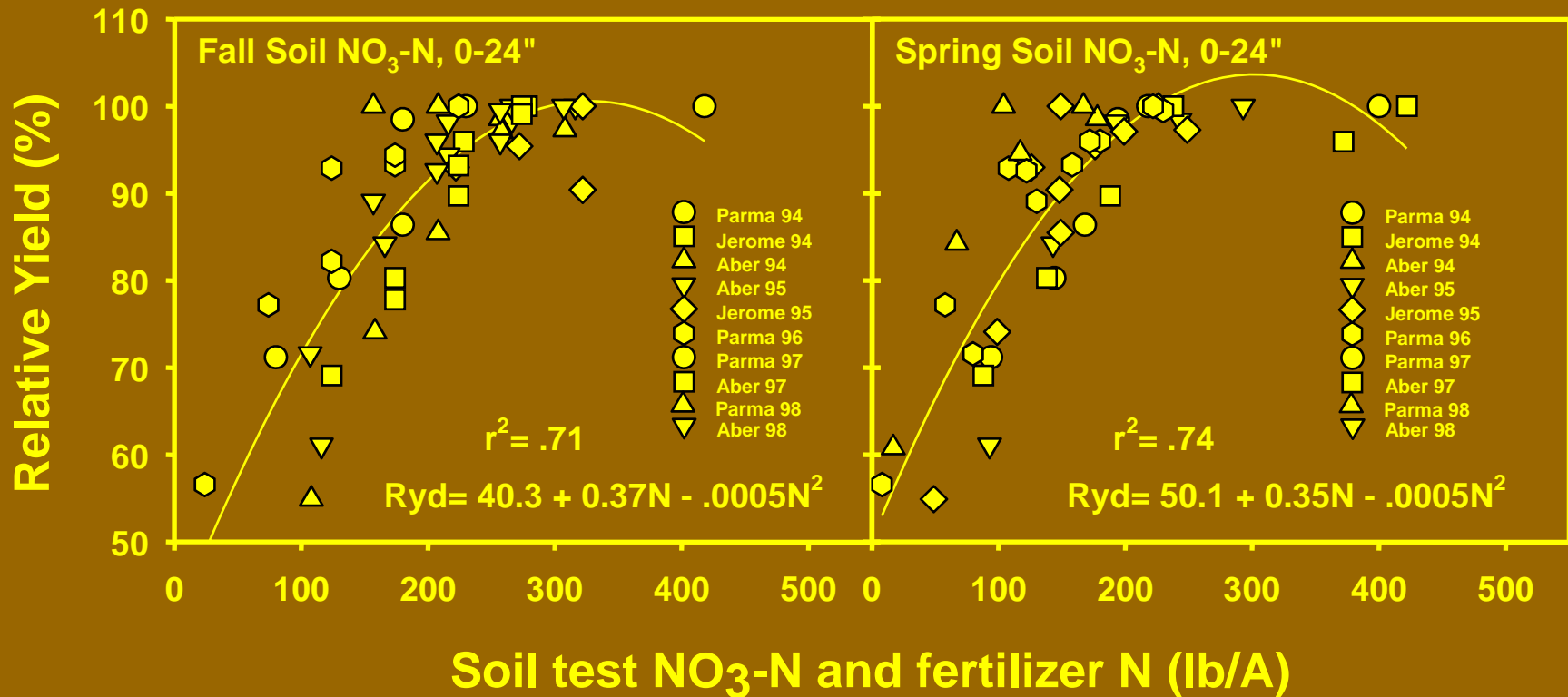
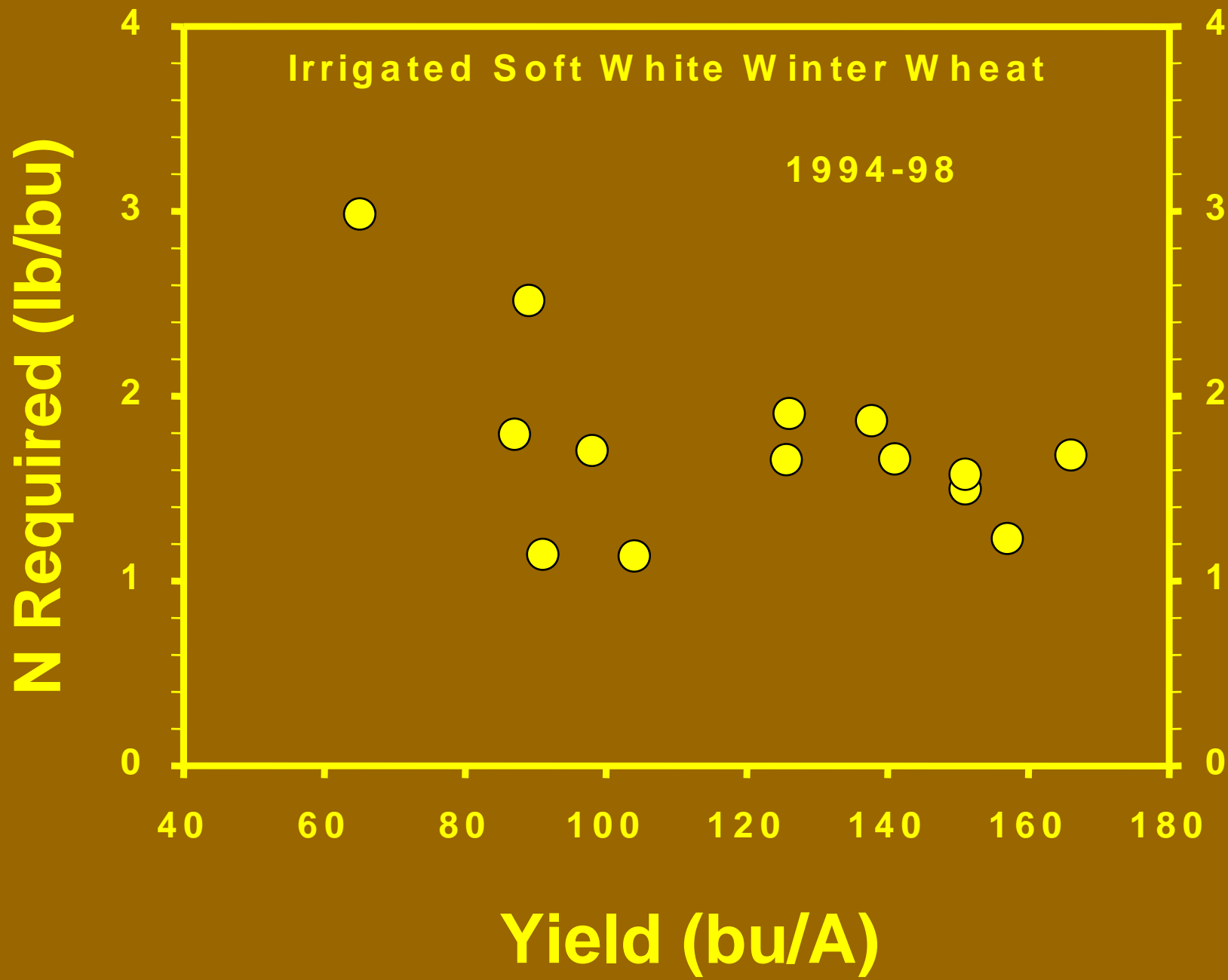


# Winter Wheat Response to Readily Available N





# Slow Release N for Hard Wheat Yield and Protein

Brad Brown

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**2008 Cereal Schools**

Production of high yielding irrigated hard wheat with acceptable protein has been challenging despite producer efforts to manage available N for protein enhancement, e.g. late season N.

Furrow irrigated producers are especially frustrated because

- (1) they don't enjoy the same N management options
- (2) N use efficiency is apparently lower

# Ideal preplant N source

- *One application to minimize application costs*
- *Avoid excessive N effects on yield*
- *Provide late season N release for increasing protein*
- *Minimize volatile N losses*

Slow release N technology may provide the advantages furrow and sprinkler irrigated producers need for higher preplant incorporated N

Objective:

