

## Technical Bulletin / Dairy

# Benefit - cost of price risk management options for purchasing grain

### Key points

- The cost and risk of four options for purchasing grain were compared using three case study dairy farms. The options examined were to: buy grain on the spot market, use forward contracts, use futures contracts, and buy grain at the beginning of the harvest season and store on-farm.
- Over a period of eight years, there was a small difference in the average total cost of grain and risk between the four options. However, options with a higher total cost tended to have less variability.
- For the three farms studied, the use of futures contracts incurred the least variability in total cost, but the total cost was generally higher. Buying grain at harvest and storing it had the lowest cost, but incurred greater variability. A farm manager is likely to choose a combination of strategies to manage their exposure to feed price risk.

### Background

Purchased feed is the single largest cost for most dairy businesses, representing an average of ~30% of farm costs. A range of strategies are available to farmers for managing variations in purchased feed price. This study investigated the benefit-cost of some options to manage the volatility of grain price over time.

The analysis compared four options: 1) buying grain on the spot market, 2) forward contracts, 3) futures contracts and 4) buying grain at the beginning of the harvest season and storing it. A forward contract is an agreement between two parties to carry out a financial transaction in exchange for a product or service at a future point in time. A futures contract is traded on a central exchange and is standardised and regulated. A futures market is where contracts, rather than the actual commodity, are purchased and sold for the future delivery of a commodity.

The analysis of the four price risk management options was based on three Victorian dairy farms over an eight year period (2007/08 to 2014/15). The farms were participants in the Victorian Dairy Farm Monitor Project.



### Approach

Partial budgets were used to assess each option. The total cost of purchasing grain (wheat) using each option was calculated for each year on the three farms. Assumptions used in the analysis were:

- The annual amounts of grain purchased on each farm were used to calculate monthly grain requirements based on 30% demand for grain in spring, 35% in summer, 25% in autumn and 10% in winter.
- Average monthly wheat prices were obtained from the weekly hay and grain report by Dairy Australia for the relevant months, years and regions.
- A monthly finance cost of \$1.50/t was assumed on all grain purchases. This was estimated using an interest rate of 6.5% and an average wheat price of \$280/t, based on historical prices for the analysis period.
- An average monthly storage cost of \$0.75/t was assumed for all grain. This was to cover depreciation for on-farm storage and/or if grain was held in off farm storage.

The assumptions for each price risk management tool were:

- *Spot market*: Monthly grain requirements were purchased on the spot market on the 10th of each month. Grain purchases were matched with actual grain price.
- *Forward contracts*: 50% of grain required was purchased on the spot market. The remaining 50% was purchased using a forward contract locked in in January with the price based on an average market price across the months November, December and January. Grain purchased on the spot market and by forward contract was used equally over the production season.

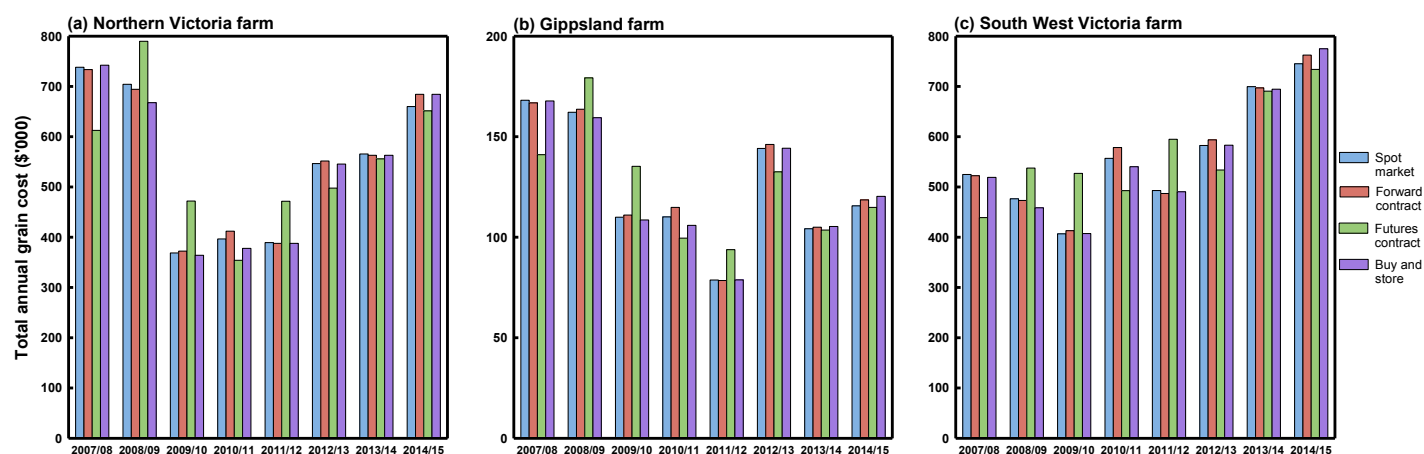
- **Futures contract:** 50% of grain required was purchased on the spot market. The remaining 50% was also purchased on the spot market, but futures contracts were used to counteract spot market variability. Three futures contracts were taken out (purchased) on the 10th of January each year for the next production season. The contracts were closed (sold) on the 10th of August, November and January (of the following year) and a physical grain purchase was made for 16% of annual grain requirements each time. Futures prices were based on historical January futures price contracts for NSW wheat. Transactions costs for using futures were 2%.
- **Buy and store:** 50% of the grain required was purchased on the spot market. The remaining 50% was purchased on the 10th of January and stored on-farm.

