

# Factsheet: Increasing Wheat Protein with Post-emergent Applications of UAN vs. Dissolved Urea



## Objective:

The overall objective of this project was to demonstrate the potential of an additional 30 lb N/ac applied late season to increase either wheat yield or grain protein compared to applying all nitrogen (N) at seeding. The impact of nitrogen source, crop staging and application method were compared.

## Methodology:

In 2019 and 2020 trial sites were initiated at 8 locations; Swift Current, Outlook, Scott, Indian Head, Yorkton, Melfort, Prince Albert, and Redvers. Treatments were designed to compare boot stage and post-anthesis timings of split N relative to side-banding all the N at seeding. Dribble band and broadcast applications of UAN and dissolved urea were compared. All split applications of N were supposed to be 30 lb N/ac applied to a base rate of 70 lb N/ac. While late season applications of UAN and diluted UAN were applied at the targeted 30 lb N/ac, dissolved urea treatments were only applied at 25 lb N/ac due to a calculation error more fully described in the full report.

**Table 1. Treatment List for the Increasing Wheat Protein with Post Emergent Applications of UAN vs Dissolved Urea Trial**

Treatment #	Seeding Lb N/ac of Side- banded Urea	Post emergence application				
		N (lb/ac)	Product	%N	method	Stage
1	70	na	Na	na	na	na
2	100	na	Na	na	na	na
3	70	30	UAN	15.7	dribble <sup>[1]</sup>	boot
4	70	30	UAN	28	dribble <sup>[2]</sup>	boot
5	70	30	UAN	15.7	dribble <sup>[1]</sup>	Post-anthesis
6	70	30	UAN	28	dribble <sup>[2]</sup>	Post-anthesis
7	70	25	Urea Sol'n	14	Dribble <sup>[3]</sup>	Post-anthesis
8	70	30	UAN	15.7	Broadcast <sup>[4]</sup>	Post-anthesis
9	70	25	Urea Sol'n	14	Broadcast <sup>[5]</sup>	Post-anthesis

[1]

Sprayed with dribble band nozzle at 20 US gal/ac to deliver 30 lb N/ac (10 gal/ac UAN + 10 gal/ac water = 15.7% N solution by weight)

[2] Sprayed with dribble band nozzle at 10 US gal/ac to deliver 30 lb N/ac (undiluted UAN =28% N solution by weight)

[3] Sprayed with dribble band nozzle at 20 gal/ac to deliver 25 lb N/ac (1.66 Kg of urea dissolved in 1 US gallon of water = 14% N solution)

[4] Sprayed with 02 flat fan nozzles at 20 gal/ac to deliver 30 lb N/ac (10 gal/ac UAN + 10 gal/ac water = 15.7% N solution by weight)

[5] Spray with 02 flat fan nozzles at 20 gal/ac to deliver 25 lb N/ac (1.66 Kg of urea dissolved in 1 US gallon of water = 14% N solution)