To evaluate preplant slow release  
N for furrow irrigated DNS

# Treatments

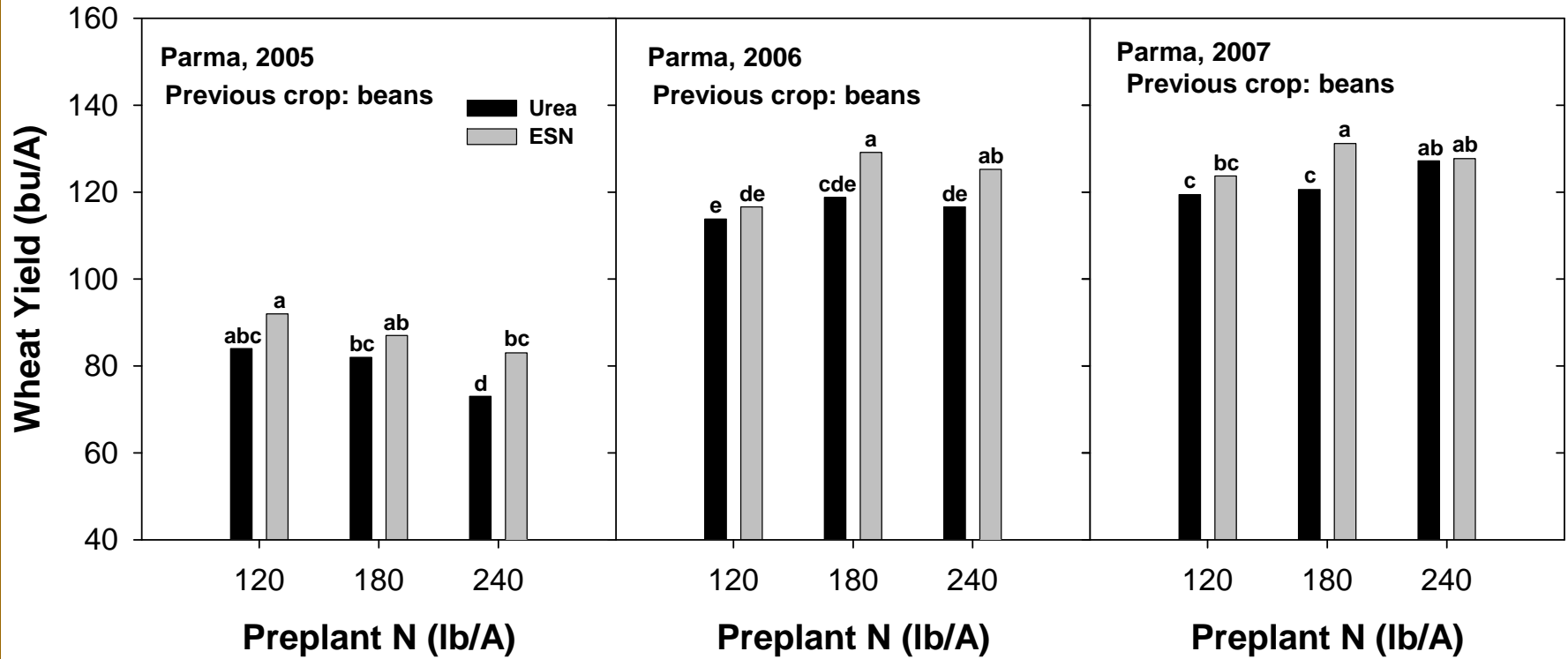
N rates: 120, 180, 240 lb /A

N sources: ESN, Urea

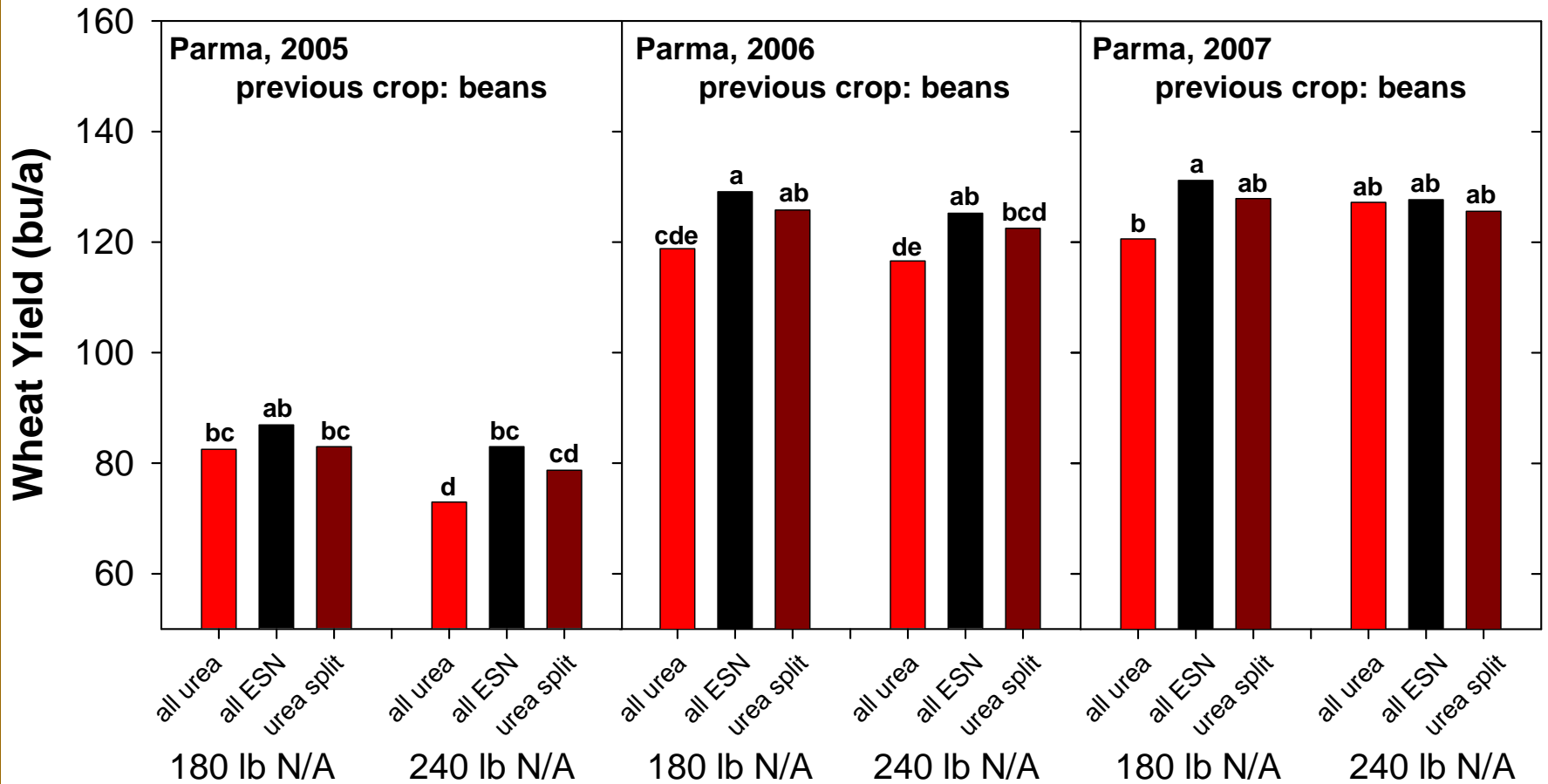
Increasing substitution of ESN for Urea  
at the 180 rate

Late season N: dry urea at 60 lb N/A

# HRS Yield Response to Preplant N



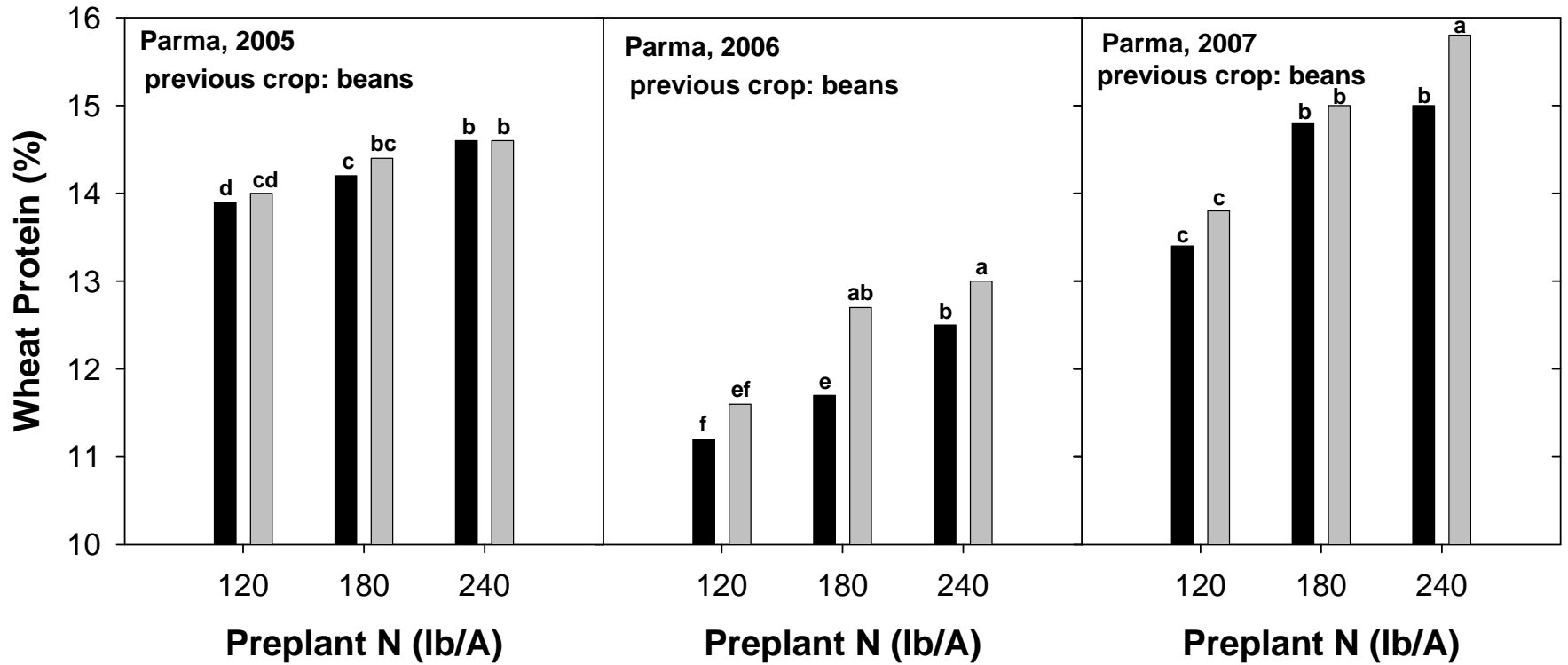
# HRS Grain Yield Response to Preplant and Late N



