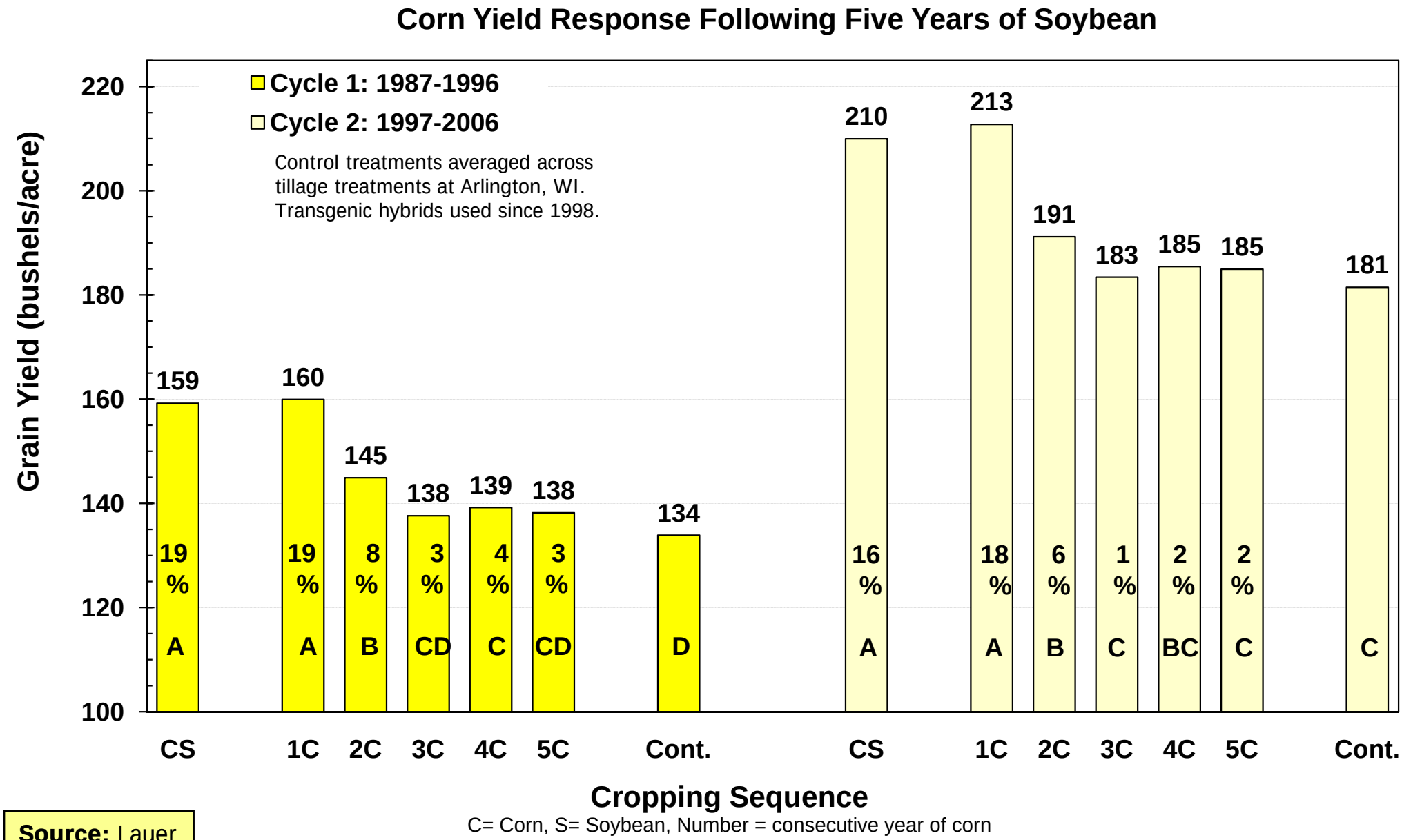
- **Tillage**
- **N rate**
- **CR Insecticide**
  - ✓ CR Variant = NS (need all the time)
- **Environment**

Non-significant

- **Plant density**
- **Row spacing**
- **Modern hybrids versus old hybrids**
  - ✓ Modern hybrids can “handle” continuous corn



