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**Budgets for
Irrigated Summer Crops
in Southern
New South Wales**

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Economist
Leeton

Leeton, November, 1979.

FOREWORD

Due to rapidly changing circumstances facing primary producers today, it is essential that information to assist farm business management and decision making, be made available as quickly as possible.

This publication concerning irrigated cropping of summer crops in southern N.S.W. is another published in the Economic Information Series, issued from time to time by Regional Economists of the South West Agricultural Region of New South Wales. This issue is titled Budgets for Irrigated Summer Crops in Southern New South Wales. The aim of this Series is to present economic information and analysis applicable to specific regional problems in a form readily usable to primary producers, Departmental Officers, researchers and others.

Past issues of the Economic Information Series STILL available for distribution, include the following:

M.I.A. Mixed Farming
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If you wish to obtain any of these, further copies of this issue, or to have your name added to the mailing list for regular receipt of future issues, write to -

The Regional Director of Extension,
N.S.W. Department of Agriculture,
P.O. Box 540,
LEETON. 2705 N.S.W.

Note: This issue is an expansion and up-date of an earlier publication in this series by Jim Kennedy, titled "Budgets for Irrigated Crops in Southern New South Wales", 1971.

The Rice Industry section in this publication was written with the helpful assistance of Jim Kennedy, currently attached to Ricegrowers' Co-operative Mills Limited.

BUDGETS FOR IRRIGATED SUMMER CROPS

IN SOUTHERN NEW SOUTH WALES

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BUDGETS FOR IRRIGATED SUMMER CROPS

IN SOUTHERN NEW SOUTH WALES

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LEETON.

INTRODUCTION

The search for profitable cropping enterprises brings a need for information enabling the comparison of costs and returns for different crops grown under similar circumstances at one point in time. This paper is an attempt to list the costs and returns which a farmer could expect to incur in the forthcoming season for irrigated summer crops in southern N.S.W. While the data presented does not purport to be precisely statistically representative of any particular area, the budgets have been synthesised from farmer experience, extension recommendations and research results. Thus, the information should prove fairly typical of such areas as Murrumbidgee, Coleambally and Murray Valley Irrigation Areas and Districts.

Enterprise Profitability

The farm can be seen as a portfolio of shares, held with the objective of maximizing yield, or in the case of the farm, the rate of return on capital invested. It is necessary to shuffle the shares in a portfolio in order to maximize yield, dropping the worst performing shares and introducing more profitable prospects. Similar re-organisation of the farm involves the introduction of new, more profitable enterprises in place of current activities. In order to have some idea of which enterprises could most profitably be introduced, it is essential to have some yardstick of enterprise profitability. The most common measure for comparing farm enterprises on an economic basis is called the Gross Margin, usually expressed per hectare or per head.

Farm costs can be split into two broad categories:

(a) Overhead Costs, which are relatively fixed in nature, and cannot easily be pinned to one particular farm enterprise. Examples are rent, depreciation, rates and permanent labour. The important thing is that such costs usually vary little with the level or type of output remaining roughly the same no matter what the mixture of enterprises on the farm (within reason).

(b) Variable costs, are those which can easily be pinned to one particular enterprise and which vary directly with the level of output of that enterprise. Examples are seed, fertilizer, water, machinery operating costs.

The performance measure for any one enterprise, the Gross Margin per hectare, is Gross Income per hectare for that enterprise, minus Variable Costs per hectare for that enterprise. This is the amount that each hectare of the enterprise makes available to cover Overhead Costs and then to provide a farming profit. Thus, Gross Margin is really a gross profit per hectare, it is not net profit. However, if the Overhead Costs can be kept at roughly the same level, then the higher we can make the whole farm Gross Margin or the total of all Gross Margins for all the enterprises on the farm, then the higher will be the farming profit.

The use of the Gross Margin concept makes it possible to compare enterprise performance between farms, and to generalise costs and returns over a number of similar farms.

Notes on Budgets

The following budgets are an attempt to derive per hectare variable costs and gross margins per hectare for summer crops grown in irrigated areas of southern N.S.W. in the forthcoming season. Brief notes on historic production levels, yields and prices, together with marketing outlets for the respective crops are incorporated with each budget. There are a number of important qualifications to these budgets which should be borne in mind.

1. The listing of purchased inputs in no way denotes a recommendation for any particular commercial product. However, it has been essential to adopt a set of inputs in order to derive any costing. These inputs listed have generally been adopted because of their common usage and/or price.

2. The listing of inputs is illustrative of a common situation, but should be varied to suit your own circumstances - e.g. fertilizer and water requirements will vary significantly according to soil type and paddock history, and the irrigation system used. Prices of purchased inputs change regularly, and thus the costings should be revised for any major price change in such items as fertilizer.

3. A charge of \$3.22 per megalitre of water used has been adopted throughout the budgets. This represents the current "average cost" of water in the Coleambally and Murray Valley Irrigation Areas and Districts, and is also common to a

number of private irrigators. You should however, insert your own water purchase or pumping cost if you farm outside these areas. For instance, a charge of \$5.09 per megalitre of water used should be adopted as an average price for farms in the Murrumbidgee Irrigation Area.

4. A charge of \$5.20 per tractor hour of operation has been adopted for the costing of land preparation. This represents the variable costs of running a 90 - 100 h.p. diesel wheeled tractor for most cultural operations. This cost will be reduced or higher, depending on the size of tractor being used. It was felt that a 90 - 100 h.p. tractor adequately reflected the wide range of tractors used in the area. The cost of \$5.20 per tractor hour does not include depreciation, although it does include fuel, oil, tyres, repairs and maintenance. A listing of these costs is given at the end of this paper.

5. Contract harvest and cartage costs have been used. These would represent the maximum costing for these operations, since farmers using their own headers and trucks would presumably be doing so at a cost less than that charged by the contract operator. Furthermore, in the case of such crops as maize and grain sorghum, much of the produce is sold on farm. However, in order to maintain a consistent costing basis, contract harvest and cartage rates were a necessary inclusion.

6. The yield and price estimates used in these budgets may differ markedly from season to season and area to area. Since profits are determined primarily by variations in prices and yields, a "profit variation" table has been included following each individual budget.

7. Pesticides and chemicals used in the following budgets are those recommended at time of publication.

It is hoped that the following budgets will be a useful framework for the construction of profitability budgets for many individual farming situations.