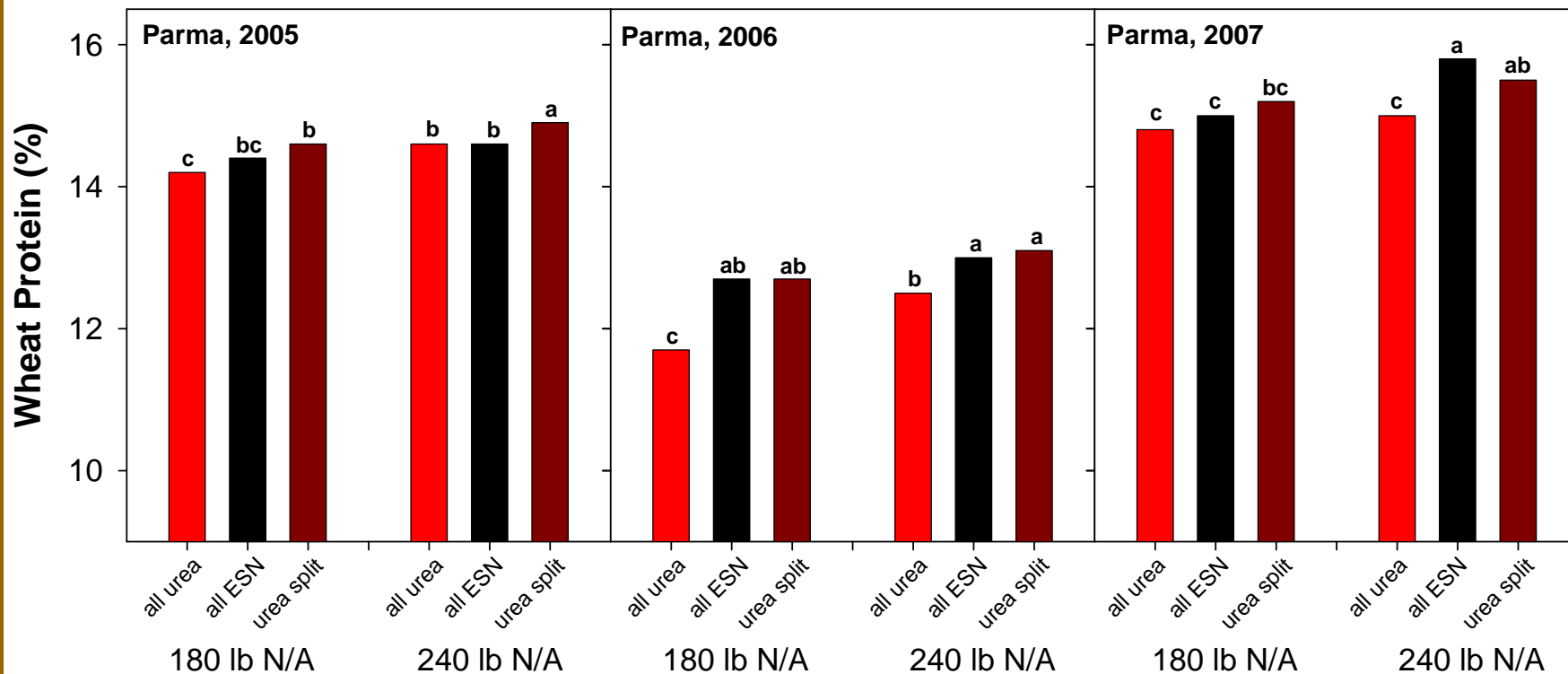
# Slow release preplant N

- helped reduce excessive urea N effects on yield
- 
- increased N utilization and yield compared to preplant dry urea
- was used at least as effectively as split applied N for increasing yield

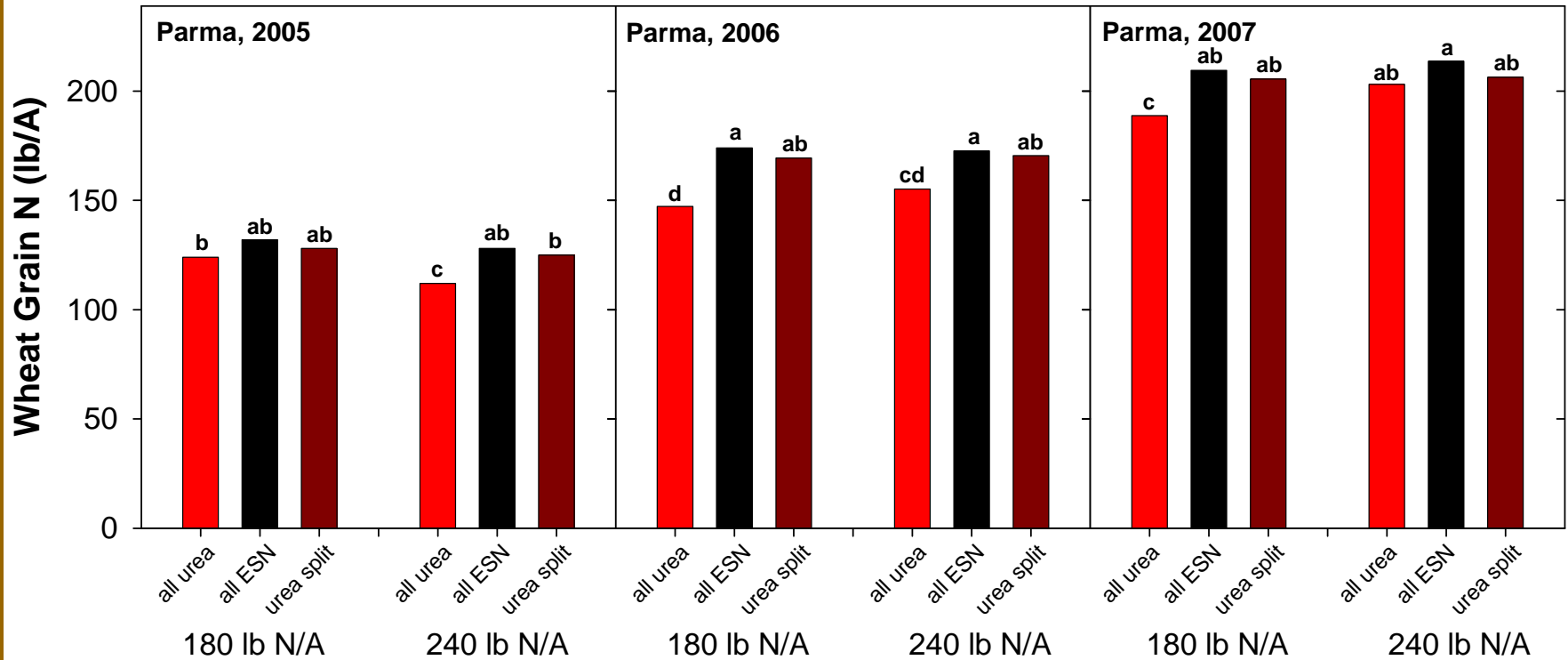
## HRS Protein Response to Preplant N



## HRS Grain Protein Response to Preplant and Late N



## HRS Grain Protein N Response to Preplant and Late N



# Slow release preplant N

- Was more effective than preplant dry urea at increasing protein at higher N rates
- Was as effective as split urea N at increasing protein in two of three years
- Was at least as effective as split urea in producing total protein N per acre

## Assume

ESN is \$.11/lb N more expensive than urea, equal application costs, wheat is \$4/bu, ignoring protein.

$N_{opt}$ rate	Urea Gross	ESN Gross	Net
120 (2005)	336	368	18.80
180 (2006)	475	516	21.40
180 (2007)	482	525	22.60

## Assume

ESN is \$.11/lb N more expensive than urea, equal application costs, wheat is \$3/bu, ignoring protein.

$N_{opt}$ rate	Urea Gross	ESN Gross	Net
120 (05)	252	276	10.80
180 (06)	356	387	11.20
180 (07)	362	394	12.20

