Wheat production and quality in practice: Wheat growing on dryland medium soils

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Introduction

My wife and I own 437 ha adjoining the Mayfield township and we farm this in conjunction with another 205 ha we lease four km away, giving a total of 642 ha. The soil types are Lismore and Ruapuna Stony Silt Loams (150-250 mm topsoil over 200 to 350 mm stony clay over-lying gravel). Rainfall is variable with around 800 mm and no irrigation. Soil moistures drop below wilting point every summer, usually for 6-12 weeks between December and March. Last season this was from Mid February to May.

This coming season we plan to grow:

Wheat	171 ha
Barley	43 ha
Peas	49 ha
Ryegrass	43 ha
Browntop	10 ha
	316 ha

The remaining 298 ha is grazing - predominantly ryegrass/cocksfoot based pasture with some lucerne, fescue and chicory stands.

Our stock is: 3500 coopworth ewes
60 rams etc.
70 dairy bulls

Why Grow Wheat

Crop yields are very dependent on weather, especially during November - December. Wheat yields have averaged from 2.3 t/ha in 88/89 ("the big drought") to 5.7 t/ha last season. An average yield is 4.0 t/ha. The area in wheat has increased around 28 ha/year, from 58 ha in 88/89 to 171 ha this coming season. Wheat varieties this year will be Otane, Tancred and Monarch for bread, Jasper for biscuit and feed (it was going to be all biscuit until I saw the contract specifications) and Sapphire for feed.

I, like almost every grower with yields like mine, view those farmers on good soils, with or without irrigation, and yields of 8-10 t/ha, with a mixture of awe and envy. However, I am here to bat for the guy on dryland medium soils. It is my contention that it takes a greater amount of skill to maximise profits by optimising inputs on medium non-irrigated soils (where, in our case, yields can vary by 250%), than it does on top cropping soils. I am not saying that I have all these skills. Bob Englebrecht, farm consultant from Ashburton, on inspecting my crops before last harvest, estimated that errors in my spray programme would cost me around 0.5 t/ha in wheat yield. If the skills required are so high, and the rewards are less than from the top soils, the obvious question is - why bother? It is a question worth asking, given that the predominant land use on similar soils in our area is crossbred sheep farming, with barley following the winter feed crops. A local contractor harvested over 400 ha of arable crops this year, and none was wheat. It is also a question worth asking because I believe that if wheat production is to significantly increase, to a level which will support industry infra-structures like breeding, then this increase will come from the medium soils. The top soils have many other options for profitable arable farming.

Why bother? Simply, because it pays better than sheep farming.

Crop vs. Livestock

For several years we have run a farm recording system which separates cost and returns into a stock enterprise and a crop enterprise. All fertiliser, weed and pest control, seeds etc. are coded as to whether they are applied to crops or the stock part of the farm. We also run a machinery partnership with my brother who farms three km away, and all machinery use is recorded in log books. This gives us a base to compare our crop farming to our stock farming.

In each of the last three years the gross margin/ha for our crop enterprise (i.e., income less all direct costs) has exceeded the income/ha from sheep. Table 1 shows these figures for 1991/92. The Gross Margin for crop has ranged from 70% higher than the gross margin for

Table 1. 1991/92 Gross margins/ha for sheep vs arable crop enterprises

	Sheep	Arable Crop
Income	$143,356	$333,056
less expenditure	79,829	142,395
Gross Margin	$ 63,527	$190,661
	$199/ha	**$719/ha**

sheep in 89/90, to 250% higher this year. The first reaction to this, is that I must be a useless sheep farmer. Bob Englebrecht assures me that our sheep performance is above average for our kind of country and the comparisons have some validity.

As I mentioned earlier, wheat has become an increasingly significant part of our crop mix, from 58 ha in 88/89 to 171 ha in 92/93. Even in the drought of 88/89 wheat kept its relativity. A yield of 2.3 t/ha was demoralising, but at 13.3% protein and $299/tonne, it gave us an income of $687/ha. Costs were $363/ha, for a gross margin (GM) of $324. This was less than overheads that year such as wages, interest rates, etc., which meant we made a loss on wheat. However, this wheat GM was equal to our total income/ha for sheep. That year we averaged only $12.42 for price lambs, $5.25 for store lambs, $16.94 for hoggets and $8.86 for cull ewes. On top of other costs in the sheep GM had to be added the cost of extra drought feeding. You can see how fast we went backwards that year.

Our increasing area of wheat has been based on:

1. Increasing confidence in being able to grow the wheats required by a de-regulated market.
2. Consistency of GM relative to other crops and stock. Other crops such as peas can often be the most profitable in any one season, but few have the consistency of wheat.
3. Ease of harvest. It can be frustrating waiting for moisture to come down in wheat compared to barley, but its great to get a nor'west wind and, as we did this year, harvest 400 tonnes in 30 hours and suddenly be up to date.

Growing Hints

1. Be realistic. Our average yield is 4.0 t/ha, so that is what we initially target. The skill is in adjusting inputs as the season unfolds. In 1988/89, 2.3 t/ha required no N after drilling and gave us 13.3% protein and 6% screenings. In 1991/92, at 5.7 t/ha, we put on up to 115 kg N in three applications, and still underestimated the requirement in many paddocks.

