

## Paper 5

# MAIZE GRAIN PRODUCTION — COSTS AND RETURNS

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## INTRODUCTION

A survey of 45 North Island maize growers was undertaken by the Agricultural Economics Research Unit as part of a study into maize production in New Zealand commissioned by the Department of Scientific and Industrial Research, Plant Physiology Division. The report prepared by Roger Lough, is based upon field work undertaken by Alister Rayne. The survey was undertaken in July and August 1984 and refers to the 1983-84 crop production year.

While regional information is presented, the small number of growers visited means that comparisons of regional data should be treated with caution.

## FINANCIAL RETURN FROM MAIZE GRAIN

Table 1 summarises the gross revenue, variable costs and machinery overheads for maize on a per hectare and per tonne basis.

The All Regions gross revenue of \$2018 per hectare required \$827 of variable cost inputs, plus machinery overheads of \$220 per hectare, resulting in a gross margin less machinery overheads of \$971 per hectare or \$96.00 per tonne of maize sold.

### Gross revenue

The All Regions average per hectare production on survey farms visited was 10.1 tonnes per hectare for the 1984 harvest. This figure should be compared with the average North Island yield of 8.9 tonnes per hectare in 1981 and 9.1 tonnes per hectare in 1982 (Agricultural Statistics 1981/82). Clearly, per hectare production was higher in 1984 than in previous years and the data presented should be viewed accordingly.

Other than yield per hectare, proximity to end user is the dominant factor determining the gross revenue per tonne, a factor favouring the Waikato and the Manawatu. The higher quality of cribbed maize produced in Poverty Bay does not reflect in gross return per tonne (Table 2).

**Table 1: Maize costs and returns summary 1983-84.**

	Bay of Plenty	Manawatu	Poverty Bay	Waikato	All Regions
Number of farms surveyed	12	10	12	11	45
Yield per hectare (t)	10.1	9.0	11.4	9.8	10.1
Per hectare (\$)					
Revenue	2006	1817	2212	2036	2018
Variable costs	891	707	823	876	827
Gross margin	1115	1110	1389	1160	1191
Machinery overheads	231	226	226	198	220
Gross margin less machinery overheads	884	884	1163	962	971
Per tonne (\$)					
Revenue	199	202	194	208	200
Variable costs	88	79	72	89	82
Gross margin	111	123	122	119	118
Machinery overheads	23	26	20	20	22
Gross margin less machinery overheads	88	97	102	99	96

**Table 2: Maize revenue 1983-84 (\$/ha).**

	Bay of Plenty	Manawatu	Poverty Bay	Waikato	All Regions
Number of farms surveyed	12	10	12	11	45
Sources of revenue (1):					
Picker-shelled maize	1982	1796	1508	2036	1843
Cribbed maize	0	0	676	0	158
Sold standing	0	0	28	0	6
Insurance claim	24	21	0	0	11
Total revenue					
Per hectare	2006	1817	2212	2036	2018
Per tonne	198.60	201.94	194.07	207.78	199.84

**(1) Average revenue/ha for each region according to how crop sold.**

The higher per hectare production of Poverty Bay offset the low value per tonne to achieve the highest regional revenue per hectare. Conversely the higher than average return per tonne in the Manawatu did not counter lower production, with the result that gross revenue per hectare in the Manawatu was the lowest of the four regions considered.

area, while maintaining per hectare production, would improve the profitability of maize production. Drying costs are the next most important item, representing 15.0 percent of the total costs on the All Regions farm. Despite seasonal variations it would appear that drying costs are greater than fertiliser costs and nearly twice that of seed.

**Total expenditure**

Table 3 details total maize production costs.

Machinery running costs, machinery overheads and contracting charges account for nearly 47.0 percent of the total costs on the All Regions farm. A more detailed analysis of this cost shows machinery overheads amounting to \$177 per hectare to be the single greatest cost component, reflecting a significant investment in high cost specialised equipment. Any attempt to spread these costs over a greater

**Maize v wheat in the Manawatu**

Wheat production in the Manawatu is a viable alternative to maize production. Table 4 compares the financial returns from these two crops during the 1983-84 crop year.