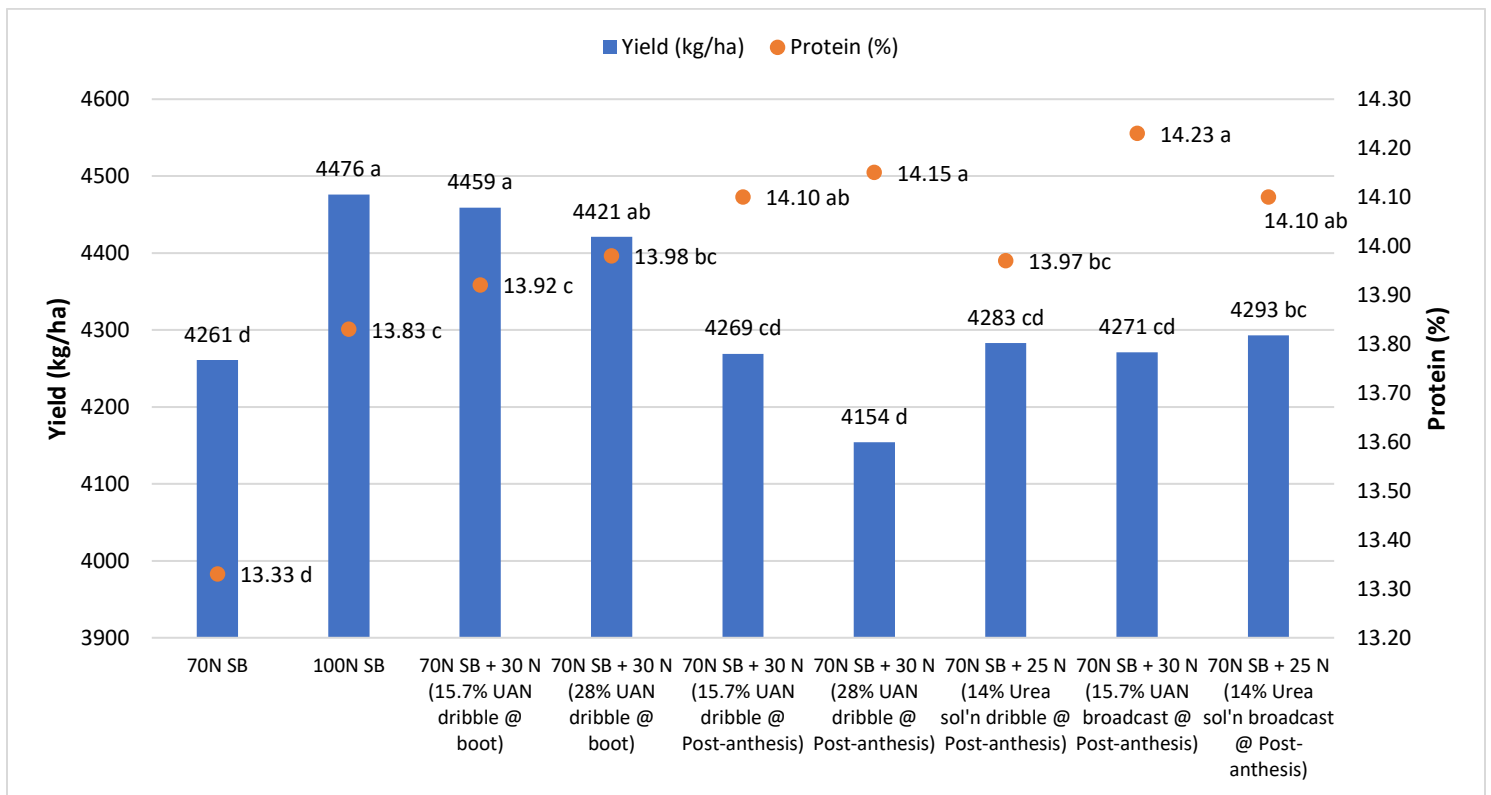
The full report is available at: [www.warc.ca](http://www.warc.ca). This project was funded through the Saskatchewan Wheat Development Commission.

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## Key Findings:

- Dribble banding UAN earlier at the boot stage caused less flag leaf burn than applications post-anthesis.
- Post-anthesis applications of nitrogen caused the most flag leaf burn when UAN (15.7% N) was broadcast sprayed compared to dribble banded. Diluting UAN from 28% to 15.7% N had no effect on flag leaf burn when dribble banding.
- There were no significant differences in flag leaf burn between dribble banded and broadcast applications of dissolved urea.
- On average, split applications of N at the boot or post-anthesis stage raised grain protein by 0.22 to 0.33% compared to side-band N at seeding. However, split applications of N also generally resulted in lower yields (Figure 1). Post-anthesis split N applications showed much larger increases in grain protein and decreases in yield than boot stage split N applications.
- Overall, split applications did not prove to be economic because of the yield loss associated with gaining higher protein and the added cost of the split application. Despite the increase in protein from split applications, it was more economical to side-band all 100 lb N/ac at seeding rather than side-band 70 lbs N/ac and split apply 25-30 lb N/ac for dissolved urea or UAN.



**Figure 1.** Effect of nitrogen rate (lb/ac), application timing and application method of dissolved urea and UAN on hard red spring wheat yield and grain protein at eight locations across Saskatchewan (2019-2020).

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