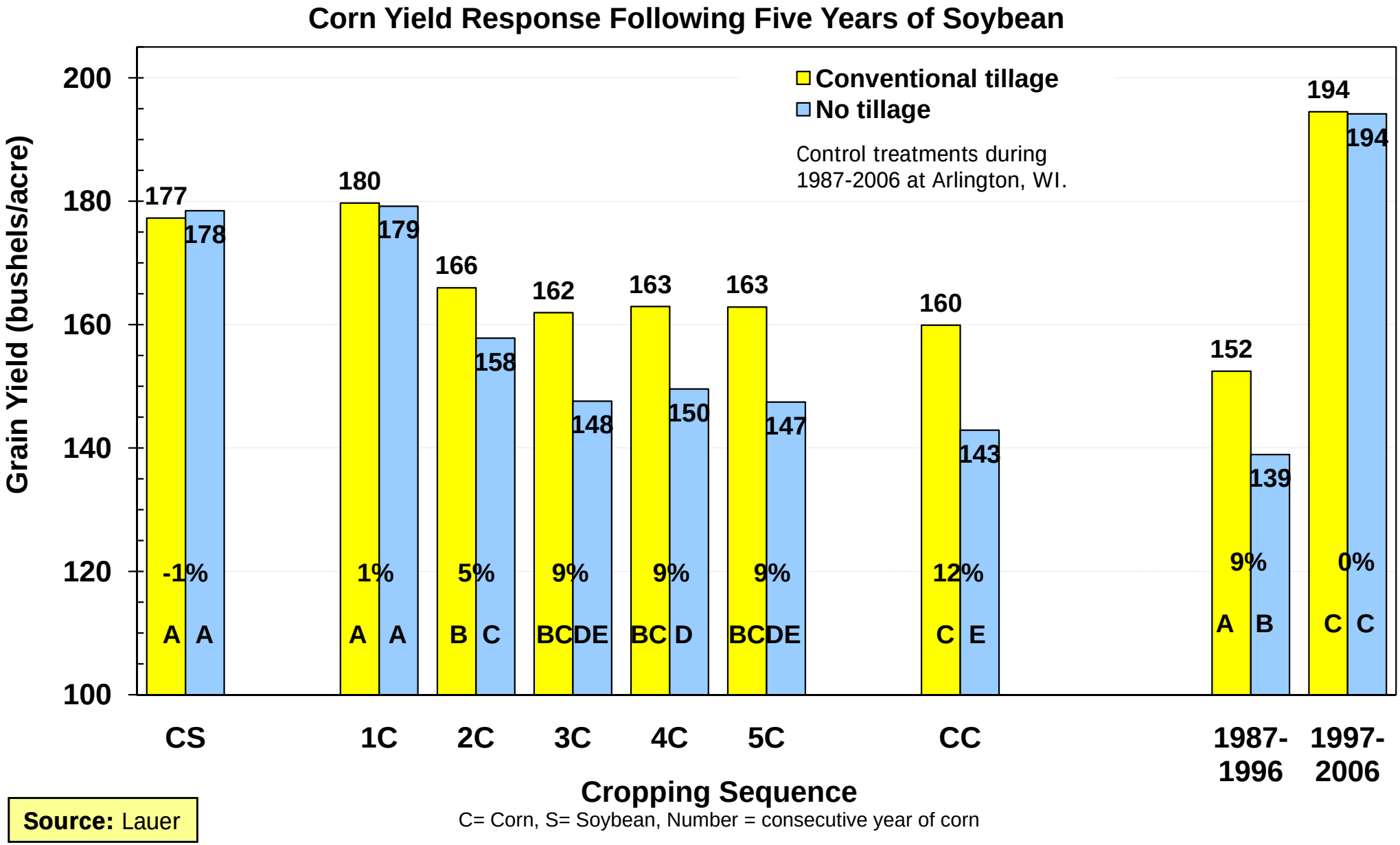
Modern corn hybrids and management practices have the same rotation response as older hybrids and practices ...