Per unit of land, ignoring the time the respective crops are actually in the ground, the gross margin for maize in the Manawatu exceeds the gross margin for wheat by \$508 per hectare, while the gross margin less machinery overheads for maize is \$377 greater than wheat. This would indicate

**Table 3: Maize production costs (\$/ha).**

	Bay of Plenty	Manawatu	Poverty Bay	Waikato	All Regions
Number of farms surveyed	12	10	12	11	45
Total expenditure					
Machinery running costs (1)	127	159	197	120	149
Contracting charges	112	86	95	174	119
Seed	92	91	68	95	87
Fertiliser	148	86	129	129	124
Chemicals	107	76	77	108	93
Cartage	90	62	110	109	92
Grain drying	213	135	147	141	159
Insurance	1	11	0	0	3
Total variable costs	890	706	823	876	826
Machinery overheads (2)	231	226	226	198	220
Total costs	1121	932	1049	1074	1046

(1) Includes labour

(2) Includes depreciation and opportunity cost on capital invested in plant and machinery

**Table 4: Manawatu maize and wheat financial comparison 1983-84.**

	Maize (\$ per/ha)	Wheat(1) (\$ per/ha)
Gross revenue	1817	1091
Expenditure		
Machinery running costs (2)	159	89
Contracting charges	86	127
Seed	91	70
Fertiliser	86	92
Chemicals	76	38
Cartage	62	56
Grain drying and bags	135	11
Insurance	11	5
Total variable costs	707	488
Gross margin	1111	603
Machinery overheads	226	96
Gross margin less machinery overheads	884	507

(1) Economic Survey of New Zealand Wheatgrowers 1983-84 (Lough & McCartin, 1984)

(2) Includes labour

that for the 1984 harvest the higher gross revenue generated by maize was not offset by either high machinery overheads or high variable costs. Adjusted for higher than average production per hectare in 1984, maize would still have showed higher returns than wheat. Recent studies conducted by the AERU into the effect of the restructuring of the wheat industry, would suggest that this may not be the situation in the future.

## VARIATION IN MAIZE PRODUCTION SYSTEMS

### Cribbed maize

Table 5 compares cribbed maize with picker-shelled maize in the Poverty Bay-East Coast area.

**Table 6: Substitution of maize for dairy cattle in the Waikato.**

	Factory supply Per Cow (\$)	Per Hectare (\$)	Maize Per Hectare (\$)
Gross revenue	648	1944	2036
Variable costs including depreciation	88	264	985
Gross margin	560	1680	1051
Less opportunity cost of capital \$750 at 14 percent (1)	105	315	89
Gross margin less opportunity cost capital	455	1365	962
Less labour at \$0.80 per kg B.F.(1)	132	396	-
Gross margin less overheads	323	969	962

(1) Dairy Board Advisory Service, pers. comm.

Total costs are similar for both systems, the only financial advantage attributed to cribbed maize being the storage increment of \$20 per tonne. Further development of cribbed maize would be considered by growers if the higher quality of cribbed maize was reflected in the price offered. Currently, there is no premium for quality.

**Table 5: Artificial drying versus crib drying systems.**

	Combine + driver \$/ha	Cob harvest + crib \$/ha
Costs		
Planting & husbandry	408	408
Harvest costs	259	277 (1)
Drying 25% to 14% at \$20.50 per tonne	246	- (2)
Cartage at \$7.17 per tonne	86	-
Crib cost	-	55 (3)
Shelling costs \$12 per tonne at 10.0 t	-	120
Cartage at \$7.17 per tonne	-	71
Interest on profit 14 percent/6 months	-	88
Total costs	999	1019
Income		
Maize 10 t at \$200 per tonne	2000	2000
Storage increment at \$20 per tonne		200
Gross margin	\$1001	\$1180

(1) Includes transport and filling of crib

(2) Average grain moisture loss of 2-3 percent per month for 3 months

(3) Crib cost \$7400 (73m x 1.2m x 4m) depreciated at 10 percent, capacity 180 t, 20-year life

### **Maize silage**

Ministry of Agriculture officials at the 1984 Large Herd Conference (Christian, 1984) claimed that a price equivalent of \$4.00 per bale, maize silage showed a gross margin of \$2396 per hectare, while at \$3.00 per bale the gross margin was estimated at \$1230 per hectare. This conclusion would suggest that at an equivalent of \$3.00 per bale, maize silage, and maize grain equate with each other, but that at \$4.00 per bale, maize silage is considerably more profitable than maize grain. Maize silage, rather than maize grain, is therefore favoured in predominantly dairying districts.

### **Maize production utilising surplus capacity**

Maize production is frequently used by dairy farmers to reduce the demand on labour or the pressure on milking shed capacity. In this instance, maize substitutes for additional cows. Table 6 summarises the return from a factory supply herd in the Waikato and compares this

return with maize.

This analysis would suggest that the incremental capital investment required to milk additional cows can be justified provided the additional cows can be handled within the existing labour force. If additional labour has to be hired on contract milking rates in order to handle the increase in cow numbers then the return from maize equates with the return from dairying.

### **REFERENCES**

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