RICE

Production

Within the present system of production, physical constraints on the level of rice output in New South Wales are strongly influenced by both the volume of irrigation water available, and the delivery capacity of some irrigation systems. In New South Wales, maximum areas of rice which can be sown on each farm are determined annually by the Minister for Conservation and Water Resources, in consultation with the Rice Industry Co-ordination Committee. Physical factors, such as water availability are taken into account, along with considerations of paddy storage and milling capacity, and the expected price levels in world markets. For the 1980 harvest, area maxima are based on 51 hectares per farm in the Murray Valley, and 73 hectares per farm in the Murrumbidgee and Coleambally Irrigation Areas.

In New South Wales rice is grown under irrigation in the south west region of the State, which produces over 95 per cent of Australian paddy output. The following table indicates rice production details for N.S.W. over the past six seasons.

N.S.W. RICE PRODUCTION DETAILS

Area	Area Harvested (ha)	% Long Grain (pd'n)	Paddy Production (tonnes)	Ave. Yield (t/ha)	No. Farms
<u>1979 Harvest</u>					
M.I.A.	39,675	56	240,602	6.06	x
C.I.A.	22,836	52	142,158	6.23	x
M.V.	43,140	-	291,680	6.76	x
TOTAL N.S.W.	105,651	31	674,440	6.38	x
<u>1978 Harvest</u>					
M.I.A.	36,584	68	202,761	5.54	600
C.I.A.	22,083	69	110,377	5.00	311
M.V.	29,707	0.2	201,313	6.06	909
TOTAL N.S.W.	88,374	45	476,312	5.39	1,846
<u>1977 Harvest</u>					
M.I.A.	34,120	66	195,950	5.74	597
C.I.A.	21,847	61	121,698	5.57	311
M.V.	33,234	0.2	201,313	6.06	909
TOTAL N.S.W.	89,201	39	518,961	5.82	1,817
<u>1976 Harvest</u>					
M.I.A.	27,127	78	146,751	5.41	605
C.I.A.	12,196	83	79,324	4.89	312
M.V.	29,312	1	182,191	6.22	915
TOTAL N.S.W.	68,635	45	408,266	5.70	1,832

Area	Area Harvested (ha)	% Long Grain (pd'n)	Paddy Production (tonnes)	Ave. Yield (t/ha)	No. Farms
<u>1975 Harvest</u>					
M.I.A.	26,807	62	148,533	5.54	603
C.I.A.	15,125	69	74,498	4.93	310
M.V.	30,384	10	151,546	4.99	892
TOTAL N.S.W.	72,316	42	374,577	5.18	1,805
<u>1974 Harvest</u>					
M.I.A.	25,219	41	170,492	6.76	601
C.I.A.	14,721	45	93,762	6.37	312
M.V.	24,928	4	139,184	5.58	782
TOTAL N.S.W.	64,868	29	403,438	6.21	1,695

NOTES: M.I.A. - Murrumbidgee Irrigation Area
C.I.A. - Coleambally Irrigation Area
M.V. - Murray Valley
x - not yet available

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The 1979 harvest in New South Wales produced a record crop of 674,000 tonnes of paddy rice, about 156,000 tonnes above the previous record. This expansion of output brought the industry close to paddy storage and processing capacity. A programme of paddy storage construction is in train for the 1980 harvest, and milling capacity is being augmented.

The area sown to rice in Australia has also been consistently increasing - in 1973-74 sowings were 68,000 ha, which increased to around 99,000 ha in 1978-9. In N.S.W., these increases have mainly been the result of increased rice areas on existing farms. However, in the longer term, the continuing availability of regulated flows of irrigation water, and the rate at which this can be reticulated through the irrigation system, will be the main physical determinants of future rice sowings. Economic constraints will continue to be based on efficiency of production and export cost competitiveness, and the general level of world markets.

In recent years, Australian rice exports have accounted for around 85% of total sales, with all exports coming from the N.S.W. crop. Australian rice exports typically comprise only 3% of world rice trade. In order to somewhat stabilise grower returns from the influence of extreme short term movements in world market returns, the industry has followed a policy of careful selective market development. The greater proportion of exports in recent years has gone to these traditional or established markets, with Papua New Guinea, Hong Kong and Indonesia together receiving around 183,600 tonnes of milled product in 1978-9.

Marketing

The two bodies involved in the marketing of the N.S.W. rice crop are the Rice Marketing Board and Ricegrowers' Co-operative Mills Limited. These bodies are owned by substantially the same group of people - the Board receives all paddy rice grown, and for the past two seasons 99.4% of the total paddy crop has been grown by shareholders of the Co-operative.

The Rice Marketing Board has basic responsibilities for paddy handling and payment of growers. It receives and stores all paddy rice at strategic centres, and samples all deliveries for quality. Acting as agent for growers, it then sells all paddy rice delivered (less an amount retained to cover seed requirements for the next season), to the Ricegrowers' Co-operative Mills, which dries, transports, mills, packs and sells the milled rice and by-products on the home and export markets. Prices for export sales negotiated by the Co-operative are approved by the Board, in an attempt to ensure that average returns exceed production costs. From its sales revenue, the Co-operative deducts agreed actual costs of milling and milling profits (which are distributed to shareholders), and pays the net proceeds to the Rice Marketing Board. Based on anticipated revenue from sales made by the Co-operative, the Reserve Bank advances funds to the industry to enable growers to receive a first advance payment for their rice soon after harvest. This is usually followed by three further advances to complete the pool within the following year.

A third body involved in the industry, the Ricegrowers' Association, with membership of about 85 per cent of growers, represents the interests of individual growers, formulates industry policies, and negotiates direct with Government and other bodies in this regard.

In summary, the N.S.W. rice industry provides a good example of vertical integration, where the product is received from farms by a grower owned Board, and processed and marketed by a wholly grower owned co-operative.

Prices

On the Australian market, milled rice is sold from production in N.S.W., Queensland and Western Australia. The domestic retail price of milled rice has remained relatively constant in real terms for at least the last five years. Australian domestic milled rice prices have generally exceeded export parity in recent years, although there are no tariff barriers on the import of milled rice into Australia.

Over the last decade, the average return to growers for paddy rice (taken over all varieties), has fluctuated in response to world price movements, but has followed a generally increasing trend. In 1969, the average paddy price was \$60 per tonne, which had fallen by almost \$20 by 1971. In line with world prices, returns peaked in 1974 at around \$122 per tonne, then slipped back to around \$95 per tonne for the next two seasons before increasing to around \$108 per tonne in 1977. Average paddy price (before Board equity deduction) is expected to be around \$116 per tonne for the 1978 crop.