## Results

Details of the three farms used in the analysis are given in Table 1.

**Table 1. Average of key production and profit indicators for the three case study farms from 2007/08 to 2014/15.**

Parameter (average from 2007/08 to 2014/15)	Farm location		
	Northern Victoria	Gippsland	South West Victoria
Milking cows per usable hectare (cows/ha)	1.5	1.5	1.7
Milk production per cow (kg P+F/cow)	605	494	478
Home grown feed (% of ME consumed)	45	64	56
Purchased feed per milker (t DM/hd)	3.6	2.3	3.1
Annual grain purchased (t)	2000	400	2000
Purchased feed costs/Total feed costs (%)	54	65	68
Concentrate feed costs/Purchased feed costs (%)	81	95	76
Return on assets (%)	6.2	3.3	4.8



**Figure 1. Comparison of total annual grain cost from 2007/08 to 2014/15 using four price risk management options for three farms.**

The cost of purchasing grain for each year from 2007/08 to 2014/15 using each price risk management tool is shown in Figure 1. The pattern in overall cost for each farm in a particular year was largely due to the different demand for grain each year. However, for each year there was variation between the different options. For example, in some years futures contracts were more favourable, but less favourable in other years. This was similar for other price risk management tools.

Average total grain cost and standard deviation from the eight years is given in Figure 2 and illustrates risk and return for each option. In general, buying on the spot market or buying and storing grain were the lower cost options, but also more risky or variable based on their standard deviations. Using forward contracts or futures contracts were higher cost options, but less risky (lower standard deviation). However, overall for the three farms, there was little difference between the four options when used over a period of eight years.

