

## Response of wheat to time of nitrogen fertilizer application in a cool temperate climate

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Deregulation of the New Zealand wheat industry since 1984 has resulted in farmers having to produce better quality wheat, with acceptable Mechanical Dough Development bake scores increasing from 12 to over 20. Previously, most nitrogen (N) fertilizer was applied at tillering (early N) to maximize grain yields. One technique to improve grain weight and grain protein, two quality criteria on which payments to farmers are based, could be to apply some or all of the N later, around stem elongation or booting. The effects of late applied N needed to be quantified before inclusion in crop management packages.

### Methods

Thirty-four experiments were conducted on both autumn and spring sown wheat crops on the Canterbury Plains from 1980 to 1991 to examine selected effects of N fertilizer management on wheat grain quality and yield (1-5; Martin, unpublished data; Saville, unpublished data). They included early and late N application rates. Most of the experiments were on heavily cropped soils, likely to be low in soil N.

### Results and discussion

Table 1 summarizes the effects of N application time on yield and quality from all of the trials. N increased grain yields, but timing of application had little effect. Late application of N raised grain protein concentration above the control more than N applied early. Late N also increased grain weight above the control, whereas N applied at tillering reduced grain weight. These effects were greater in the autumn sown trials. These trials clearly demonstrated the benefits on grain quality of applying N at stem elongation or booting on low fertility sites.

**Table 1. Mean yield, grain protein content, and grain weight with no applied N and mean change with early and late N applications over 21 autumn- and 13 spring-sown trials.**

	Autumn – sown			Spring – sown		
	mean	early N	late N	mean	early N	late N
Yield (t/ha)	6.1	+1.2	+1.0	5.3	+0.4	+0.4
Grain protein (%)	9.4	+1.2	+1.6	10.9	+1.1	+1.3
Grain weight (mg)	44.4	-1.3	+1.4	43.9	-0.5	+1.0

### References

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