Costs and Returns

Cost and returns for one hectare of rice vary according to variety, geographical area, local input prices, and different management techniques.

In order to present a valid comparison between rice and other summer crop budgets in this publication, the following rice budget has been costed for the most typical situation in Murray Valley Districts - that is, Calrose variety aerially sown. Almost no long grain rice is grown in the Murray Valley; production is centred in the Murrumbidgee and Coleambally Areas, where ground preparation, sowing and crop management techniques differ from those shown below. Long grain varieties typically yield less than Calrose, although a price premium is paid on long grain rice to compensate for this.

For a comparable costing for long and medium grain rice varieties in the Murrumbidgee Irrigation Area, see reference 4. A comparison of the costs of different methods of rice establishment in northern areas is given in reference 2. Expected costs and returns for all enterprises commonly undertaken on a typical rice growing farm in the Berriquin Irrigation District are detailed in reference 1 for the 1979/80 season. Included are gross margin calculations for winter cereals and livestock enterprises, which could be compared with budgets for summer crops shown in their publication.

CALROSE RICE

VARIABLE COSTS

		<u>\$/hectare</u>
<u>Seed:</u>	120 kg/ha \$ \$120 per tonne	
	less \$5/t cash payment	13.80
<u>Fertilizer:</u>	120 kg/ha Urea @ \$204/tonne	
	plus \$4/t freight to farm	24.96
<u>Machinery:</u>	Banking, pushing up ends	
	furrows @ 1.25 hrs/ha	
	1 disc @ 0.875 hrs/ha	
	1 scarify @ 0.625 hrs/ha	
	1 grade (8m)@ 0.655 hrs/ha	
	1 combining @ 0.65 hrs/ha	
	Harvest help @ 0.70 hrs/ha	
	Total 4.725 tractor hours @ \$5.20	24.57
<u>Sowing:</u>	By air @ \$11.40 per hectare	11.40
<u>Herbicide:</u>	2.8 litres/ha 27% M.C.P.A. @ \$1.60	4.48
	- aerial appl'n \$6.42	6.42
<u>Water:</u>	14.58 ml/ha @ \$3.22/ml	46.95
<u>Bloodworm:</u>	Apply 60 ml Temephos 500	
	with seed @ \$31.50/litre - \$1.89	
	-additional appl'n 1 year in 4	
	- \$1.33	3.22
<u>Snails/Slime:</u>	6 kg/ha @ \$0.74 kg plus aerial	
	appl'n - \$4.44	
	- total cost : \$8.88	
	- apply 1 year in 4	2.22
<u>Rice Beetle</u> <u>or Armyworm:</u>	Trichlorphon (Dipterex)	
	0.75 litres @ \$6.20/litre for	
	liquid concentrate plus aerial	
	appl'n (\$6.42) -total cost	
	\$11.07/ha - apply 1 year in 4	2.77
<u>Harvest:</u>	by contract, \$12.50 per tonne	
	recommended rate	78.75
<u>Cartage:</u>	by contract, \$3.60 per tonne for	
	16 kms	22.68
	TOTAL VARIABLE COSTS	242.22
<u>GROSS INCOME</u>	6.3 tonnes @ \$110.50 cash	
	(estimated \$114 less \$8	
	equity plus \$4.50 R.C.M. cash)	\$696.15
<u>GROSS MARGIN: PER HECTARE</u>		<u>\$453.93</u>

NOTES

Seed: There are numerous discount offers available when purchasing seed from the Rice Marketing Board - basically discounts from the base price for early collection. A cash payment discount of \$5/tonne has been allowed for in this budget.

Fertilizer: Various fertilizer prices will apply if purchased through the R.M.B., depending on time of payment. Sulphate of ammonia could also be applied, although given the nitrogen requirement, the application of Urea using present prices is cheaper.

Herbicide: Molinate can be applied by contract application although is costed here to have been applied by boom spray.

Bloodworm, Slime, Snails and Armyworm: The frequency of applications to control these problems varies from grower to grower. An attempt is made here to cost such applications, however growers should insert the frequency which aligns with their situation.

Yields and Prices

The gross margin per hectare attainable in the above budgeting situation, will be influenced by any variations in yields and prices. The following table indicates the variations that may occur in the gross margin obtainable from rice grown using the same techniques as those applied in the above budget.

RICE PROFIT VARIATION

Yield per ha	\$60	Price per tonne (cash) \$85	\$110.50	\$140
Gross Margin - \$/hectare				
3.75	23.84	117.59	213.21	323.84
4.9	74.32	196.82	321.77	466.32
6.3	135.78	293.28	<u>453.93</u>	639.78
8.6	236.75	451.75	671.05	924.75

References: For further information, see:

- (1) J. Lacey, P. Penman, J. Kennedy: "Berriquin Farming" Economic Information Series, N.S.W. Depart. Agriculture, Leeton, Sept., 1979, 26pp.
- (2) P. Penman: "Energy Costs of Rice Establishment", IREC Farmers' Newsletter, Large Area No. 111, July, 1979, p 15-18.
- (3) J. Kennedy: "Rice in New South Wales", Commodity Bulletin, Vol. 6, No. 10, May, 1978, P 9-18.
- (4) J. Kennedy: "Financial Notes on an M.I.A. Mixed Farm 1977/78" N.S.W. Department of Agriculture, Feb., 1979, 4pp.
- (5) Rice Marketing Board: Annual Report, February, 1979.
- (6) Ricegrowers' Co-operative Mills Limited: 1979 Annual Report

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MAIZE

Production

Virtually the entire Australian maize crop (98%) is produced in New South Wales and Queensland, being divided fairly evenly between the two States over the last decade. Although Queensland was the major producer a few seasons ago, New South Wales has once again produced the majority of the crop in 1978-79.

The following table outlines the area and production statistics for maize in Australia over the last decade.