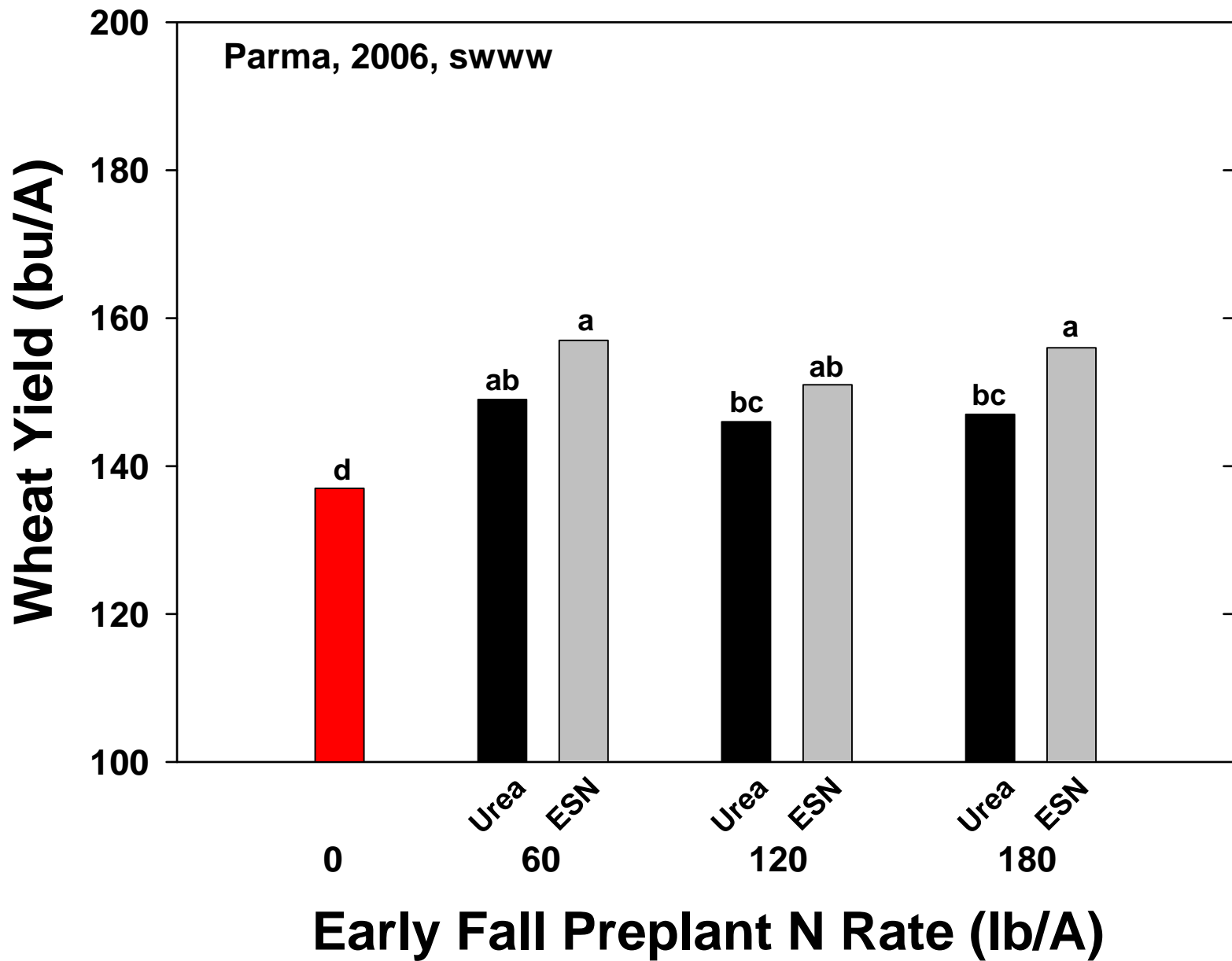
## *Caution*

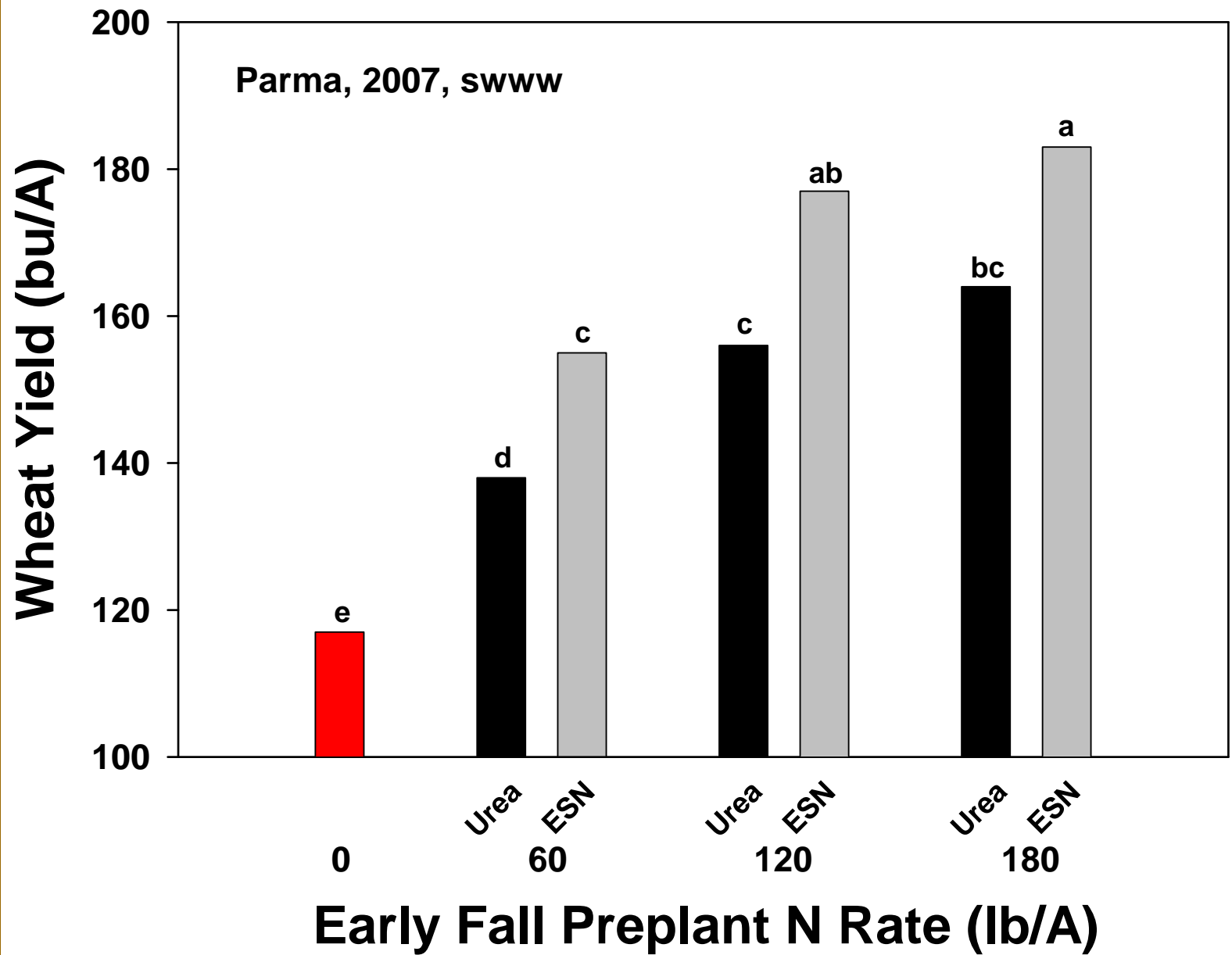
Slow release N may not release N rapidly enough to satisfy early season wheat N requirements when residual N is low.

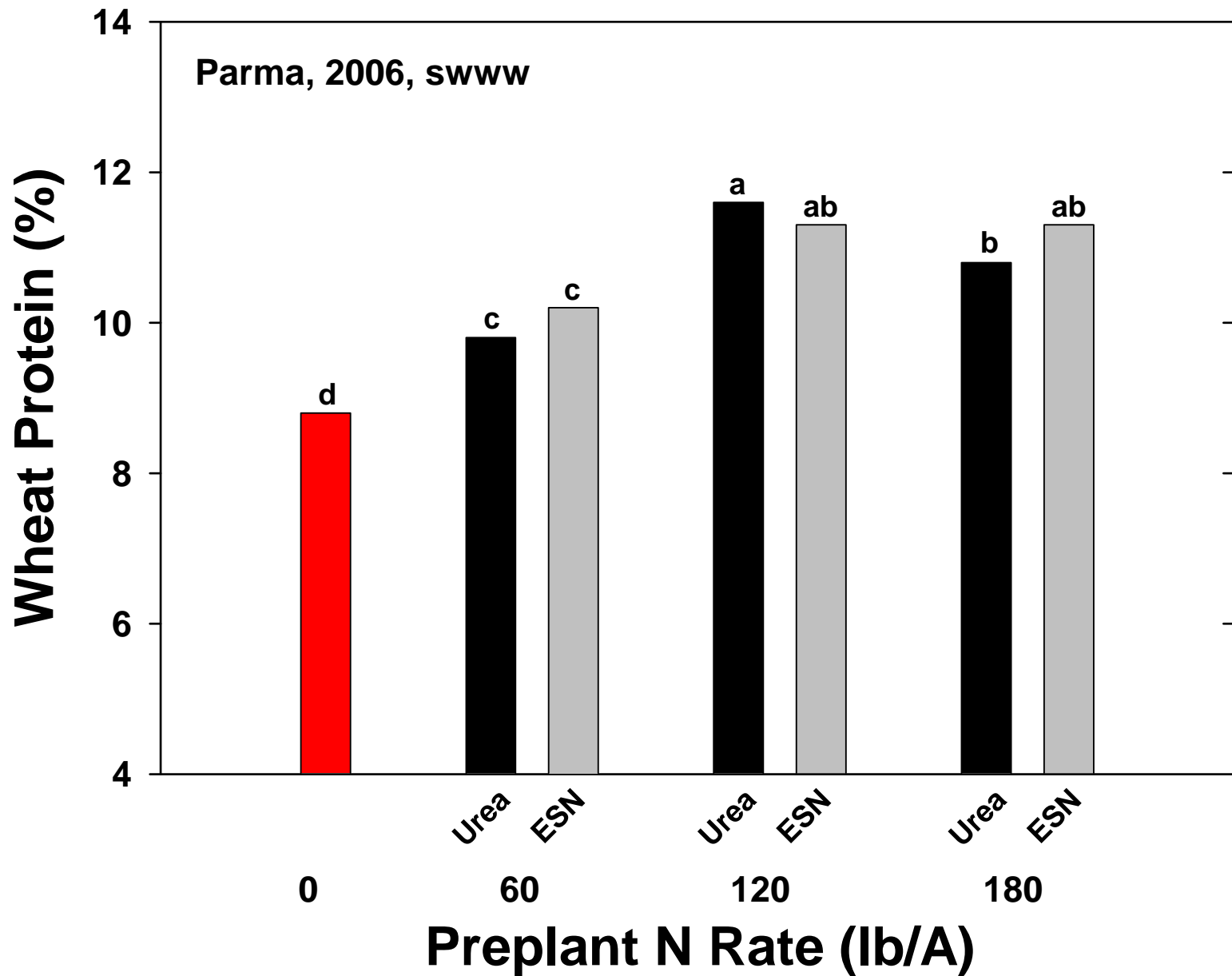
# Slow Release Preplant N for Winter Wheat

