

On-farm-tests evaluate nitrogen rate, source and timing for spring wheat yield and protein

John Heard¹, Brunel Sabourin², Amir Farooq¹ and Lori-Ann Kaminski³

¹Manitoba Agriculture, Carman, MB, Canada, ² Antara Research. ³Manitoba Wheat and Barley Growers Assoc.

Traditional nitrogen (N) management practices may be inadequate to fulfill yield and protein potential of recently introduced high yielding hard red spring wheat varieties. Three N management strategies being studied in concurrent traditional, small plot research were suggested to interested wheat growers for on-farm-testing.

- Farmer's standard base N rate plus 30 and 60 lb N/ac at or near seeding (sites A-L),
- blends of standard N source with the controlled release N source, ESN (sites M-O)
- post anthesis nitrogen (PAN) as UAN at 30 lb N/ac (sites P-d).

Field strips were replicated 3-4 times, scouted, combined and weighed with weigh wagon, and when available yield monitor and grain cart (Figure 1 to right).



Figure 1. On-farm-test plot harvest.

Nitrogen Rate

There was a wide range of farmer standard base N rates (70-145 lb N/ac) and with soil nitrate-N (0-24"), total base rate N supply was 105-173 lb N/ac.

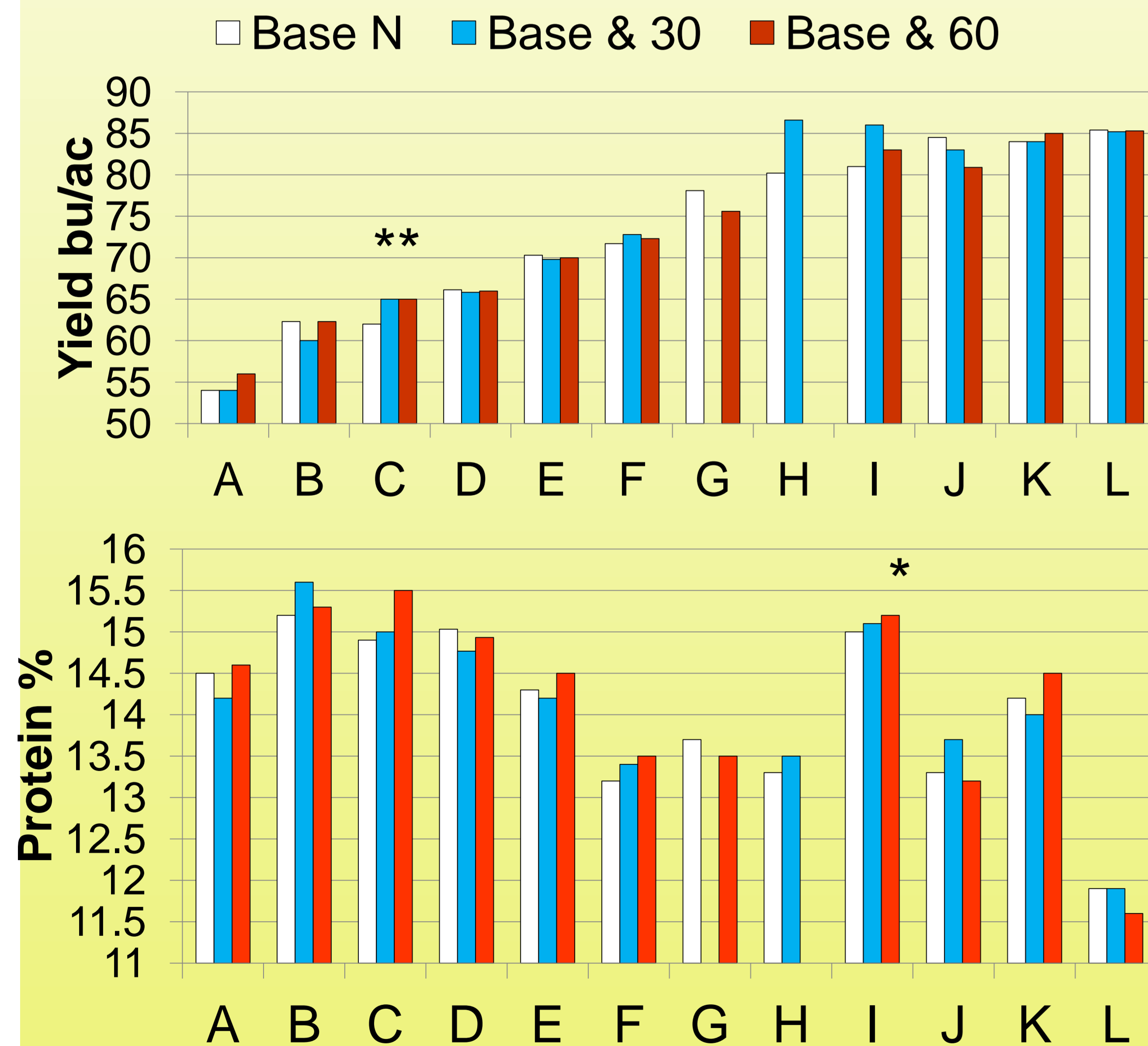


Figure 2 & 3. Wheat yield and protein response to additional N rates. (* over columns indicates significantly different than base N at the 10% probability level.)