Source: Lauer

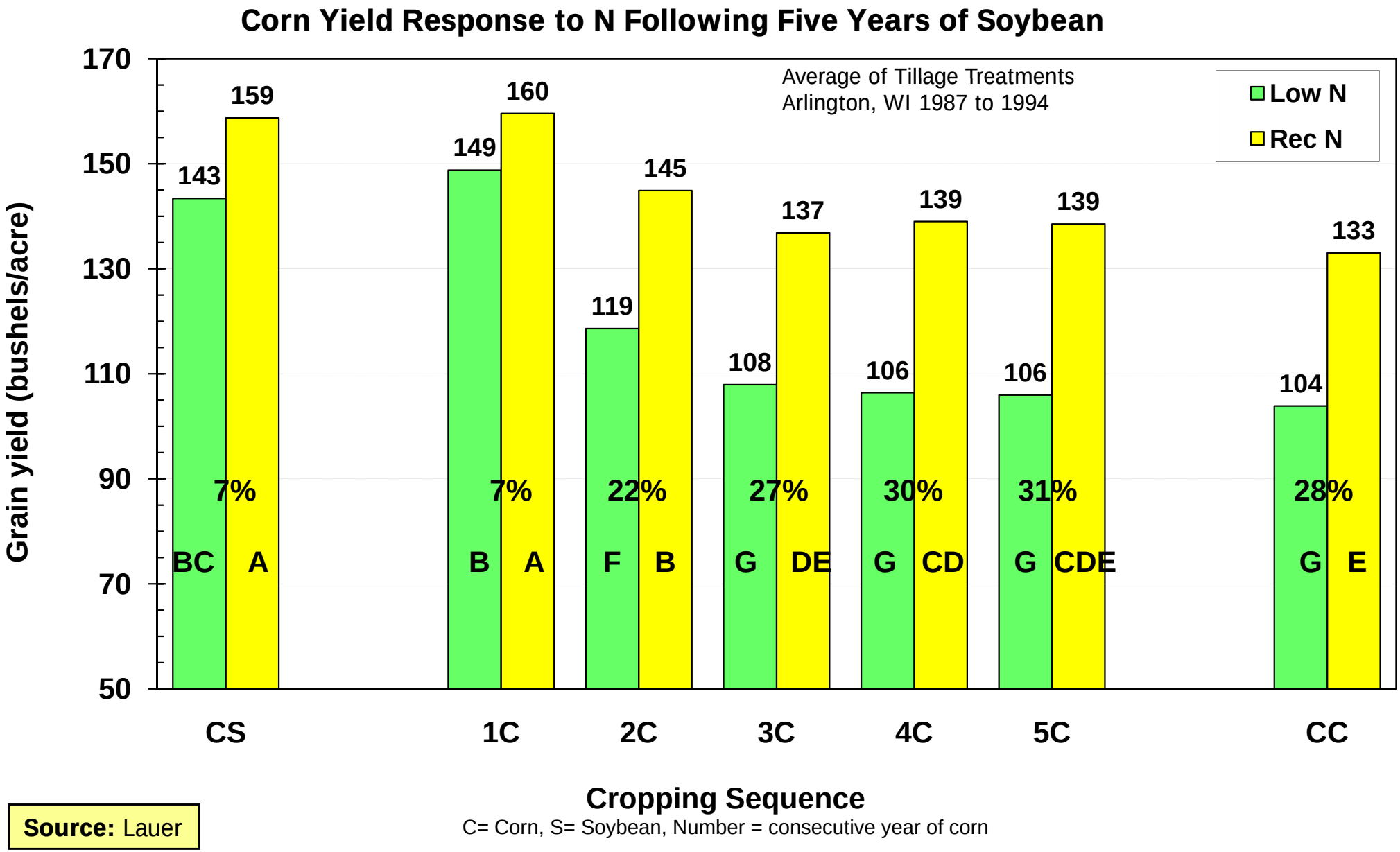
Tillage does not affect corn yield the first year following soybean, but improves yield 5% in the second year, and 9% in the third year ...

No tillage response is observed in the second cycle ...