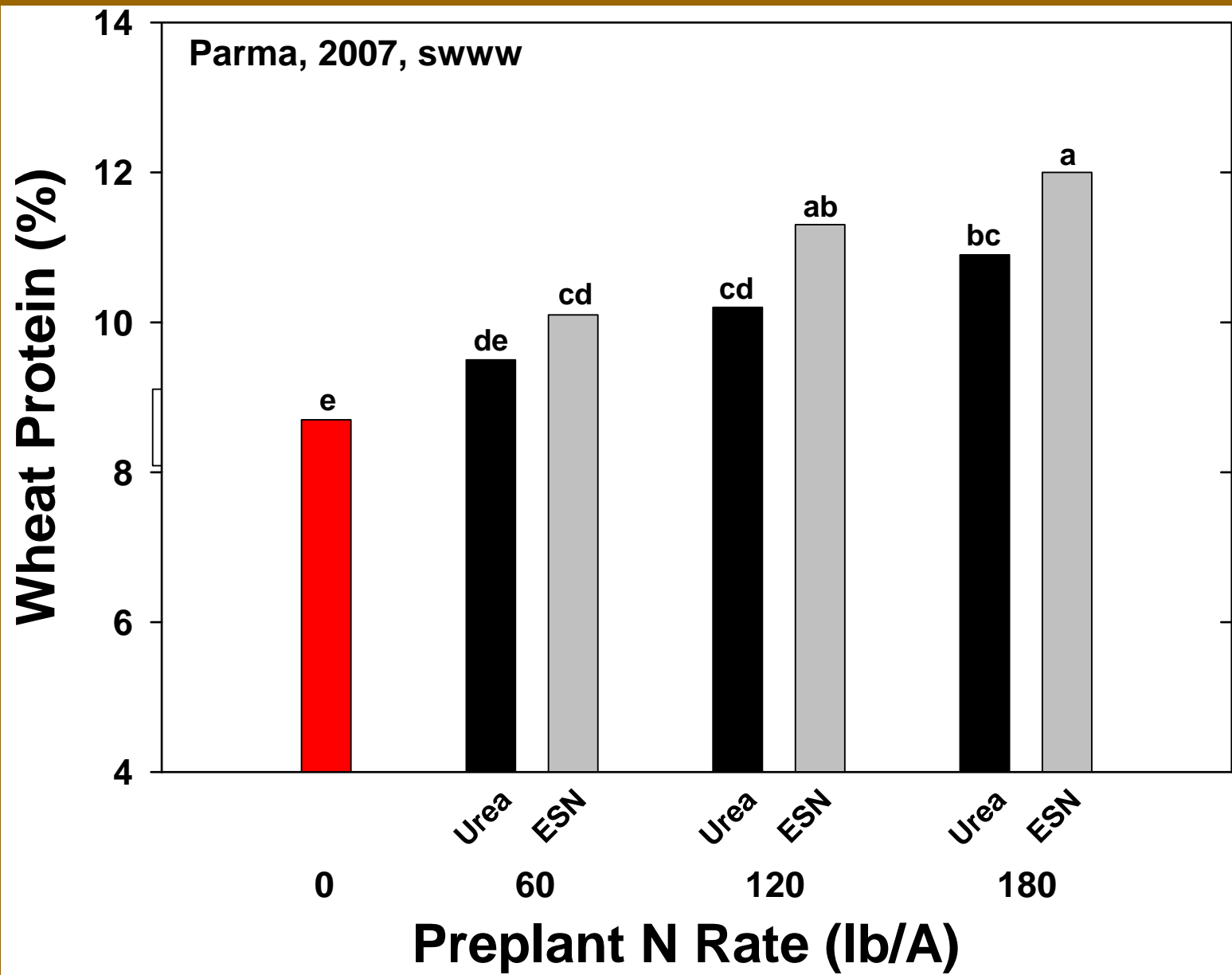
N Sources: Urea, ESN

N Rates: 0, 60, 120, 180









# Assume

ESN is \$.11/lb N more expensive than urea, equal application costs, wheat is \$3/bu (SWW), ignoring protein.

<b>N rate</b>	<b>Urea Gross</b>	<b>ESN Gross</b>	<b>Net</b>
<b>60 (06)*</b>	<b>447</b>	<b>471</b>	<b>17.40</b>
<b>180 (06)</b>	<b>356</b>	<b>387</b>	<b>11.20</b>
<b>60 (07)</b>	<b>414</b>	<b>492</b>	<b>71.20</b>
<b>180 (07)</b>	<b>465</b>	<b>549</b>	<b>64.20</b>

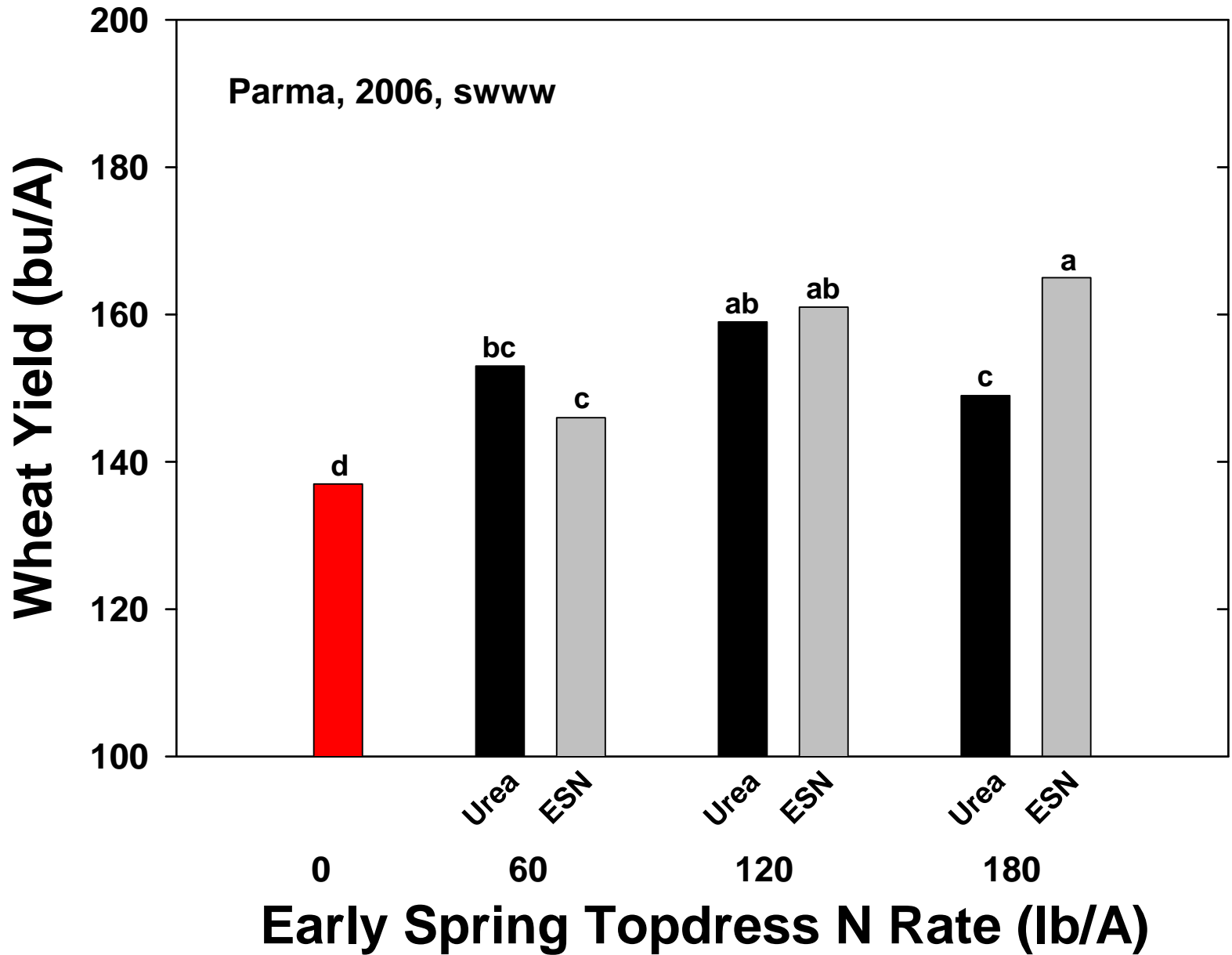
# Slow Release Preplant N for Winter Wheat