Maize Area and Production

	<u>Area ('000 ha.)</u>			<u>Production (kt)</u>		
	<u>NSW</u>	<u>Qld</u>	<u>Aust</u>	<u>NSW</u>	<u>Qld</u>	<u>Total</u>
1968-69	22	44	67	78	69	149
1969-70	33	46	80	102	88	192
1970-71	33	52	86	106	104	212
1971-72	33	45	78	114	97	214
1972-73	24	35	59	67	70	139
1973-74	18	27	46	48	56	106
1974-75	22	29	51	60	72	133
1975-76	17	29	47	52	77	131
1976-77	20	33	53	65	77	144
1977-78 (p)	18	30	49	50	59	111
1978-79 (s)	30	28	59	92	60	165

p = preliminary

s = estimates of B.A.E.

Source: Coarse Grain Situation and Outlook, 1979
B.A.E.

Australia's maize production has shown a generally declining trend since reaching a peak in 1971-72. A major reason for this declining trend has been the reduced demand for maize as a component of rations formulated for various livestock industries. However, preliminary estimates of the 1978-79 crop show a substantial increase in expected production.

With the high costs involved in the production of irrigated maize, there has been an increasing trend for the number of growers in the industry to decline. Consequently, production has tended to be concentrated with a few growers who are able to achieve economies of scale. Although comparisons are difficult because of the different proportions of the crops which are irrigated, N.S.W. has been able to maintain higher average yields than Queensland over the last ten years. Average yields in N.S.W. have dropped from 3.55 tonnes/hectare in 1968-69 to an estimated 3.06 tonne/hectare in 1978-79 whereas Queensland yields have been 1.57 tonne/hectare and 2.13 tonne/hectare for each respective year.

The majority of Australia's maize production is utilized on the home market. The percentage exported has risen to slightly over 10 per cent in the last few seasons, after previously being at levels of 2-3 per cent. A feature of the Australian maize industry over recent years has been the increasing proportion of domestic grain used in the food industry. Over the last few seasons, the percentage utilized in the food industry has doubled to 50 percent. However, total tonnage has not risen as dramatically, due to the declining production. Most of the maize is used in breakfast cereals, snack foods, confectionary and starch processing.

Marketing

In 1975, producers of yellow maize in N.S.W. voted in favour of forming a Yellow Maize Marketing Board, under the provisions of the Marketing of Primary Products Act, (1927).

During the first four years of operation the Board conducted a Licensed Merchant and Miller System to service the local market. Such a policy provided an alternative marketing outlet for growers - together with the facility of co-ordinating export shipments, the Board sought to stabilize the final price. However, a number of problems encountered under such a marketing strategy, such as difficulties in taking full advantage of export market opportunities, have prompted changes to the marketing system.

In 1980, the Yellow Maize Marketing Board will for the first time, acquire the entire crop in an attempt to ensure that growers receive on farm prices that reflect the substantially improved prices for maize obtainable on the local and export market during the 1980 season. The Board will occasionally offer all registered maize growers the opportunity to enter into fixed tonnage, minimum price, specified quality, delivery period and place contracts with the Board itself. Agents for the Board will be located throughout the maize producing areas of the State. After the Board has offered contracts to the growers, all negotiations will be between the grower and the Board's agent in his area. In addition to receiving yellow maize into its pools, the Board has arranged for growers to deliver maize direct off-farm to end users who have contracted to purchase maize from the Board.

Upon delivery of the crop, the grower's maize will enter a particular pool. A first advance payment will be forwarded by the Board, within three weeks. With a number of pools in operation, the Board expects subsequent and final payments to be paid within a relatively short period after the first advance payment.

As yet, there has been very little comment made by the Board on prices for the 1980 crop. Tentative estimates are a first advance payment of \$105 per tonne delivered Sydney basis.

Prices

Growers of maize in Australia have been receiving increasing prices since 1971-72 when levels were around \$50 per tonne, to levels in 1978-79 of \$100 per tonne. Maize prices have tended to fluctuate within each season according to time of harvest, seasonal conditions, etc. Capital city prices have fluctuated during the season depending on time of delivery.

Although export prices for maize rose by 8 per cent in January 1979, significant increases in U.S. coarse grain production together with favourable cropping conditions in the Northern Hemisphere will cause an increase in supply, which may in turn have a slightly depressing effect on prices in the 1980 season.

Costs and Returns

Within the south-west irrigation areas, the two most common maize varieties grown are XL45 and XL81. The following budget is costed for a semi-dwarf variety.

Contract cartage and harvest rates have been used although by far the majority of maize growers harvest their own crop. However, in order to make valid comparisons with other enterprises, contract rates were used.

No costing for drying of grain has been allowed for in this budget, because of its totally unpredictable frequency. Growers should insert an appropriate cost if they feel it necessary. Within the irrigation areas of south-west N.S.W. an increasing proportion of growers have driers as the grain is often held on farm for up to six months or more. Furthermore growers owning their own driers are able to begin harvest earlier without waiting for seasonal conditions to dry down.

The following budget is costed following one previous cereal crop which has been adequately fertilized. Areas sown directly following a pasture phase would generally require less fertilizer.

MAIZE

<u>VARIABLE COSTS</u>		<u>\$/hectare</u>
<u>Seed:</u>	69,000 plants established per hectare (assume 3,500 seeds/kg @ \$0.80/kg)	15.77
<u>Fertilizer:</u>	120 kg/ha Anhydrous combined at scarifying @ 44.4¢/kg N - at sowing, 150 kg/ha of Starter 12 @ \$253/tonne - with irrigations, 70 kg/ha Urea @ \$200 /tonne	37.95 12.00
<u>Machinery:</u>	1 deep rip @ 1.2 tractor hrs/ha 2 discings @ 0.85 " 2 scarifying @ 0.625 " 1 sowing @ 1.00 " 1 furrow-out @ 1.00 " 2 inter-row @ 0.85 " cultivation Total 7.85 t.h. @ \$5.20/hour (Based on 93 h.p. tractor)	40.82
<u>Water:</u>	8 Ml/ha @ \$3.22/Ml	25.96
<u>Herbicide:</u>	4.5 litres/ha Atrazine @ \$3.62/litre	16.29
<u>Harvest:</u>	by contract, \$37.50/ha minimum up to 1 tonne, then \$12.50/tonne thereafter	87.50
<u>Cartage:</u>	by contract, road freight to Melbourne @ \$18/tonne	90.00
	TOTAL VARIABLE COSTS	\$379.37
<u>GROSS INCOME</u>	5.0 tonnes/ha est. @ \$100/tonne	\$500.00
<u>GROSS MARGIN</u>	per hectare	<u>\$120.63</u>

Notes:

Machinery: There may be a need for land planing in early years, especially on a new layout, since correct grade for water control is vital to crop success. However, on an established layout, such a cost is avoided altogether, or replaced by a pass with a small farm grader or an extra scarifying (as is the case in this instance).

