Trial 4. Nutrition for Hyper Yielding Wheat (FAR TAS W23-05) cv Stockade

Key points:

- *There was no significant positive response to applied nitrogen fertiliser.*
- *Applied nitrogen input higher than 120kg N/ha only served to reduce yield, although the reduction in yield was not statistically significant until the N applied exceeded 200kg N/ha (240 & 280 N applied).*
- *With 110kg N/ha in the soil 0 – 60cm on 11 July the zero N treatment (only 10kg N/ha MAP applied) yielded 11.55t/ha with a protein of 10.9% indicating the presence of 221kg N/ha in grain.*
- *If 75% of the N is assumed to be in the grain and 25% in the straw residue then the total N uptake at harvest in zero N plots would be approximately 294kg N/ha.*
- *With 10kg N/ha from the MAP and approximately 100kg N/ha in the soil in July it would indicate that 184kg N/ha came from deeper in the soil profile and or mineralization through the course of the season.*
- *There were no differences in grain protein, test weight and screenings, although there was a trend for increased N applied to increase grain protein up to a level of 160 N.*

Table 1. Treatment list and timings.

	Treatment Name	Sowing	GS30	GS32	GS39
		MAP kg/ha	N kg/ha	N kg/ha	N kg/ha
1	**Untreated**	100	0	0	
2	**80**	100	40	40	
3	**120**	100	60	60	
4	**160**	100	80	80	
5	**200**	100	100	100	
6	**240**	100	120	120	
7	**280**	100	140	140	
8	**200 3-split**	100	80	80	40
9	**120 + OM****	100 + 3 tonnes chicken manure	60	60	
10	**120 + PKS***	100 + PKS content to match OM	60	60	

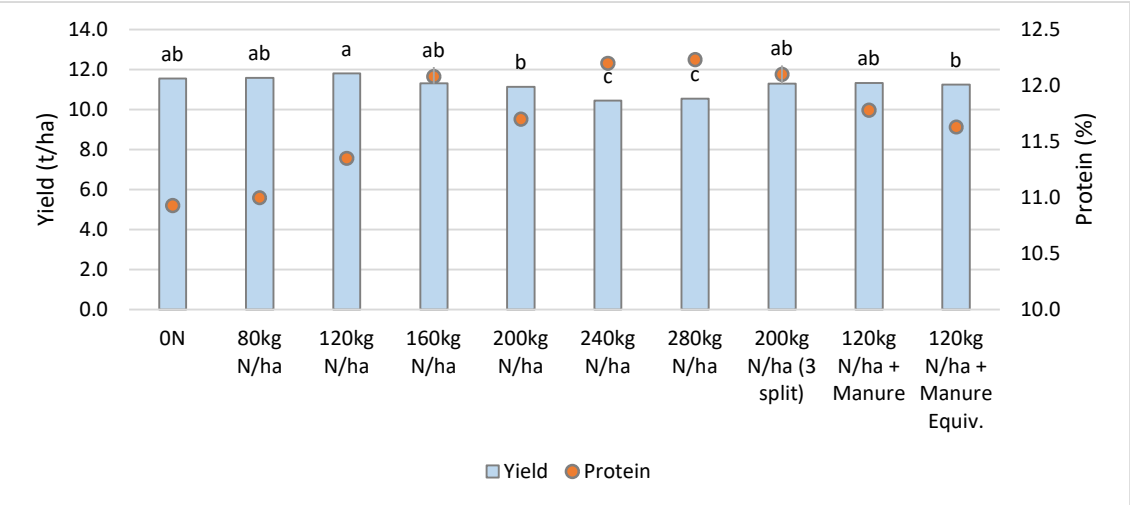

Figure 1. Influence of nutrition strategy on grain yield (t/ha) and protein content (%), harvested 26 January 2023.

Table 2. Influence of nutrition strategy on wheat grain yield (t/ha) and grain quality (Protein (%), test weight (kg/hL), and screenings (%)).