2 Timeliness is essential. Moisture rules our lives. Spring N applications are wasted if we miss the rains. Last season was the first time we even came close to having moisture right through grain fill. This autumn it was too dry to cultivate. On 11 May we were bending our plough trying to plough dry stony ground, but by the end of Queens Birthday weekend we had 96 ha of wheat in good seedbeds.

Both our tractors have had bigger alternators fitted to drive extra lights. We make it a rule to finish drilling a paddock on the same day we start. In frosty greasy conditions we may start at about 5 pm as the frost comes down. The tyres and drill should run clean and its usually about 2 am before the frost gets too heavy to start being a problem. We broadcast fertiliser before drilling to make drilling faster.

3. Previous Crop. Wheat is generally grown early in the rotation. Bread wheat follows winter feed brassicas or pasture. Biscuit wheat follows other cereals. Our best bread quality is after brassicas. Sowing wheat after pasture can present fertility problems. The pasture may be poor quality due to drought - clover doesn't grow in a drought so there is no fertility build up. Alternatively, if cultivation is quick there is little time for vegetation break-down and this will continue while the wheat is growing, locking up N in the process. In both of these situations, N application needs to be at least as high as you would put on a second wheat crop.

4. Sowing Date. The earlier the better. I like to start drilling autumn wheat in early May. Its hardly autumn wheat it its not through the ground before the end of June. Usually I sow nothing in July, but aim to get all spring wheat planted in August. These targets are so we get maximum crop development before the high evapo-transpiration losses of summer. However, there are two factors that conflict with early sowing:

i) December can be our wettest month, e.g., last season.
ii) Early sowings have lower quality than later sowings.

5. Sowing Rates. We generally sow around 100 kg/ha, aiming for about 200 plants per square metre, apart from late sowings (September) when the rate is increased. I would much rather have a crop of that density, with good strong tillers I can boost if required, than risk a crop that is too thick and taking moisture out early. Drilling speeds are reasonably fast. We have a 4 m Begg drill which holds over half a tonne of seed and has 11 x 28

tyres, providing a very stable platform for metering the seed. This drill places the seed in our stony soils much better than Duncan drills I have used in the past, even at the higher speeds I now travel. Average drilling rate is 2.5 ha/hour.

6. Fertiliser Application. Two seasons ago we brought our own fertiliser spreader. This is the biggest advance we have made in controlling quality. Too much N, especially early, risks high screenings and depressed yield. Too little N risks low yields and low quality. We can now respond immediately to the season, e.g., last November we applied late N to our biscuit wheat crops. N application rates are based on guidelines such as set out by Bede McCloy in his management packages. It is essential to calibrate the spreader in the yard and to be able to modify it to continue working in the rain without gumming up and changing the rates.

Fertiliser at sowing: Autumn, 200-250 kg sulphur super gives greater flexibility for later use of urea. Spring, 150-250 kg Cropmaster 20 applied before drilling.

7. Spraying. Spraying is the only major operation done by contract. We get excellent service from a skilled operator who knows how to prioritise work. This, plus constraints on labour and the investment required for an equivalent rig, means I shall probably remain with the contractor for the foreseeable future. I am always conscious that it costs about the same to spray a 3 tonne crop as a 7 tonne crop. I try to adjust sprays to reflect yield potential, and in lower yield seasons tend to treat outbreaks rather than spray preventatively. This year I got caught with a late outbreak of rust in the heads, although all crops were sprayed at ear emergence with Merit.

8. Machinery Costs. Our stony soils are abrasive, but are easy to break down to a seed bed, allowing cultivation to be kept to a minimum. One of the most common comments I get from sheep farmers, is that machinery costs make cropping on light to medium soils a waste of time. However, 1991/92 machinery costs, excluding harvest were 5% of stock income. Operating cost for harvesters average $40/ha, but contract baling cost for straw was $210/ha.

Machinery replacement is a part of crop farming and must be faced up to. We try to replace when interest on replacement cost is less than repairs on existing machinery. This year we replaced a combine-harvester of 2900 hrs with one of 900 hrs. We bought 2000 hrs of combine-harvest time for $18.75/hour. To change from a 900 hr machine to a new machine would cost $100/hr plus.

Conclusion

I would like to conclude by considering Table 2, which shows our seven paddocks of Otane wheat grown in 91/92, ranked on quality.

Clearly we still have a lot to master in a high yielding season like this. Proteins were generally lower than aimed for, although even the lower protein paddocks generally produced good MDD bake scores. Protein tended to be higher from later drilling dates and when higher rates of N were applied.

As I said, we still haven't mastered it. This harvest has clearly indicated areas that need improvement, but even so, wheat is still one of our most profitable land uses.

Table 2. 1991/92 Otane performance

	Protein (%)	MDD	Soil Type	Yield (t/ha)	Previous Crop	Sowing Date	Applied Nitrogen (kg/ha)		
							Early	Late	Total
1	10.0	23	light	4.7	barley	30/5	40	40	80
2	10.3	24	light	5.0	pasture	20/8	30	60	90
3	10.4	25	good	6.0	kale	16/8	40	30	70
4	10.5	25	medium	5.5	turnip	8/8	50	40	90
5	11.0	25	medium	5.5	turnip	27/8	30	20	50
6	11.2	26	medium	5.5	pasture	16/8	50	65	115
7	12.2	25	good	6.0	turnip	4/9	50	65	115