Water: Approximately 8 Ml/ha is adequate water, although this depends largely on the season. Maize should not be stressed during grain filling. In summer, watering intervals of 8 to 10 days are possible.

Herbicide: Herbicide is generally applied prior to or at sowing. If the paddock is well prepared to guard against winter/spring growth of weeds, the herbicide may have a split application.

Total Variable Costs: This figure does not include a cost for drying grain. The need for drying grain is extremely unpredictable, depending on time at sowing and weather conditions at harvest. The grain at selling needs to have a moisture level not exceeding 14%. Most maize growers dried their grain, most commonly from a level of 17-18%. Drying may be avoided for early sown crops yet may be a substantial cost if weather conditions are poor for late sown crops. A figure should be included here, depending on each individual farmer's situation.

The following table indicates the gross margin per hectare attainable, given various yield and price levels.

MAIZE PROFIT VARIATIONS

Yield per Hectare	<u>Price</u> - \$/tonne			
	\$85	\$100	\$110	\$125
Gross Margin - \$/hectare				
3.5	-36.12	16.38	51.38	103.88
5.0	45.63	<u>120.63</u>	170.63	245.63
7.5	181.88	294.38	369.38	481.88
10.0	318.13	468.13	568.13	718.13

GRAIN SORGHUM

Production

New South Wales and Queensland account for approximately 98 per cent of Australia's grain sorghum output. Queensland is the major producer, consistently securing at least 60 per cent of production over the last ten years.

The following table indicates the area and production statistics of grain sorghum for the two major producing states and Australia as a whole.

	<u>Grain Sorghum Area and Production</u>					
	<u>Area ('000 ha)</u>			<u>Production (kt)</u>		
	<u>NSW</u>	<u>QLD</u>	<u>AUST.</u>	<u>NSW</u>	<u>QLD</u>	<u>AUST.</u>
1968-69	55	150	210	107	185	294
1969-70	99	258	359	164	381	547
1970-71	180	369	552	487	806	1,297
1971-72	208	423	638	371	833	1,228
1972-73	269	414	697	372	622	1,018
1973-74	201	332	540	394	654	1,061
1974-75	176	329	511	257	634	901
1975-76	161	339	504	375	740	1,124
1976-77	152	377	532	343	605	956
1977-78(P)	105	306	413	185	475	669
1978-79(S)	250	400	652	470	700	1,180

P = preliminary S = B.A.E. estimates

Source: B.A.E. Situation and Outlook:
Coarse Grains 1979.

From the above table, it can be seen that both the area sown to, and the production achieved from grain sorghum in Australia has followed a fluctuating course over the last decade. Within the Murrumbidgee and Coleambally Irrigation Areas, areas sown to grain sorghum have been declining. The main reasons for the declining areas have been the increased rice areas and the improving returns from winter crops. Furthermore, the improving oilseeds market has had an effect on areas sown to alternative summer crops. A careful consideration not only for grain sorghum growers in the Murrumbidgee and Coleambally Irrigation Areas, but also growers of other summer crops in conjunction with rice, is the availability of adequate water throughout the season.

Although the picture is confused by the proportion of the crop irrigated, N.S.W. has maintained a higher average yield for grain sorghum than Queensland over the last ten years. However the average yield figures have fluctuated dramatically. Average yields for N.S.W. were highest in 1970-71, being 2.71 tonnes per hectare and lowest in 1972-73 at 1.38 tonnes per hectare. Estimates for the 1978-79 crop indicate average yields will be similar to those of ten years ago at 1.85 tonnes per hectare.

The majority of Australia's grain sorghum crop is exported each year. The percentage of the crop exported has fluctuated from 58 per cent in 1974 up to 84 per cent in 1977. The majority of the remainder is used for stockfeed.

Marketing

New South Wales grain sorghum crop is marketed through the Grain Sorghum Marketing Board. Traditionally, the Board has operated under a licensed merchant system allowing the grower to sell grain into the domestic market through a licensed merchant of the grower's choice, or alternatively delivering to the Board's voluntary export pool.

Growers who choose to deliver to the Board are paid a first advance (less freight) which is then followed up by subsequent and final payments throughout the season. The Board attempt to give an "indicative price" at planting which is intended to give growers some idea at the beginning of the season, of what prices they may expect at harvest.

In the Murrumbidgee and Coleambally Irrigation Areas much of the grain sorghum crop is sold on farm and delivered to feed millers in Victoria or the Berrigan area. Very little of the crop is delivered to the Board's export pool. The primary reason for this is the freight rates that exist between south-western N.S.W. and Sydney.

The Grain Sorghum Board has not as yet announced its marketing strategies for the 1980 season. Little indication has been released on expected prices for the coming season.

Prices

Prices received by grain sorghum growers over recent years, have followed similar patterns to the prices received for maize and other coarse grain crops. Prices for grain sorghum in 1971-72 were around \$50 per tonne (net), which have increased to \$85 per tonne in 1979. As is the case with maize, sorghum prices fluctuate within each season depending on time of harvest and seasonal conditions.

Costs and Returns

The primary grain sorghum varieties grown in south-west N.S.W. are NK 212 and Pacific 303. The following budget is costed for these or similar varieties.

Contract harvest and cartage rates have been used although the majority of grain sorghum in the south-west region, is harvested by the grower and sold on farm. Cartage rates of \$18 per tonne are used to transport the crop to Melbourne. This figure would differ if the crop was being transported elsewhere. For instance, \$23 per tonne is the cartage rate for transporting to Sydney by road.

Most grain sorghum grown in this area is planted as a development crop on virgin country, or in a cropping situation. The following budget is costed for a sorghum crop sown following an adequately fertilized cereal crop.