	Grain Yield and Quality			
Treatment	**Yield t/ha**	**Protein %**	**Test Weight kg/hL**	**Screenings %**
0N	11.55 ab	10.9 d	75.9 a	2.6 -
80kg N/ha	11.57 ab	11.0 cd	76.5 a	2.7 -
120kg N/ha	11.81 a	11.4 bcd	75.6 ab	3.1 -
160kg N/ha	11.30 ab	12.1 ab	75.3 abc	2.5 -
200kg N/ha	11.13 b	11.7 a-d	75.2 abc	2.7 -
240kg N/ha	10.45 c	12.2 a	74.5 bc	2.8 -
280kg N/ha	10.54 c	12.2 a	74.1 c	3.1 -
200kg N/ha (3 split)	11.29 ab	12.1 ab	75.3 abc	2.6 -
120kg N/ha + Manure	11.32 ab	11.8 abc	76.3 a	2.6 -
120kg N/ha + Manure Equiv.	11.25 b	11.6 a-d	76.2 a	2.9 -
Mean	11.22	11.7	75.5	2.8
LSD (P=0.05)	0.55	0.8	1.5	ns
P Value	<0.001	0.024	0.040	0.376

Table 3. Influence of nutrition strategy on crop height (cm), head count (m^2), crop dry matter at maturity (t/ha) and harvest index (%).

Treatment	**Height cm**	**Heads m^2**	**GS99 Dry matter t/ha**	**Harvest Index %**
0N	98.3 -	627.3 -	27.3 -	37.9 -
80kg N/ha	98.3 -	515.9 -	22.8 -	44.3 -
120kg N/ha	98.3 -	593.9 -	26.2 -	37.8 -
160kg N/ha	99.6 -	557.8 -	23.0 -	43.7 -
200kg N/ha	99.2 -	536.4 -	21.5 -	51.5 -
240kg N/ha	97.9 -	548.0 -	22.3 -	43.4 -
280kg N/ha	99.2 -	544.4 -	23.5 -	40.6 -
200kg N/ha (3 split)	96.7 -	495.5 -	21.6 -	45.2 -
120kg N/ha + Manure	100.0 -	615.9 -	25.9 -	38.0 -
120kg N/ha + Manure Equiv.	99.2 -	605.4 -	25.1 -	40.8 -
Mean	98.7	23.9	564.0	42.3
LSD (P=0.05)	ns	ns	ns	ns
P Value	0.120	0.279	0.597	0.533

Table 4. Analysis of chicken manure composition (Applied at 3t/ha, treatment 9).

Analyte	Unit	Result
Sodium (total)	mg/kg	5,400
Total Nitrogen (Combustion)	%	2.80
Total Carbon (combustion)	%	36.00
C:N Ratio		13.00
Nitrate Nitrogen	mg/kg	<50
Chloride	%	0.51
Moisture	%	40.4
Ammonium Nitrogen	mg/kg	1,100.0
pH (1:5 Water)		7.3
pH (1:5 CaCl2)		7.1
Electrical Conductivity (1:5 water)	dS/m	6.98
Dry Matter	%	59.6
Manganese (total)	mg/kg	680.0
Iron (total)	mg/kg	5,700
Copper (total)	mg/kg	150.0
Zinc (total)	mg/kg	430.0
Boron (total)	mg/kg	25.0
Phosphorus (water soluble)	mg/kg	2,800
Potassium (water soluble)	mg/kg	13,000
Calcium (water soluble)	mg/kg	530
Magnesium (water soluble)	mg/kg	570
Sulphur (water soluble)	mg/kg	2,100
Boron (water soluble)	mg/kg	16.00
Zinc (water soluble)	mg/kg	45.00
Manganese (water soluble)	mg/kg	32.00
Copper (water soluble)	mg/kg	19.00
Iron (water soluble)	mg/kg	130.00
Sodium (water soluble)	mg/kg	3,900
Phosphorus (total)	mg/kg	10,000
Potassium (total)	mg/kg	18,000
Calcium (total)	mg/kg	21,000
Magnesium (total)	mg/kg	6,300
Sulphur (Total)	mg/kg	5,200
Molybdenum (water soluble)	mg/kg	5.00

Table 5. Trial input and management details.

Sowing date:		**26 April 2023**
Harvest date:		**26 January 2024**
Variety:		Stockade
Seed rate:		180 seeds/m^2
Basal fertiliser:	26 Apr	100 kg/ha MAP
Nitrogen:		As per treatment list
PGR:	GS31	Moddus Evo 0.20 L/ha & Errex 1.3 L/ha
Fungicides:	GS31	Opus 0.50 L/ha
	GS39	Radial 0.84 L/ha
	GS59-61	Opus 0.50 L/ha

Table 6. Active ingredients and chemical loading (g/L) for products used.

Name	**Active 1**		**Active 2**		**Type**
Fungicide					
Opus	Epoxiconazole	125 g/L	---	---	SC
Radial	Azoxystrobin	75 g/L	Epoxiconazole	75 g/L	EC
PGR					
Errex 750	Chlormequat	582 g/L	---	---	SL
Moddus Evo	Trinexapac-ethyl	250 g/L	---	---	DC