Economics of on-farm storage

What do you need to know?

What is your assessment of your present post harvest operations and marketing, from an economic point of view? How strategic are you in your business planning? Can you do these things?...

- calculate the true costs of your production, storage and marketing
- interpret industry forecasts for grain commodity prices
- generate alternative business and production targets using market intelligence
- carry out cost-benefit analyses of your business alternatives
- create a five year business and marketing plan.

Use this list to identify your own learning goals. By studying this and other sections of the web–CD, and by using our hotlinks to other information sources, you have the opportunity to achieve your goals.

Introduction

Much of this analysis has been taken from the RIRDC *Grain Marketing Handbook*, a booklet helping grain growers improve their marketing strategies and their farm gate price and profit. The Handbook was prepared by Neil Clark & Associates and was funded by the Rural Industries Research and Development Corporation and the Grains Research & Development Corporation. Revised by David Webley, edited by Orange Agricultural College. (Note: Neil Clark & Associates acknowledges advice from Australian Wheat Forecasters in the preparation of this material. Website: http://www.austwheat.com.au. Email: cpeace@ozemail.com.au .)

The task of marketing commences before the crop is sown. It begins when markets are identified and targeted. The grower must consider the selling channels, the time of selling, the contracts under offer, and the pools, to reach a blend of sales that matches the practical realities of commodity production and market access.

A grower would like to sell all of a particular commodity at the top of the market, but such a strategy involves a high level of risk. The risks of price variations can be managed by selling to different markets at different times. This approach is a planned marketing strategy that reduces overall risk and should give good returns.

Income and profit

A positive approach is to establish a target income and compare it with your calculated income. By completing the following table you will get a better understanding of your total cropping income linked to yield projections and price.

To help you understand the potential gains from marketing, add 10% to the price per tonne for each crop and calculate the increased income. (Remember that you can print the following table, then do the exercise yourself; see Printing graphics and text.)

Table 1: Grain income ready reckoner

Crop	Area (ha)	Yield estimate (t/ha)	Price ($/t)	Income	+10% in budgeted price ($/t)
e.g. Wheat	100	2.5	$148.00	$37,000	40,700
Wheat					
Barley					
Canola					
Chick peas					
Total					

Calculating farm gate price

A range of pricing terms are used to refer to the buying and selling of grain. For successful grain marketing, it is critical to understand exactly what a particular price means. By looking to farmgate price, farmers can compare different selling options and offers. Table 2 shows how to derive this figure.

Table 2: Calculating the farm gate price

	Pool return	Indicator price	Cash price
FOB	$195.00		
Less fobbing costs +/- port cost differentials less storage and handling charges	Less $22.00		
Delivered to port or Melbourne	$173.00	$173.00	$169.55
Less costs of moving grain from silo to port or end user location	Less $17.05	Less $17.05	Less $13.60
Delivered silo	$155.95	$155.95	$155.95
Less costs of moving grain from farm to the silo (notional freight rate)	Less $6.75	Less $6.75	Less $6.75

Farm gate return	**$149.20**	**$149.20**	**$149.20**
Less industry levies. Example: wheat * deduct 2% for WIF * deduct 1% for the GRDC and 0.015% for National Residue Survey **	**Less $4.50**	**Less $4.50**	**Less $4.50**
Farm gate price	**$144.70**	**$144.70**	**$144.70**

Source: ***Grain Marketing with your AWB*, July 1997-98**

Extra profit can be gained from freight differentials if the farm is located near the delivery point.

Cost of production and target price

Knowing your costs of production will enable you to set target prices. If sales at the target price are to lead to a profit, then the price must cover variable costs, overhead costs and provide a margin for profit.

Establishing a target price does not mean you can guarantee your selling price in a free market. A target price provides a reference point, the starting point for any marketing program. There are several benefits in setting a target price:

- More farmers are forward selling, hedging and using storage options. Knowing your target price will simplify the adoption of these selling methods.
- Farmers have limited control over market price but some control over cost per tonne. Achieving higher yields at reduced operating costs will lower costs per tonne. This is the secret to future profitability. Keeping track of this for your major crops will allow you to benchmark your own performance.
- Knowing a poor price and when not to sell is equally important. Establishing costs per tonne minimises the risk of selling at a loss when prices are depressed.

