

Climate and Agriculture decision making - Costs of decisions (Wheat)

Background Information

You live in the Central Western area with a median yearly rainfall of 550mm. The rainfall is usually evenly spread throughout the year (see graph in Rainman for say Dubbo NSW). Frost period is usually from mid May to mid September.

The property is mixed (livestock and crops), with a cropping area of 1000ha. The cropping enterprise usually makes up to 80% of the income for the property.

50mm of rainfall fell in late April/May allowing sowing to occur. The SOI was;

Feb -10

Mar -7

April -15

May -12

In your calculations assume any rainfall received is spread evenly throughout the growing period unless stated otherwise, and there are no major nutrient, pest or disease problems. Assume wheat at \$145/tonne on farm price.

Case Studies:

RAINFALL IMPACT.

Wheat yield is directly related to rainfall during the growing season (assuming good moisture is able to germinate and establish plants to begin with). Calculations to estimate yield are:

$$\text{Potential yield kg/ha} = (\text{April to October rainfall} - 110) \times 20$$

What are yields (kg/ha) and returns (\$/ha) where April to October rainfall was:

- 200 mm
- 250 mm
- 300 mm
- 320 mm
- if time, what rainfall will be minimum needed to 'break even'?

DROUGHT YEARS

In drought years, evaporation tends to be higher than in normal years. When April to October rainfall is below 180mm, about 60% of rainfall is lost through evaporation.

$$\text{Potential yield kg/ha} = (\text{April to October rainfall} \times 0.4) \times 20$$

What are yields (kg/ha) and returns (\$/ha) where April to October rainfall was:

- 180 mm
- 160 mm
- 140 mm
- 120 mm
- If time, what rainfall will be the minimum needed to 'break even'?

SOWING DATE

For Dubbo where the 'average' rainfall zone is 450-550mm/yr, most wheat varieties need to be sown by the last week of May for optimum yield. (more yield is lost from late sowing and hot dry springs than from early sowing and frosts).

Yield decreases by 5-7% per week for every week beyond the optimum sowing date. Assume a 'safe' Optimal Yield of 2.2 t/ha.

$$\text{Potential yield kg/ha} = \text{Optimal yield} - 6\% \text{ yield loss for each week delayed sowing}$$

What are yields (kg/ha) and returns (\$/ha) where there is:

- Delayed sowing of 3 weeks
- Delayed sowing of 5 weeks

TEMPERATURE

One frost at flowering can reduce yield by 25% or more. Wheat also becomes stressed at temperatures over 25°C where late flowering in hotter weather reduces yields by about 6% for every weeks delay in flowering. Assume a 'safe' Optimal Yield of 2.2t/ha

$$\text{Potential yield kg/ha} = \text{Optimal yield} - (25\% \text{ yield loss for each week frost at flowering})$$

What are yields (kg/ha) and returns (\$/ha) where there is:

- 1 frost at flowering
- 2 frosts at flowering

HERBICIDE APPLICATION AND 'RAIN-FASTNESS'

Many herbicides if rained on within 8 hours of application, will become ineffective.

Using the Gross Margin table, what are the costs of applying herbicide on a 'fine day', to then have rain within 8 hours?

Exercise

Complete Gross Margin budgets [yields (kg/ha) and returns (\$/ha)] on the 4 different scenarios:

Scenario 1 Excellent crop.

Scenario 2 Low rainfall at finish leading to a 50% decline in yield.

Scenario 3 Low rainfall at beginning, with decision to sow only half the area, and excellent rains following.

Scenario 4 Sown but crop failed due to insufficient rainfall from end of July.

Wheat: Long Fallow

Central Zone - West

Winter 1997

1. GROSS MARGIN BUDGET

	Standard Budget \$/Ha	Your Budget \$/Ha
INCOME:		
2.20 tonnes/Ha@ \$145.00 /tonne (on farm) (AH)	\$319.00	
A. TOTAL INCOME \$/Ha:	\$319.00	
VARIABLE COSTS: (see opposite page for detail)		
Cultivation.....	\$16.06	
Sowing.....	\$23.76	
Fertilizer.....	\$30.12	
Herbicide.....	\$53.53	
Insecticide.....	\$0.00	
Contract harvesting.....	\$35.00	
Levies.....	\$9.62	
Crop Insurance.....	\$6.54	
Cartage, grading, @ bagging.....	\$0.00	
B. TOTAL VARIABLE COST \$/Ha	\$174.63	
C. GROSS MARGIN (A-B) \$/Ha	\$144.37	

2. EFFECT OF YIELD AND PRICE ON GROSS MARGIN PER HECTARE:

YIELD Tonnes/Ha	ON FARM PRICE (\$/tonne)				
	\$105 /t	\$125 /t	\$145 /t	\$165 /t	\$185 /t
1.20	-\$40	- \$ 18	\$5	\$27	\$50
1.60	-\$ 1	- \$ 29	\$59	\$89	\$120
2.00	\$39	\$ 76	\$114	\$151	\$189
2.20	\$58	\$ 100	\$141	\$182	\$224
2.60	\$98	\$ 147	\$196	\$244	\$293
3.10	\$147	\$ 205	\$264	\$322	\$380
3.60	\$197	\$ 264	\$332	\$399	\$467

Budgets from NSW Agriculture