Of 12 sites, only once was there yield or protein advantage to increasing N above farmer base rates. Average yield was 73.3, 73.8 and 73.9 bu/ac at base, &30 and & 60 N rates. Average protein was 14.0, 14.1 and 14.2 % at base, &30 and & 60 N rates.

Nitrogen Source:

Controlled release N (ESN 44-0-0) was applied as a proportion of the standard source N rate at seeding.

- Site M = midrow banded 160 lb N/ac as NH_3 vs 100 N plus 60 lb N/ac as seedplaced ESN.
- Site N = side banded 130 lb N/ac as urea vs. a 50:50 urea:ESN blend.
- Site O = sidebanded 98 lb N/ac as UAN vs 49 N plus 49 lb N/ac as seedplaced ESN.

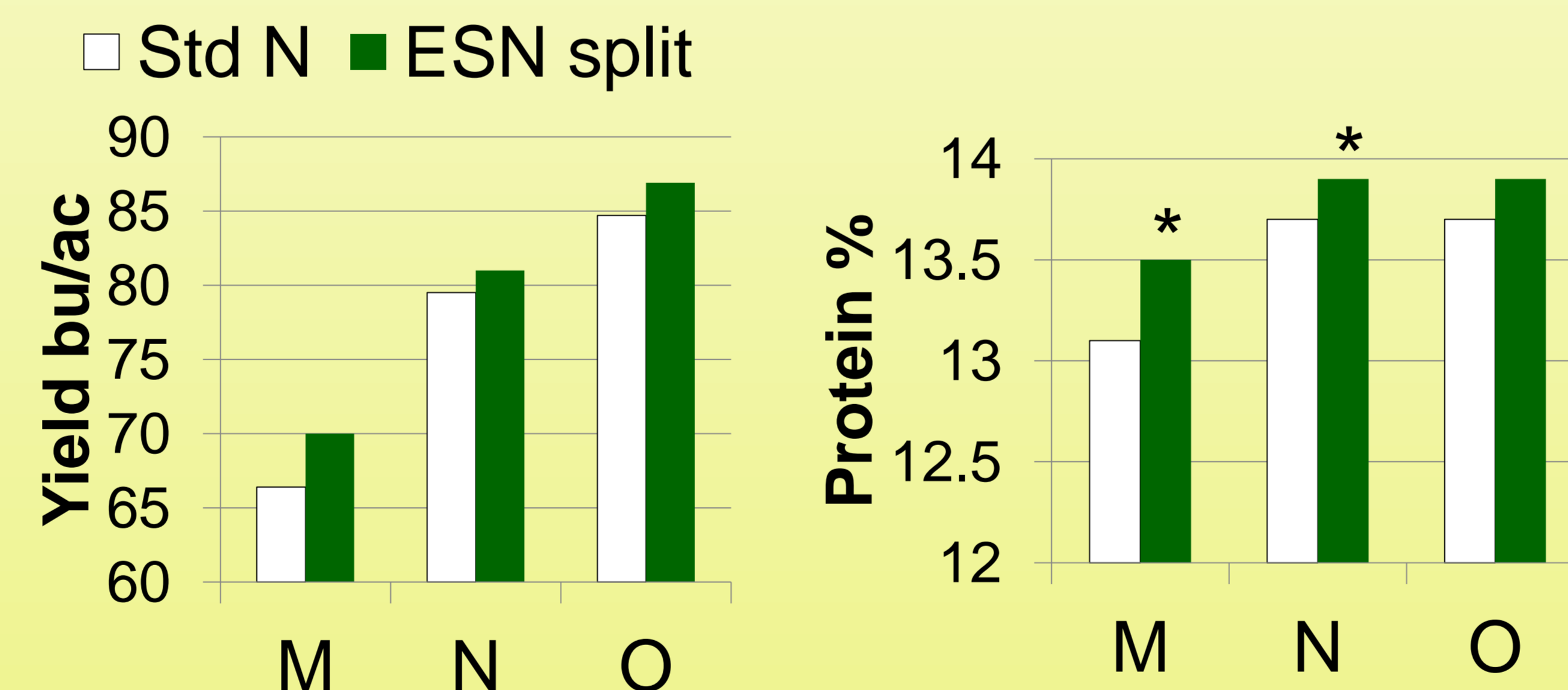


Figure 4 & 5. Wheat yield and protein response to a portion of N as ESN. (* over columns indicates a significant difference at the 10% probability level.)