To calculate the cost per tonne:

1. add variable costs to overhead costs, and
2. divide by yield per hectare.

The target price can then be set by adding a profit margin. In the example below, the target profit margin includes salaries for the family, tax payment, financing costs and a margin for off-farm investment.

Table 3: Example: calculating total costs per hectare

	$/ha
Variable Costs per ha	
Seed	**$14.00**
Fertiliser	**$70.00**
Weed control	**$35.00**

Machinery **Insurance** **Harvest**	**$20.00** **$4.00** **$10.00**
Total variable costs per ha	**$153.00**
Overhead costs per ha	**$33.00**
Profit margin per ha	**$80.00**
Total costs per ha	**$266.00**

Divide $266.00 by yield potential to work out target price per tonne. For example, a potential yield of 2.5 t/ha will mean a target price of $106.40 per tonne farm gate price.

Overheads will vary from farm to farm. As a guide, the results of the FAST Project (Farm Management 500 & Sustainable Technology) showed that the average for overhead costs in the Wimmera was 16% of average income. For our example, let's say $33.00 per hectare. It is not always easy to achieve this margin, but for this example the margin has been set at 30%. This should be designed to cover annual finance and living costs.

The cost of on-farm storage

Storing grain costs money! Farmers must carefully consider the advantages and disadvantages of storing grain and be clear about their reasons for taking this option. They must also be confident that the sale price will cover storage costs and return a profit. Store grain only if there is a high degree of certainty that this can be achieved. Most growers already have some storage and must decide at each harvest whether to use it or not. The advantages are increased flexibility, less time in silo queues, storage of feed grain and increased marketing opportunities. The cost of storing grain can be divided into actual costs and opportunity costs. Storage costs increase with the length of time for which grain is stored.

'Actual costs' and opportunity costs

What are the actual costs?

Actual costs include the asset costs and the operating costs. These include:

- Depreciation of the silo and handling equipment assets over their perceived life plus annual repairs and maintenance
- Operating costs which are directly related to the amount of grain handled and the storage period, including labour costs for loading and unloading, auger running costs, repairs and maintenance, insect control and monetary loss due to loss of quality.

What opportunity costs are involved?

In the following example we look at the situation of a farmer who wishes to maximise marketing opportunities and store grain residue-free in a sealed silo.

A new sealed silo is required. In this example it is assumed that the handling equipment is already owned and used as part of the farming operation and therefore depreciation and interest costs for the handling equipment have been ignored. It is assumed that the purchase of a new 80 tonne sealed silo is funded by an overdraft. The grain is fumigated with phosphine immediately after it is placed in the silo.

Opportunity costs are twofold:

- the first opportunity cost is the interest rate which could have been earned on putting the cash into an alternative investment.
- the second, and the main opportunity cost, is the penalty for storing grain rather than selling it straight off the header at harvest.

For the purposes of this example, it is assumed that a real interest rate of 10 % is the opportunity cost for purchasing the new silo and for holding grain in storage. Changes in interest rates will of course influence decisions about the costs of storing grain. At high interest rates, the incentive to store grain is reduced unless there is a corresponding rise in commodity prices to offset the high interest cost.

For example, grain in storage valued at $140 per tonne, could earn interest at the rate of 10% per annum. The lost earning potential would add another $1.16 per tonne per month to the cost of storage. The longer grain is stored the greater the opportunity cost.

The figures we have used are provided as examples, and the actual figures will vary depending on grain prices and type, interest rates, type and price of silo and individual operating costs. Farmers can, however, use the same principles when doing sums for their own situations. Using a range of opportunity interest rates provides an indication of the variation in storage cost over time.