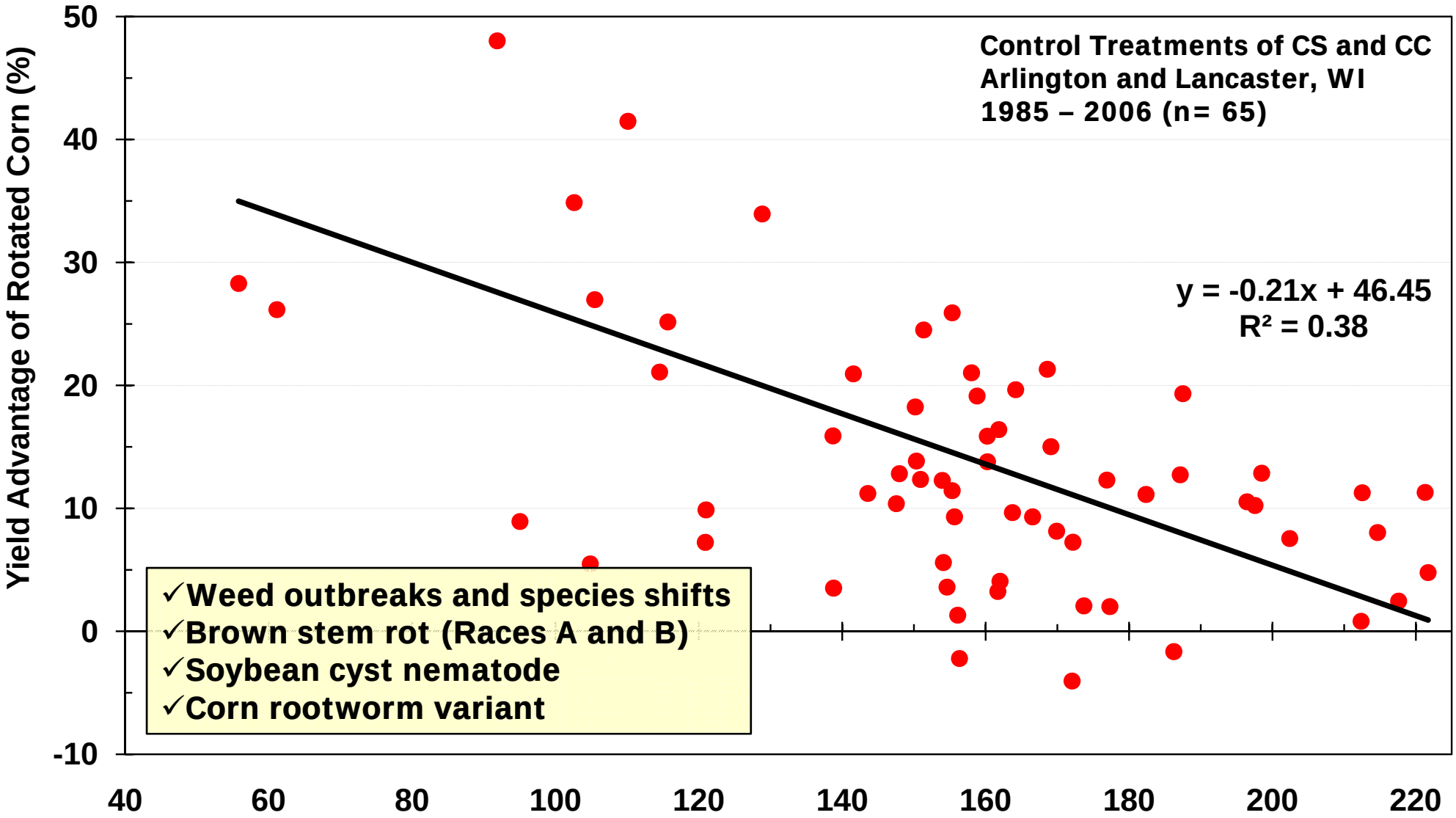
Source: Lauer

N fertilization response increases in 2C and 3C of the rotation, so err on the high side of the recommended N application range …



Source: Lauer

Rotation is more important in stress environments ...