GRAIN SORGHUM

<u>VARIABLE COSTS</u>		<u>\$/hectare</u>
<u>Seed:</u>	10 kg/ha @ \$1.28/kg	12.80
<u>Fertilizer:</u>	combined at final working	
	200 kg/ha Urea @ \$204/tonne	40.80
	- at sowing, 150 kg/ha Starter 15 @ \$253/tonne	37.95
<u>Machinery:</u>	1 scarifying @ 0.625 tractor hrs/ha	
	2 discings @ 0.85 "	
	2 gradings @ 0.75 "	
	Boom spray, trailing harrows, @ 0.85 "	
	Fertilizer combining @ 0.75 "	
	Sowing @ 0.75 "	
	Harvest help @ 0.50 "	
	Total 6.67 t.h. @ \$5.20/hr (based on a 93 h.p. tractor)	34.68
<u>Herbicide:</u>	Broadcast boom spray pre-sowing	
	4.5 litres/ha of 50% product	
	liquid atrazine @ \$3.62/litre	16.29
<u>Water:</u>	8 ML/ha @ \$3.22/ML	25.76
<u>Harvest:</u>	By contract, \$23.40/ha minimum up to 2.5 tonnes, then \$7.00 per tonne thereafter	40.90
<u>Cartage:</u>	By contract, \$18/tonne to Melbourne	90.00
	TOTAL VARIABLE COSTS	\$299.18
<u>GROSS INCOME:</u>	5 tonnes per hectare @ \$84/tonne	\$420.00
<u>GROSS MARGIN:</u>	PER HECTARE	<u>\$120.82</u>

Notes

Fertilizer: Grain Sorghum requires differing rates of phosphorus/nitrogen inputs depending on the recent history of the paddock and the soil type involved. The fertilizer input in this budget contains 110 kg/ha nitrogen and 30 kg/ha phosphorus. This rate may be lowered if the crop is sown immediately following a good pasture.

Machinery: In certain circumstances, a land planing may be advisable as is the case in the maize budget, however only grading within the ditches or checks has been costed here. If the banks are knocked down after each crop, landplaning may take place as part of the land preparation.

Herbicide: Herbicide cost may be avoided if the crop is sown on virgin paddocks, otherwise weed control is a necessity.

Water: Water requirements for grain sorghum vary between 7 and 8.5 Ml/hectare, depending on the season and layout. A dry, hot summer can mean 10-day waterings which increases water usage to the top end of the scale.

Prices and Yields: As with most summer crops in the south west, yield variations for grain sorghum can be substantial. Yield levels may rise as high as 9.0 tonnes/ha yet fall to around 3.0 tonnes/hectare. The following table indicates variations likely for the gross margin, gross variations with yield and price levels.

GRAIN SORGHUM PROFIT VARIATION

Yield per tonne	Price per tonne			
	\$55	\$70	\$84	\$100
	Gross Margin - \$/hectare			
3.5	-69.18	-16.68	32.32	88.32
5.0	8.40	50.82	<u>120.82</u>	200.82
7.0	35.82	140.82	238.82	350.82
9.0	95.82	230.82	356.82	500.82

OILSEEDS

SOYBEANS AND SUNFLOWERS

Production

Australia's oilseed production levels have only last year regained the high levels achieved during the 1974-75 season. Total oilseed production in 1975-76 dropped by 24% although the level has gradually increased since then with significant increases over the past couple of years. However, during that same period, production of soybean and sunflowers fell by greater proportions, being in the order of 40% and 30% respectively from 1974-75 to 1975-76.

During this same period there has been a comparable decrease followed by a gradual increase in the area being sown to both soybeans and sunflowers. However, the yield per hectare has tended to increase each year for both crops. The following table indicates area and production for both soybeans and sunflowers in N.S.W. and Australia.

Area and Production

Soybeans and Sunflowers

<u>Area</u> ('000 ha)	<u>Soybeans</u>		<u>Sunflowers</u>	
	<u>NSW</u>	<u>Aust.</u>	<u>NSW</u>	<u>Aust.</u>
1974-75	12.8	45.9	94.1	209.6
1975-76	6.7	26.3	62.6	136.9
1976-77	8.5	34.6	38.8	134.5
1977-78	14.1	48.3	60.0	207.0
1978-79(P)	18.0	52.0	84.0	253.0
<u>Production (kt)</u>				
1974-75	21.1	73.7	37.5	113.4
1975-76	11.3	44.6	32.6	80.0
1976-77	14.4	55.3	21.8	74.9
1977-78	32.0	77.0	34.0	147.2
1978-79 (P)	40.0	92.0	50.0	203.6

P - Preliminary

Source: B.A.E. Situation and Outlook: Oilseeds 1979

From the above table it becomes clear that the area sown to these summer oilseeds in 1978/79, represented a significant increase over areas sown in the previous season. A major factor contributing to this increase was the wet conditions experienced in the previous winter, restricting winter sowings of oilseeds and cereals.

Area sown and production in the south-west areas of N.S.W. has been increasing in recent years for both these crops. Although the area sown to soybeans in 1975-76 was only 100 hectares, this had increased to 616 hectares by 1977/78. Production during this period rose from 104 tonne to 867 tonne. In the case of sunflowers, area sown in 1975-76 was 3,050 hectares which increased to 3,834 hectares by 1977-78. Production for the corresponding period increased from 2,798 tonnes to 5,205 tonnes.

With increasing levels of production over the last few seasons, there has been a subsequent increase in the level of exports for total oilseeds. However, the situation for soybeans and sunflowers has been slightly different. An increasing proportion of both these crops is being consumed on the domestic market rather than being exported. Australia is a net importer of vegetable oils and would need to increase production significantly before there would be a need to export any surplus. Soybean oil remains the single most important oil import. However, although remaining a nett importer of oils, Australia does continue to export oilseeds.

Marketing

The marketing of both sunflower and soybean crops in New South Wales is organised by the Oilseeds Marketing Board, which is set up by the growers under the provisions of the Marketing and Primary Products Act. In the case of sunflowers and soybeans, the Board acquires the entire crop.

The 1979 soybean crop was marketed on a contracting system between the growers and the crushers. Licensed crushers were able to arrange contracts directly with the growers. The Oilseeds Marketing Board operated three pools for the 1979 crop, on a guaranteed minimum price and fixed tonnage basis. Weekly harvest prices are negotiated between the Board and the crushers. If the grower delivers his crop to the Board during a given week, he receives the negotiated price for that week.

There is a number of slight changes to the marketing strategy of the Oilseeds Marketing Board for the 1980 soybean crop. If a grower is contracted to a crusher he must fulfil that contract and deliver his crop to him. In previous years, the grower was able to change his mind and deliver to the Board, even after being contracted to a certain crusher. Another area of change for the 1980 crop, is that the Board will have country receival points, which will reduce freight charges. Growers will be charged freight to the nearest crushing point. Any additional transporting of the crop will

be done at the Board's expense.