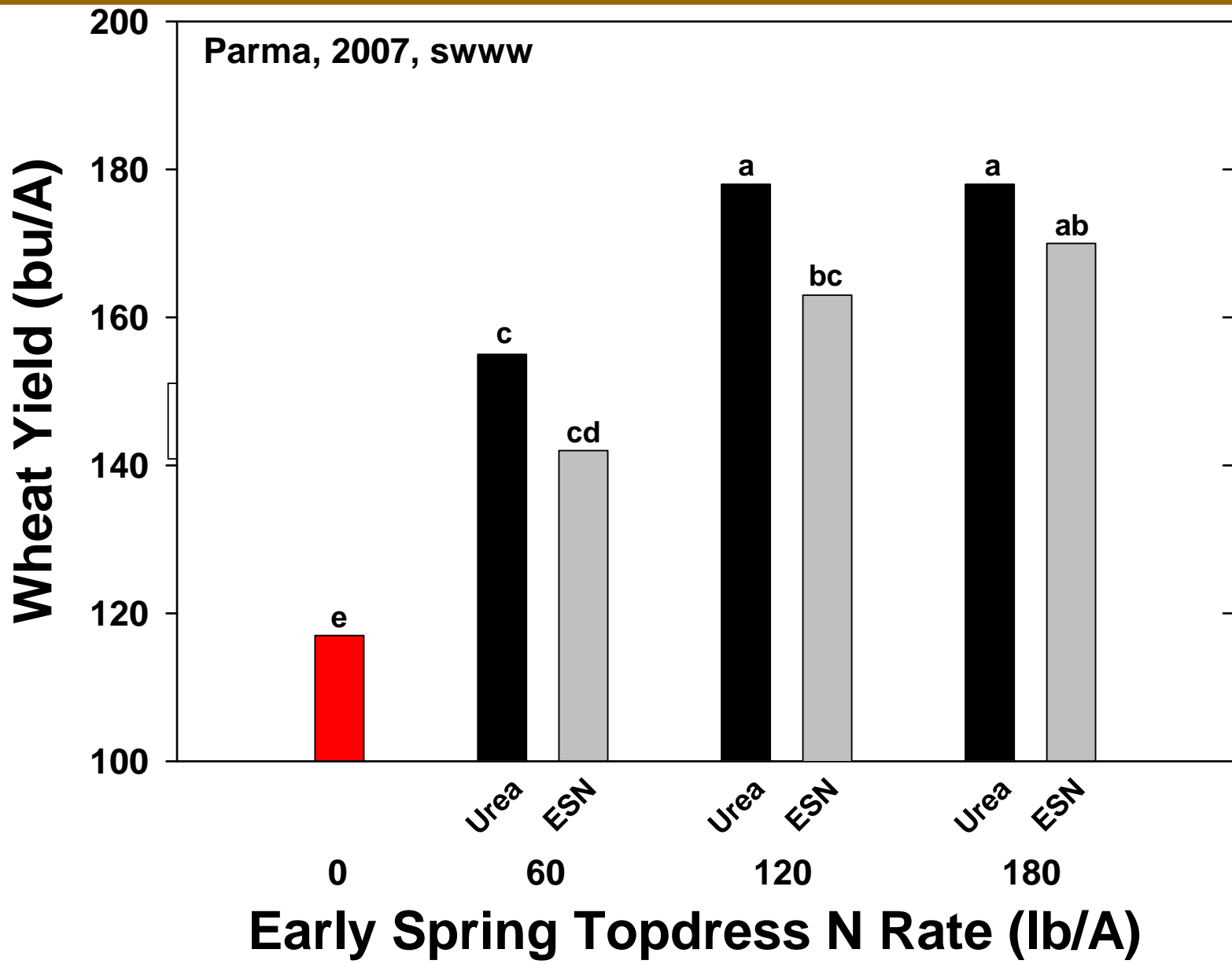
- was consistently at least as productive or more than urea for winter wheat yield and protein
- 
- Was cost effective in the two years evaluated
-

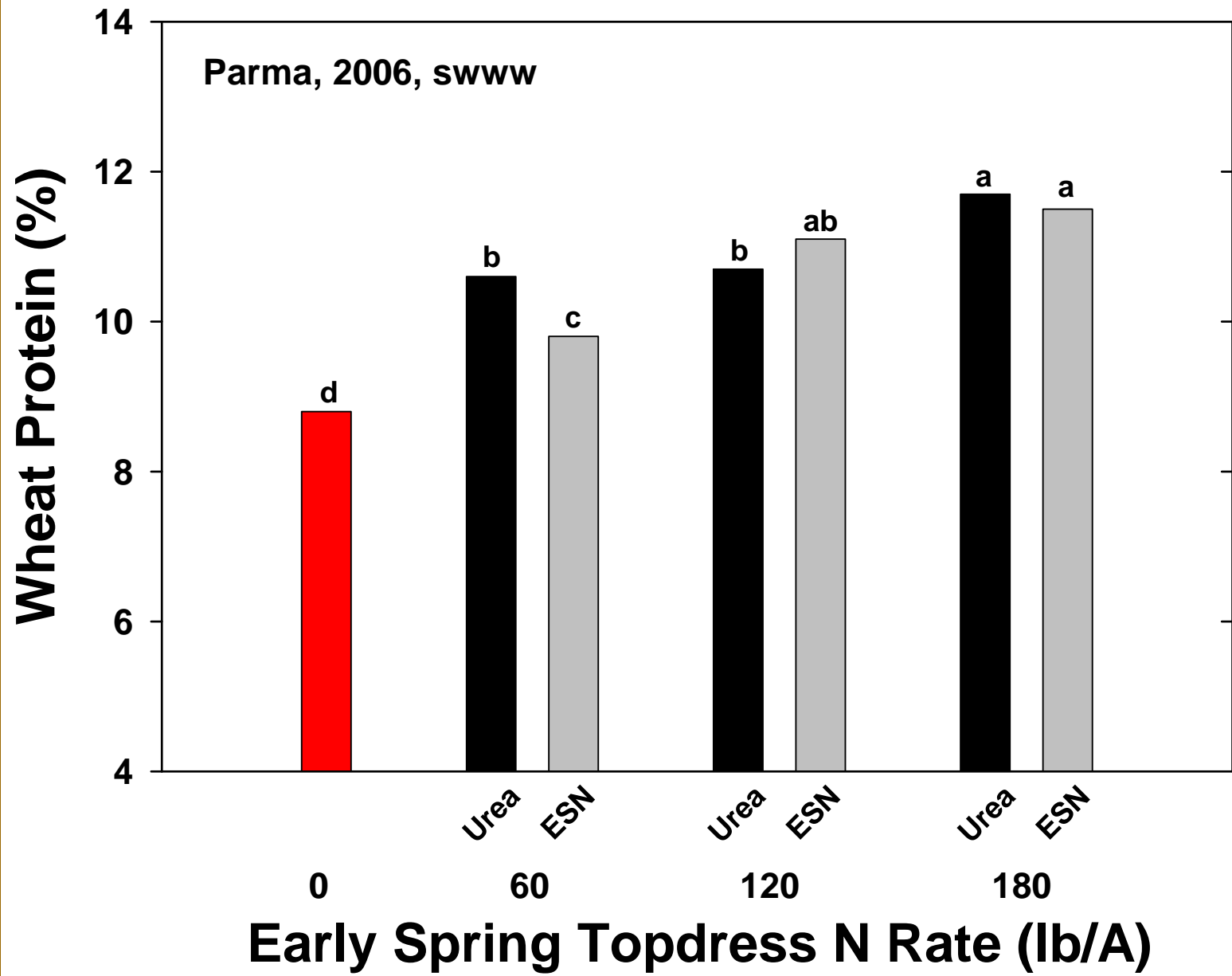
# Slow Release Topdressed N in Late Winter for Winter Wheat

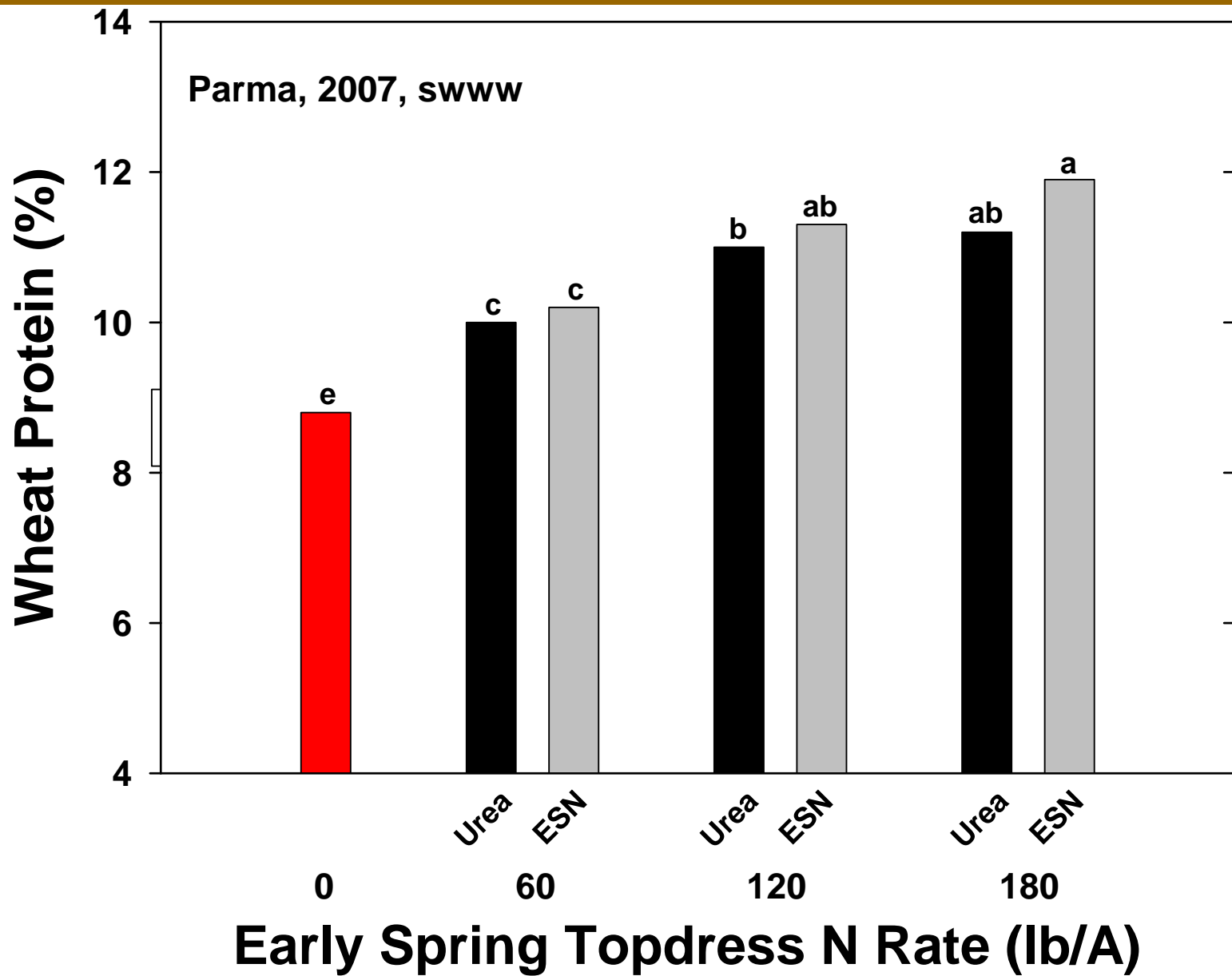
N Sources: Urea, ESN

N Rates: 0, 60, 120, 180









# Assume

ESN is \$.11/lb N more expensive than urea, equal application costs, wheat is \$3/bu (SWW), ignoring protein.