Source: Lauer, unpublished

Conclusions

- **Mechanism for rotation effect is unknown**
  - ✓ Hypothesis #1: One factor causes effect.
  - ✓ Hypothesis #2: Multiple factors cause effect and risk of expression depends upon the environment.
- **The rotation effect lasts at most two years increasing grain yield 10 to 19% for 1C and 0 to 7% for 2C.**
- **At least two break years are needed to measure a response in the second continuous cropping year.**
  - ✓ A one year break using soybean reduces the rotation effect in the second continuous year.
- **Adding a third crop does not improve corn yield, but does improve soybean yield.**
- **Tillage does not affect yield the first year following soybean, but improves yield 5% in the second year, and 9% in the third year.**
- **N fertilization response increases in 2C and 3C of the rotation, so err on the high side of the N application range.**
- **Modern corn hybrids and management practices have the same rotation response as older hybrids and practices.**
- **Crop rotation is even more important in stress environments.**
  - ✓ Continuous- versus rotated-corn results in yield advantages of 5 to 30% for rotated-corn.

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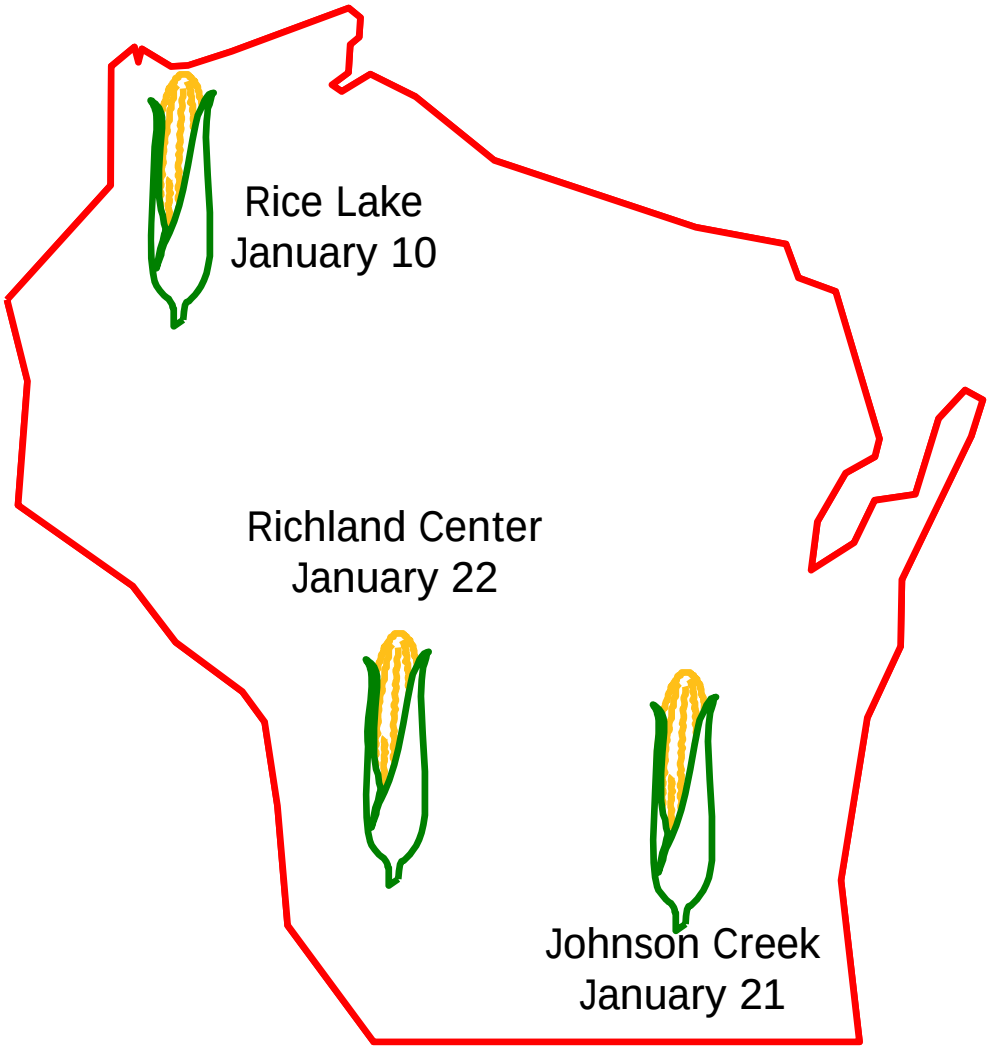
Photo by Justin Hopf

Thanks for your attention!
Questions?

2008 Corn Conferences



WISCONSIN Corn/Soy EXPO

PEPS

January 24-25, 2008
Kalahari Resort
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