Present indications for the soybean market in the coming season are favourable. A guaranteed minimum price of \$180/tonne delivered Sydney for both growers and crushers has been released by the Board for the 1980 season.

Last season, the sunflower crop was acquired by the Board at the request of the industry, especially the crushing sector. The primary reason for the request to acquire the crop last season, was the clear indications that there would be an exportable surplus.

The payment procedure for the sunflower crop is on a system of a first advance followed soon after by a "balance" payment which has the Board charges deducted. There is very little adjustment made to the first advance payment, with the exception of an oil premium being paid. The first advance for the 1979 crop was \$200 per tonne delivered Sydney. The second payment has not yet been paid although should be around \$40 per tonne, from which the Board's charges will be deducted.

The 1980 sunflower crop will be acquired by the Oilseeds Marketing Board. At this stage, some sales have been made by the Board at favourable prices. For the 1980 season guaranteed minimum price and a first advance of \$200/tonne will be offered by the Board.

Prices

Prices being offered by the Oilseeds Marketing Board for soybeans this year reached as high as \$256 per tonne on farm. Sunflower prices rose to around \$212 per tonne on farm. It is difficult to determine whether these prices will continue for the coming season. The success or failure of the American soybean harvest, strongly influences prices received on a world scale.

Prices received for oilseeds by Australian growers have been fairly constant over the past few seasons. In 1976-77, growers were receiving prices averaging \$250 per tonne for soybeans.

Costs and Returns

The following budgets attempt to give a guideline to possible costs and returns associated with the growing of soybeans and sunflowers in south west N.S.W. Bethel is the most common soybean variety grown in this area.

The irrigation system chosen for soybean production should permit the establishment of a uniform plant stand. Row cropping, using hills or beds is the most reliable system and also has the following advantages:-

- better drainage is achieved, minimising waterlogging;
- water control is easier;
- production is possible on land with more side fall and less uniform grades; and
- inter-row cultivation is possible.

However, row cropping requires timeliness of operations and specific equipment. Border check or ditch systems have the advantage of requiring less labour, equipment and land preparation to obtain the desired tilth. It is essential to have land which has good surface and internal drainage which overcomes the problems associated with waterlogging.

Yield and price levels used in the following budgets are conservative estimates for the 1979-80 season. There is every likelihood that prices offered next season may be above the levels used here. Furthermore, yield levels may be increased from the levels used in these budgets with careful crop management. It is for these reasons that special attention is drawn to the "profit variation" table which indicates likely fluctuations in gross margin per hectare for each enterprise given variations in yield and price levels.

SOYBEANS

<u>VARIABLE COSTS</u>		<u>\$/hectare</u>
<u>Seed:</u>	70 kg/ha @ \$0.52/kg	36.40
	Inoculum - Group H	1.60
<u>Fertilizer:</u>	150 kg/ha triple super @ \$165/tonne	24.75
<u>Machinery:</u>	2 scarifyings @ 0.625 tractor hrs/ha	
	2 gradings @ 0.75 "	
	hilling up @ 1.00 "	
	Boom spray, trailing harrows @ 0.85 "	
	Fertilizer combining @ 0.75 "	
	Sowing @ 0.60 "	
	Harvest help @ 0.50 "	
	Total 6.45 t.h. @ \$5.20/hour (Based on a 93 h.p. tractor)	33.54
<u>Herbicide:</u>	Pre-plant application 2.8 litres per hectare Trifluralin @ \$3.50/litre	9.80
<u>Insecticide:</u>	Heliothis/soybean moth or green vegetable/brown shield bug, Parathion methyl 700 ml 50% product per hectare @ \$5.70 per litre	3.99

VARIABLE COSTS (cont.)		\$/hectare
<u>Water:</u>	9.0 Ml/ha @ \$3.22/Ml	28.98
<u>Harvest:</u>	By contract, \$46.50 per hectare up to 1 tonne, and \$10.00/tonne thereafter	52.00
<u>Cartage:</u>	By contract, \$18 per tonne road freight to Melbourne	27.90
TOTAL VARIABLE COSTS		\$218.96
<u>GROSS INCOME</u>	1.55 tonne/ha @ \$230/tonne	\$356.50
<u>GROSS MARGIN</u>	PER HECTARE	<u>\$137.54</u>

Budget Notes

Fertilizer: Soybeans require a fertilizer application containing 25-30 kg/ha of phosphorus. An alternative application which could be used in the above budget is:
320 kg/ha single super @ \$77/tonne

Sowing: Soybeans are usually inoculated at sowing, using either a cement mixer or mixing the inoculum with water and pouring into the seed box. Alternatively, if water injection is available, the inoculum is put in the water, the hose positioned adjacent to the seed bed outlet and dripped around the seed.

Herbicide: Weed control is essential for maximum economic return. Early land preparation gives the grower the opportunity of sowing on time and hence, more of an opportunity of getting the correct plant population - two essential factors if high yields are to be achieved. The major problem weed in soybean production is Barnyard Grass, because of its competition with the crop and of the reduction it causes in the quality of the bean harvested. Trifluralin is the most widely used pre-planting herbicide and when properly applied provides an excellent control.

Insecticide: Over the past 3-5 years the need to spray for insect control has fallen in the south west soybean growing areas. This cost may in fact be justified in splitting over two years, although it is unusual to avoid such a cost every second year.

Harvest: The soybean crop should be harvested when the moisture content of the beans falls to 13%. When this is reached most of the leaves will have fallen from the plant and most stems will be dry. Under some circumstances the grain must be stored and dried if the moisture content is above the critical level at harvest.

However, no cost has been allocated for drying in the above gross margin because it is such an unpredictable expense depending on time of sowing and weather conditions at harvest. Depending on each individual situation, a cost for drying should be included if appropriate.

Prices and Yields: The yield variation can rise as high as 2.5 or 3 tonnes/hectare yet fall to below 1 tonne/hectare. The yields within the south west area invariably average between 1.25 and 1.85 tonnes/hectare. Prices also fluctuate for the crop within the season. Such variations influence the gross margin per hectare attainable, which is indicated by the following table.