N rate	Urea Gross	ESN Gross	Net
60 (06)*	459	438	-27.60
180 (06)	449	495	26.20
60 (07)	465	426	-45.60
180 (07)	534	510	-43.80

# Slow Release Topdressed N in Late Winter for Winter Wheat

- was not as consistently effective as topdressed urea for furrow irrigated winter wheat yield
- 
-

# Seed Banded N for Wheat

- Banding low to moderate rates of N with seed may save application costs but the rates used are limited due to risks of reducing germination
- Urea is the most phytotoxic of the conventional N sources available

# Seed Banding Risks

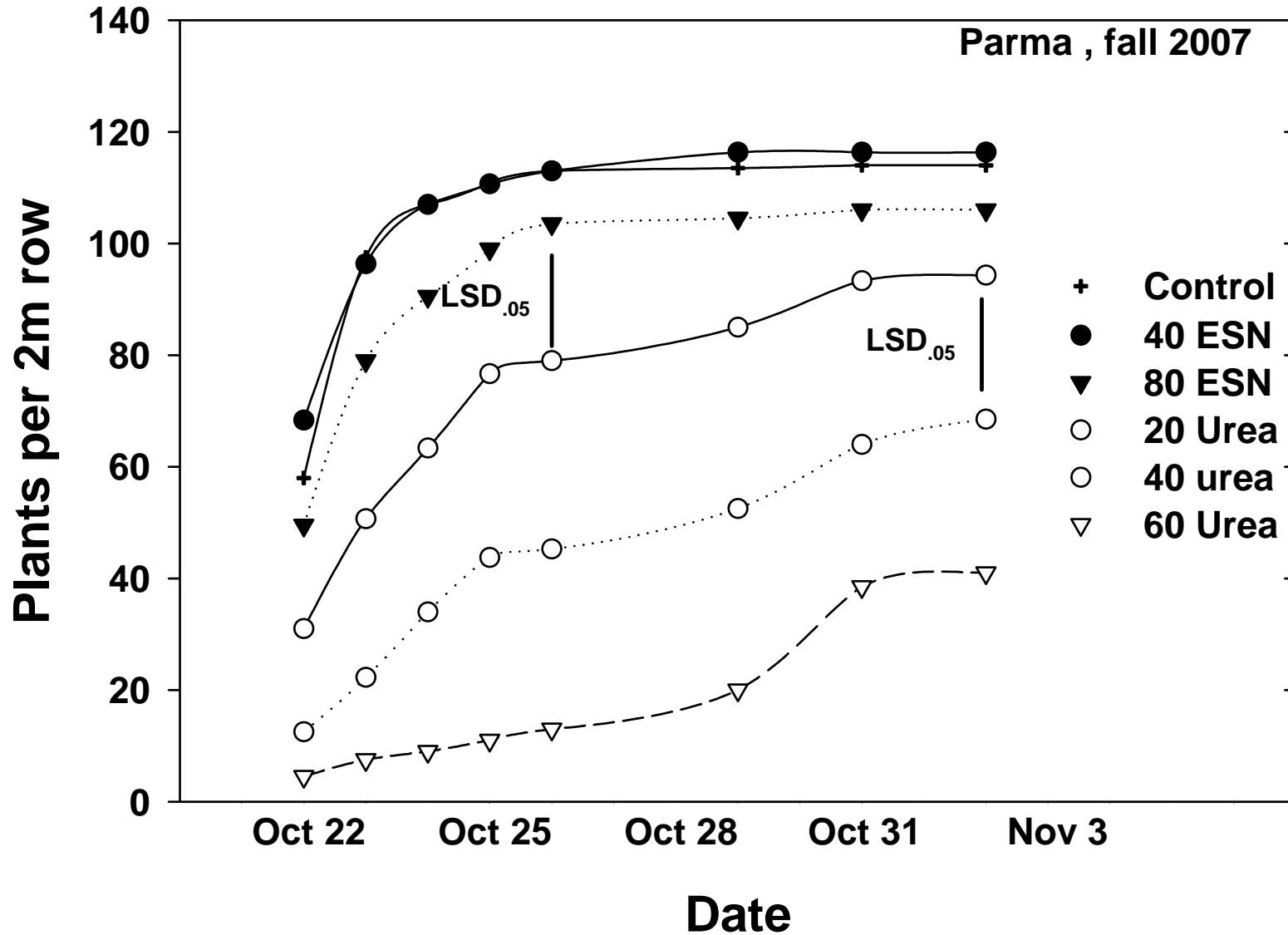
- Salt Effects
  - K, SO<sub>4</sub>, Cl, NO<sub>3</sub>,
- NH<sub>3</sub> toxicity
  - any ammoniac N, urea