Yield was not significantly influenced by ESN but protein increased significantly by 0.2 and 0.4 % points at 2 of the 3 sites.

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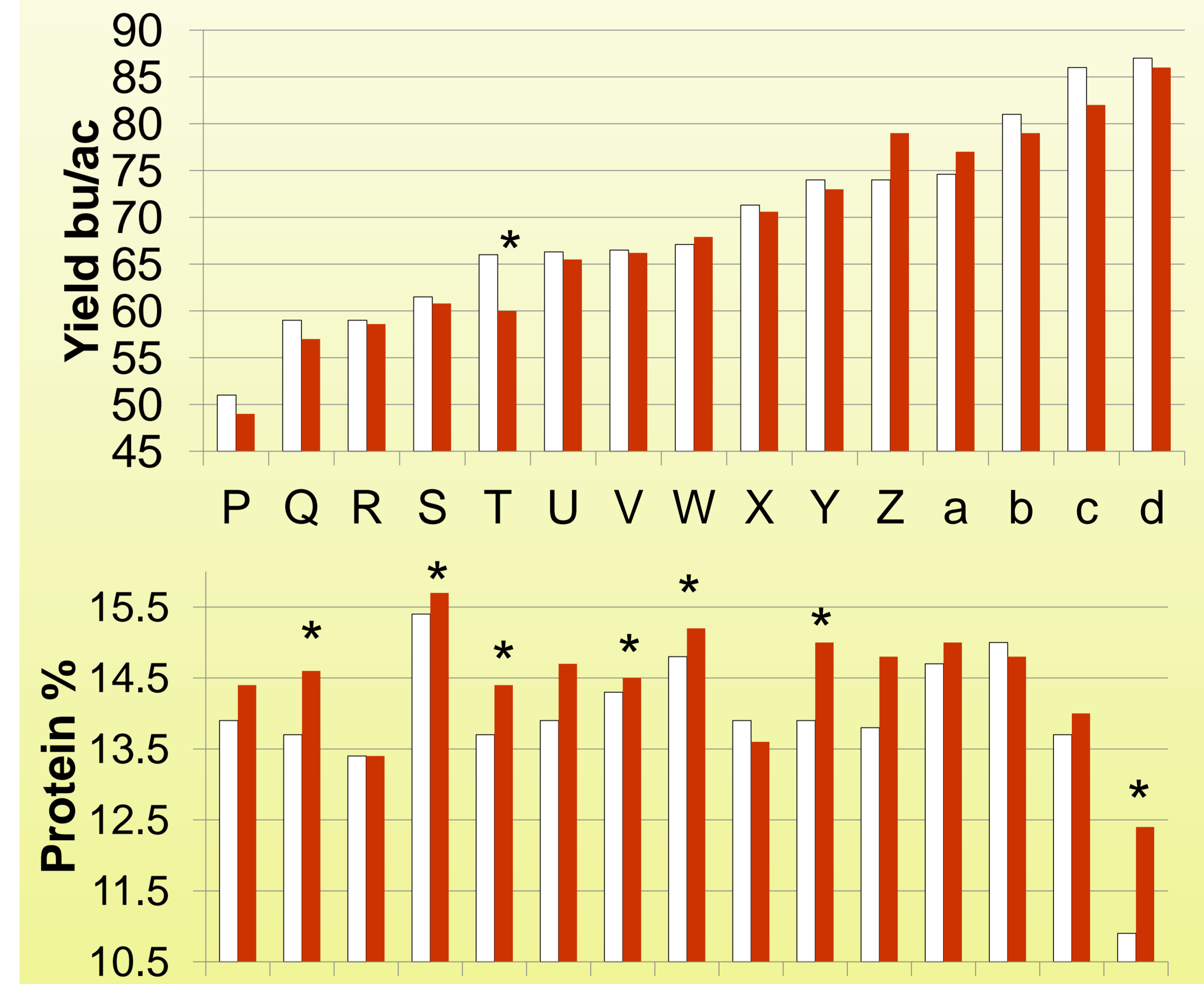
Nitrogen Timing: PAN

UAN was applied at 30 lb N/ac some 7-10 days after anthesis, mixed 50:50 with water. (Figure 6). Application caused leaf burn (Figure 7) which only reduced yield at one location (T) with application at mid day in high heat and humidity. (Figures 8-9).

Figures 6-7. PAN application and typical leaf burn.



□ Base ■ PAN



Figures 8-9. Wheat yield and protein response to post anthesis N. (* over columns indicates a significant difference at the 10% probability level.)

Of 15 sites, yield was reduced once but protein increased at 7 sites. Average yield was 69.6 and 68.8 bu/ac at base, & PAN rates, respectively. Average protein was 13.9% and 14.4% at base, & PAN rates, respectively.

Summary

Protein increases were low to modest likely owing to sufficient base N supply. Nitrogen additions applied at seeding were less consistent in increasing grain protein than ESN blends or PAN treatments.