Assumptions used in the analysis:

- Silo cost is $5,700 for a new 80 tonne sealed silo
- Silo life 30 years; salvage value 5% of new value
- The silo is filled to 80 tonne once per year
- On-farm grain price for wheat at harvest is $140 per tonne
- Interest rates on long-term investment capital is 10% real. (i.e. net of inflation)
- Insecticide costs using phosphine fumigation: fumigation is only effective in a fully sealed gastight silo; the grain is fumigated immediately after being placed

in storage. The total volume of the storage is treated, regardless of how much grain is in the silo. The cost is assumed to be 36 cents per tonne.
- Fuel, labour, repairs and maintenance approximately 80 cents per tonne.

Working with the previous assumptions, we will now run through the different methods used to describe the costs of storing grain year by year.

Annual costs

Summary of terms used to describe the annual costs of storing grain

1. Annual costs:

- **(1a) Capital costs**
- **(1b) Variable costs**
- **(1c) Insect control**

2. Opportunity cost on grain stored

3. Total grain storage cost per tonne for various storage periods.

TOTAL ANNUAL COSTS =

CAPITAL COSTS + DEPRECIATION + VARIABLE COSTS

Annual costs include capital and operating costs. Capital costs incorporate two main values which are interest and depreciation.

Capital costs

$$\text{ACV (average capital value)} = \frac{\text{(cost installed - salvage value)}}{2}$$

$$\text{ACV silo} = \frac{(\$5{,}700 - \$285)}{2}$$

$$= \$2{,}707 \text{ per year}$$

Therefore the annual interest (A.I.) for the silo is calculated at 10% real on the ACV.

AI (silo) = $ 2,707 x $\frac{10}{100}$

= $ 271

= $ 3.40 per tonne per year

Silo depreciation is calculated using the straight line method as follows:

NEW COST – SALVAGE VALUE DEPRECIATED OVER 30 YEARS.

Purchase price:		**$ 5,700**
Salvage value @ 5 % of purchase price:	**=**	**$ 285**
Depreciation over 30 years:		**$ 5,700 - $ 285**
	=	**$ 5,415**
Depreciation per annum:		**$ $\frac{5,415}{30}$**
	=	**$ 180.50**
Depreciation per tonne per annum:	**=**	**$ 2.26**

Variable costs

Variable costs include things like repairs, maintenance, labour, and auger running costs. In our example, variable costs total 80 cents per tonne.

Insect control

In this example, insect control costs 36 cents per tonne.

In this example, TOTAL ANNUAL COST = $6.82 per tonne per year.

Opportunity cost on grain stored

Interest foregone @ 10% real on grain @ $140 per tonne

= $14.00 per tonne per year

= $1.16 per tonne per month

Total grain storage cost per tonne for various storage periods

TOTAL GRAIN STORAGE COST PER TONNE = ANNUAL COSTS +

OPPORTUNITY COSTS

BREAKEVEN PRICE PER TONNE = PRICE PER TONNE AT HARVEST + TOTAL GRAIN STORAGE COSTS

Table 4: Example: breakeven farmgate price for various storage periods

Storage period	Annual cost	Opportunity cost	Total	Breakeven farmgate price
1 month	$6.82	$1.16	$8.00	$148.00
2 months	$6.82	$2.30	$9.12	$149.12
3 months	$6.82	$3.50	$10.32	$150.32
4 months	$6.82	$4.60	$11.42	$151.42
5 months	$6.82	$5.80	$12.62	$152.62
6 months	$6.82	$7.00	$13.82	$153.82

This exercise can be repeated for different opportunity interest costs on the purchase of the silo and the storage of grain over various periods.

Finally, if you would like to know the break even price for on-farm storage in your operation, please visit the *Break Even Grain Storage Model* spreadsheet, developed by Peter Botta and Brendan Madden for Agriculture Victoria; click here ❑ . Note: Excel will ask whether it should enable macros; select Yes. You will be asked whether to Save to disk or Open the file; select Open the file.

To continue, select **Market trends** from the sidebar.