# Treatments

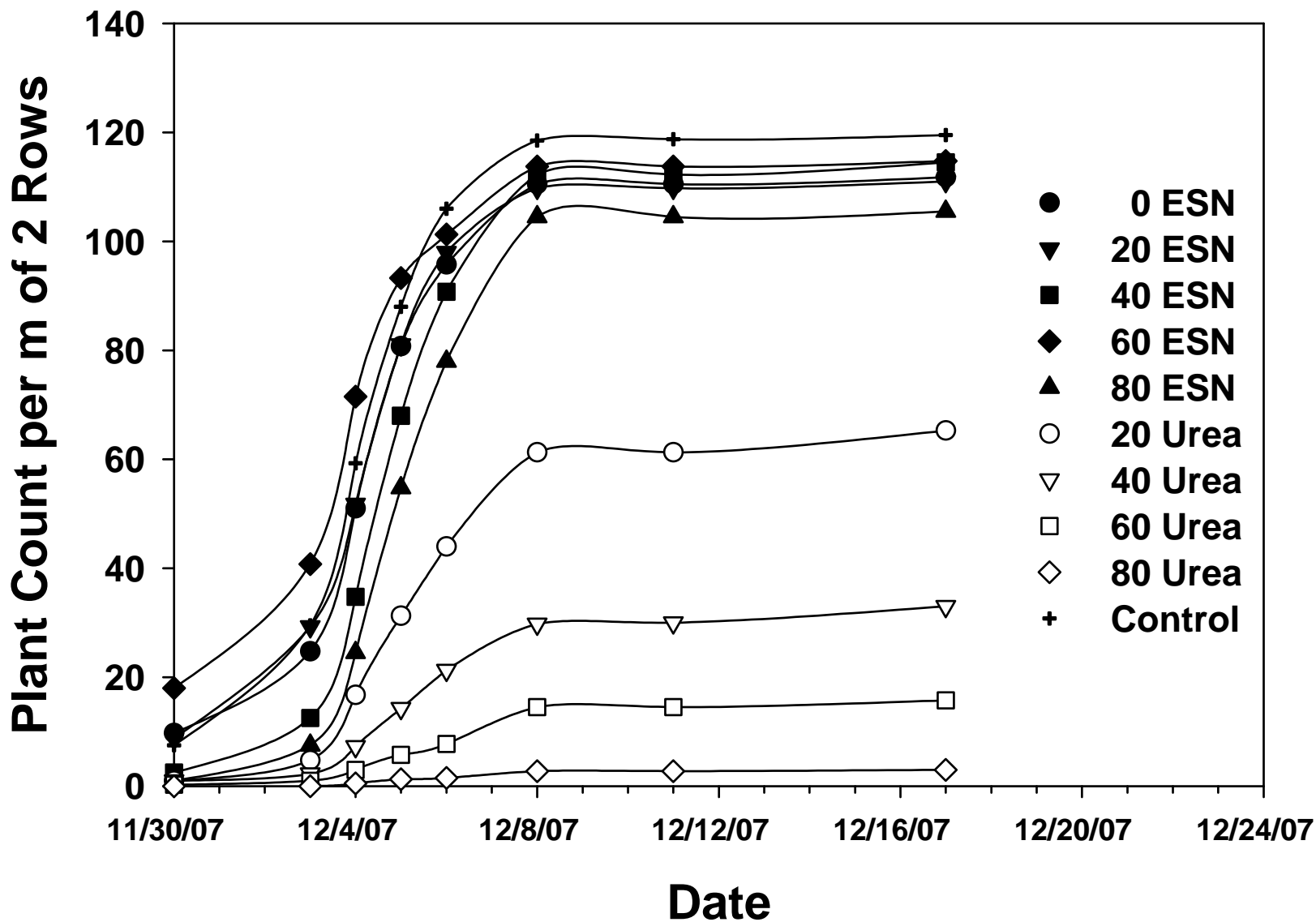
N Sources: Urea, ESN

N Rates: 0, 20, 40, 60, 80 lb N/A

# Early Planted Wheat Emergence from Seed-banded N Sources



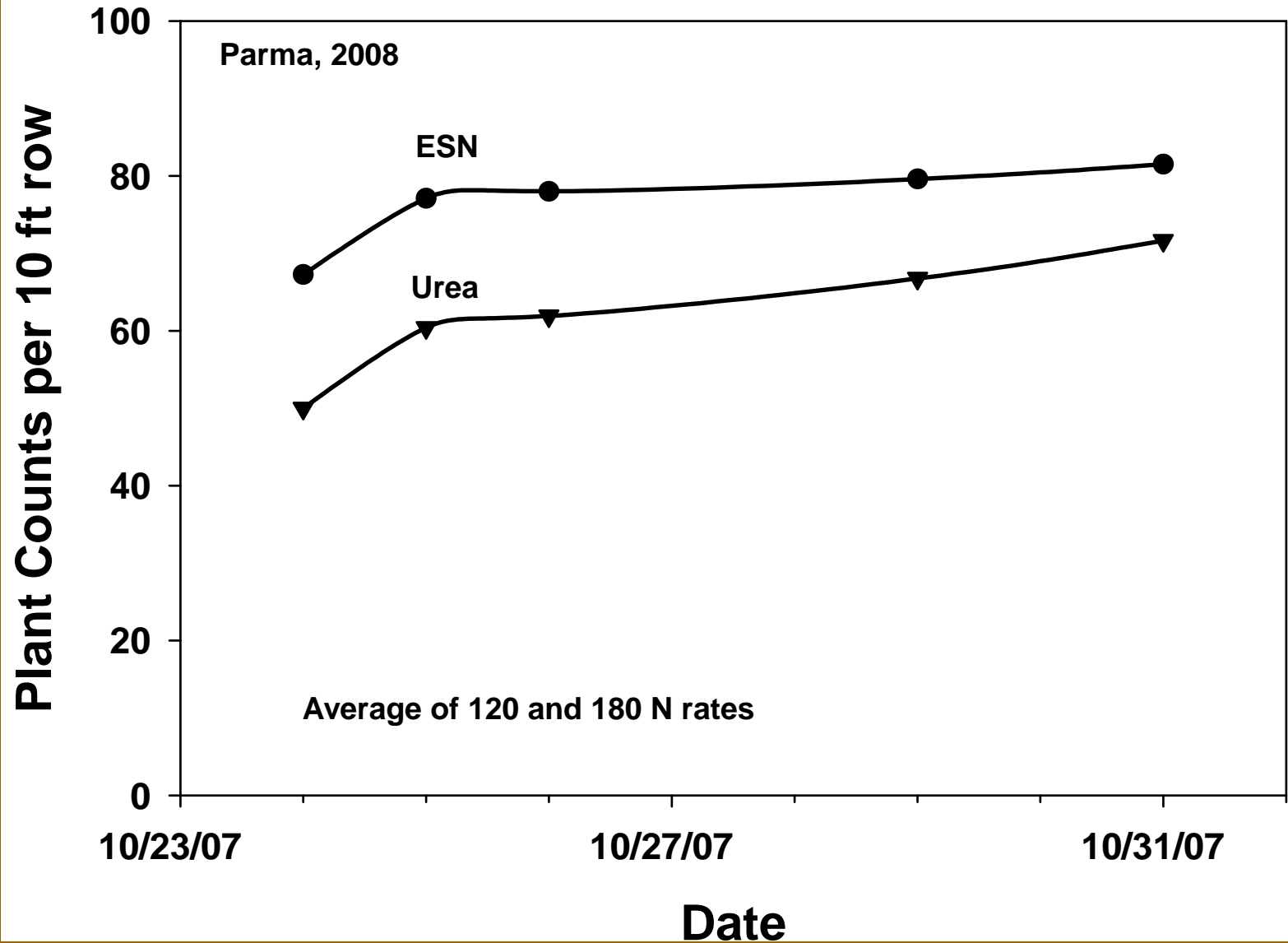
# Late Planted Wheat Emergence from Seed-Banded N Sources



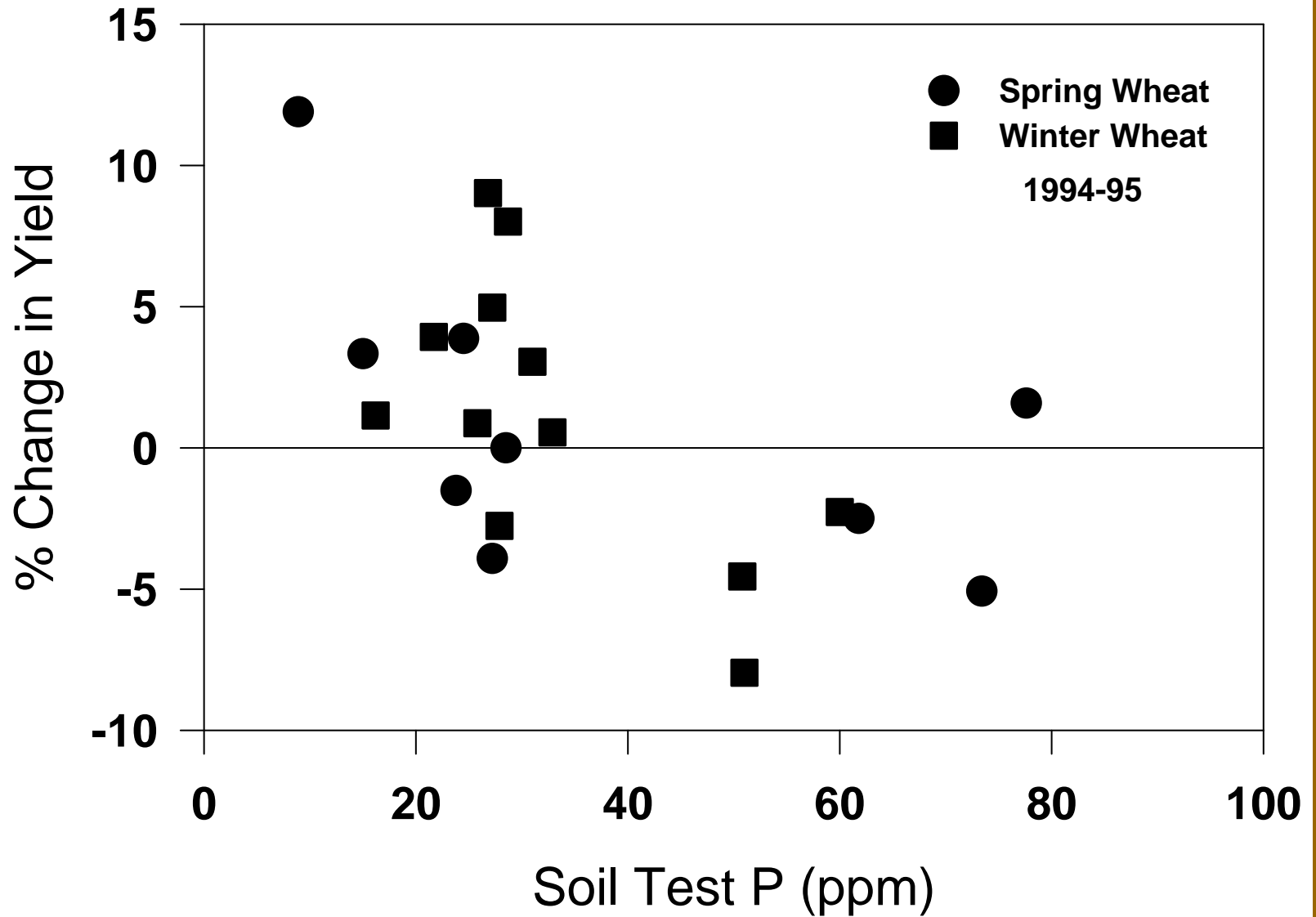
# Slow Release Seed Banded N for Winter Wheat

- was considerably safer than urea regardless of fall planting date
- 
-

# N Fertilizer Effects on Emergence



# Seed Banded P Response



# Seed Banded P Summary

- Likelihood of a yield increase is greatest below 30 ppm STP
- Likelihood of a yield decline above 30 ppm STP



# Treasure Valley HRS Wheat Production Survey - 1999

13 growers

32 fields

Grower reported yield, fertilizer and protein

14 furrow irrigated fields

18 sprinkler irrigated

10 of the 13 growers applied late season N  
for protein enhancement

## Furrow vs Sprinkler

	Yield	Protein
furrow	88	11.1%
sprinkler	92	13.3%

## Fall vs Spring Planted HRS

8 of 32 (25%) of the fields were fall planted

	Yield	Protein
Fall	113 bu/A	11.7%
Spring	83 bu/A	12.9%

# *Low Protein in Furrow Irrigated Wheat*

- *Excessive water - N leached, denitrified*
- *Volatile losses from topdressed N*

Furrow irrigation provides limited late season N management options.

*Use foliar N*

*N rate limits*

*Application costs*

*Use topdressed N at higher rates*

*May increase volatile losses*

*Water run N*

*Non-uniform, runoff*

*Use higher preplant N rates*

*Excessive N risks*