SOYBEAN PROFIT VARIATIONS

Yield per hectare	Price per tonne			
	\$180	\$205	\$230	\$265
	Gross Margin - \$/hectare			
0.90	-39.76	-17.26	5.24	36.74
1.55	60.04	98.79	<u>137.54</u>	191.79
2.0	128.44	178.44	228.44	298.44
2.5	204.44	266.94	329.44	416.94

SUNFLOWERS

<u>VARIABLE COSTS</u>		<u>\$/hectare</u>
<u>Seed:</u>	6 kg/ha @ \$4.20/kg of hybrid seed	25.20
	-- plant population 74,000/ha	
<u>Fertilizer:</u>	- combined at final working,	
	150 kgs/ha Urea @ \$204/tonne	30.60
	- at sowing, 100 kgs/ha Starter 15	
	@ \$253/tonne	25.30
<u>Machinery:</u>	1 scarifying @ 0.625 tractor hrs/ha	
	2 discings @ 0.85 "	
	2 gradings @ 0.75 "	
	- Boom spray, trailing harrows	
	@ 0.85 "	
	Fertilizer combining	
	@ 0.75 "	
	Sowing @ 0.625 "	
	harvest @ 0.50 "	
	Total 6.55 tractor hours @ \$5.20/hr	34.06
	(Based on a 93 h.p. tractor)	
<u>Herbicide:</u>	pre-plant application, 2.8 litres/ha	
	Trifluralin @ \$3.50/litre	9.80
<u>Water:</u>	6.5 ML/ha @ \$3.22/ML	20.93

VARIABLE COSTS (Cont.)

\$/hectare

<u>Insecticide:</u>	Rutherglen bug control, say 1.2 litres/ha 50% Maldison @ \$2.50/litre	3.00
<u>Harvest:</u>	By contract, \$26/hectare up to 1 tonne, then \$25/tonne thereafter	47.25
<u>Cartage:</u>	By contract, \$19/tonne road freight to Melbourne	35.15
TOTAL VARIABLE COSTS		<u>\$231.29</u>
<u>GROSS INCOME</u>	1.85 tonnes/hectare @ \$210/tonne	\$388.50
<u>GROSS MARGIN</u>	per hectare	<u>\$157.21</u>

Budget Notes:

Fertilizer: Sunflowers generally require 20-30 units of phosphorus and 80-100 units of nitrogen under a row cropping situation. The actual amount varies depending on soil fertility, with well cropped paddocks requiring the higher application rates.

Machinery: The amount of land preparation required will depend upon the condition of the paddock, the method of irrigation and the soil type. Sunflower paddocks are sometimes ripped if land preparation is early and hills are going to be erected.

Herbicide: Herbicide needs to be applied every year with the possible exception of where sunflowers are grown on virgin country for the first time. Barnyard grass is the prevalent weed and will outstrip the growth of sunflowers unless controlled by a pre-sowing application of Trifluralin. Such an application effectively controls all annual grasses and a variety of broadleaf weeds.

Insecticide: Rutherglen bug control measures are normally required, although this varies with the level of infestation. While it is hoped that their numbers decline cyclically, more than one spraying may be required.

Water: Moisture and temperature at flowering are vital. Yield is strongly influenced by moisture availability during the period about three weeks before and three weeks after mid-flowering. The total water requirement of sunflowers is similar to other crops being in the 6 to 7.5 megalitres/ha range. It is vital that an adequate water supply is maintained during the high water demand period of bud initiation through to seed development.

Cartage: Production of oilseeds from the M.I.A. are generally carted to the capital cities by road. The freight rate to Melbourne has been used in the above budget. If growers are transporting to Sydney or elsewhere, the appropriate cost should be inserted.

Prices and Yields: The final price paid to sunflower growers is dependent upon such factors as export sales, domestic oilseeds processor requirements and the relative volume of production of other oilseed crops. Yields also vary within the irrigation areas of the south-west, ranging from over 3 tonnes/ha to below 1 tonne/ha. The following table indicates variations in the gross margin per hectare, given varying yield and price levels.

SUNFLOWER PROFIT VARIATION

Yield per hectare	<u>Price</u> - per tonne			
	\$170	\$190	\$210	\$225
	Gross Margin - \$/hectare			
1.0	-23.89	-3.89	16.11	31.11
1.85	83.21	120.21	157.21	184.96
2.25	133.61	178.61	223.61	257.36
3.0	228.11	288.11	348.11	393.11

TRACTOR OPERATING COSTS

This is an attempt to establish operating costs for normal tractor usage. The only costs considered are those that vary directly with tractor usage - overhead costs (such as depreciation or cost of shelter) which are incurred regardless of usage, are not included.

Within the M.I.A. there is a wide variety of tractor sizes being used, ranging from 60 horsepower up to 120 horsepower. The data used here is based on a 93 engine horsepower diesel wheeled tractor, fairly typical of Irrigation Area mixed farms. Variations in the size of tractor being used will require some adjustments to these costs.

The following costing is designed to cover most broad acre cultural operations using a cultivation implement on a task of moderate load (e.g. discing, scarifying). Such things as fuel consumption and tyre wear may vary according to the type of operation being undertaken (higher for heavy operations e.g. deep ripping and lower for light operations as boom spraying), work load on tractor, nature of the terrain etc. Variation on fuel consumption is the most important factor affecting operating costs.

<u>OPERATING COSTS</u>	<u>\$ per hour of tractor operation</u>
- 93 engine h.p. diesel wheeled tractor	
<u>Fuel:</u> 14.9 l/hr @ 16.52¢/l	2.46
<u>Oil:</u> Engine Oil 9.4 l @ 81¢/l	
changed every 150 hours	.05
Topping up .094 l/hr @ 78¢/l	.07
Transmission Oil 52.1 @ 75¢/l	
changed every 400 hours	.10
<u>Grease & Filters:</u> Oil filter \$7.50 changed at 200 hrs	.04
Fuel filter 2 x \$4 changed every 250 hrs	.03
2.27 kg Grease every 700 hrs @ \$2.44/kg	.01
<u>Tyre & Tubes:</u> Replace 2 rear tyres every 2000 hrs	
@ \$520 ea.	.52
2 front tyres every 3000 hrs	
@ \$70 ea.	.04
2 rear tubes every 2000 hrs	
@ \$58 ea.	.06
2 front tubes every 3000 hrs	
@ \$35 ea.	.02
<u>Repairs & Maint:</u> (including spare parts & Maint. labour)	
Expressed as % of purchase price -	
Tractor 120% of \$18,000	
Exp. Life 12,000 hrs	1.80
	<u>\$5.20</u>