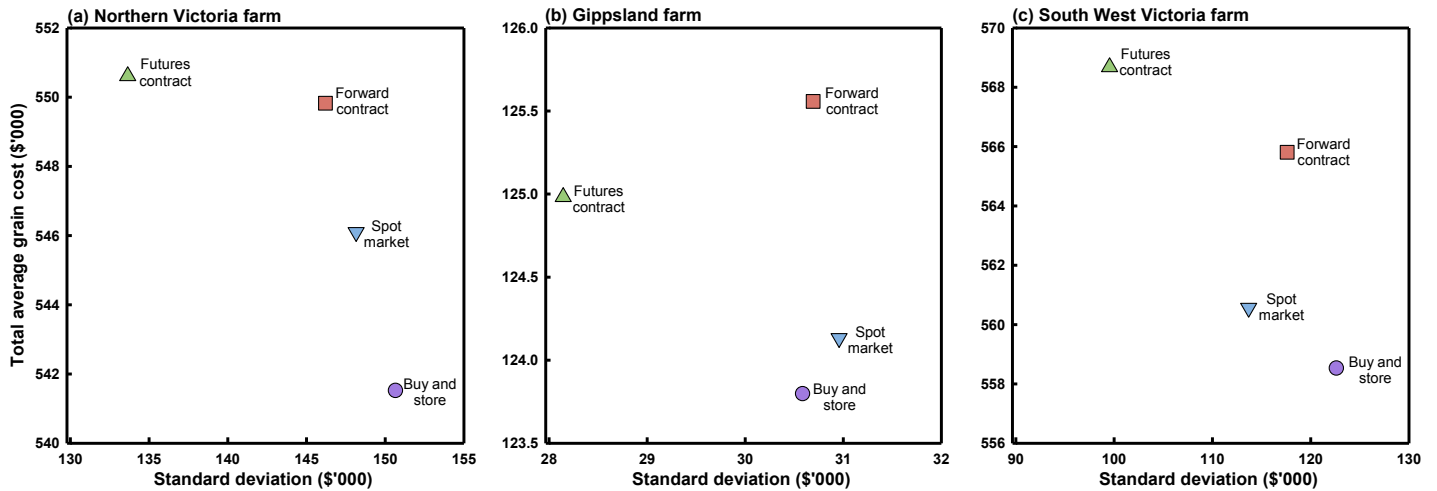


Figure 2. Average annual total grain cost and standard deviation for four price risk management options. The standard deviation indicates the risk or variability associated with that option.

The differences in risk and return between the options compared were relatively small, so the difference between the highest and lowest total grain cost for each year was examined (Figure 3). The average difference over the eight years for the northern Victorian farm was \$75,000 with a range of \$10,000 to \$130,000. For the Gippsland farm, the average difference between the options with the highest and lowest cost was \$16,000 with a range of \$2,000 to \$27,000. The average difference for the south west Victoria farm was \$74,000 (range \$9,000 to \$120,000).

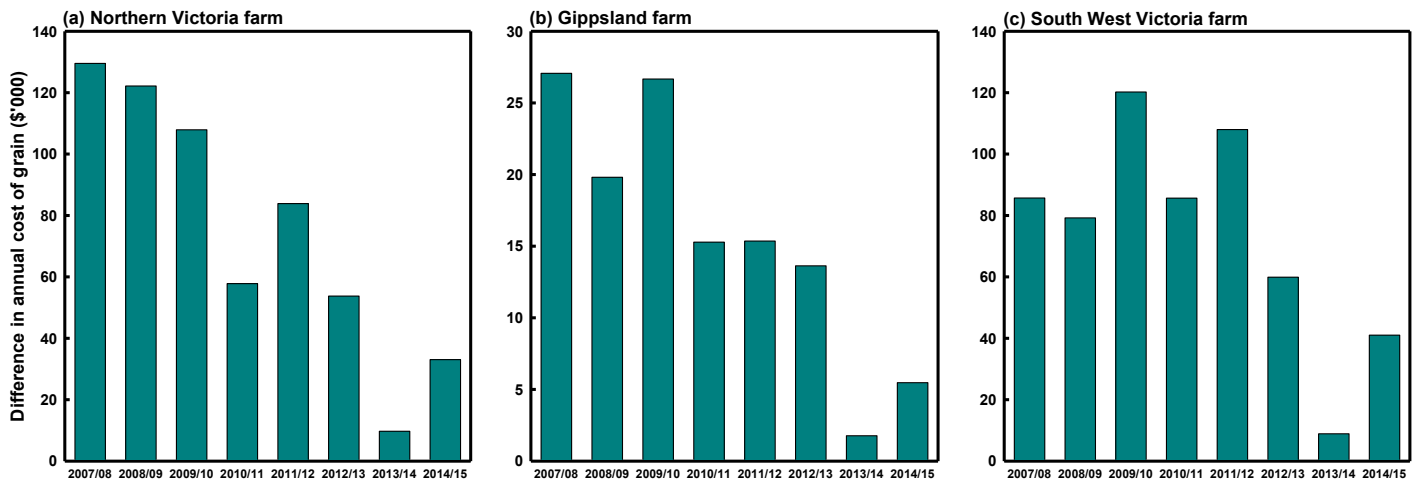


Figure 3. Difference in annual cost of grain between the highest and lowest options in each year.





## Summary

- This analysis compared four price risk management options for purchasing grain and examined the difference in risk and return.
- Based on the approach and assumptions used, there was little difference over an eight year period between the average annual cost of grain for each option on the three farms examined. However, the options that had a higher average cost generally had less variability.
- For the three dairy farms studied, the use of futures incurred the least variability in total grain cost, but the cost was generally higher. Buying grain at harvest and storing on-farm had the lowest cost, but incurred greater variability. In practice, a farmer is likely to choose a combination of strategies to hedge their exposure to supplementary feed price. This analysis showed that each option offers an approach to reducing risk and cost, depending on attitude to risk.

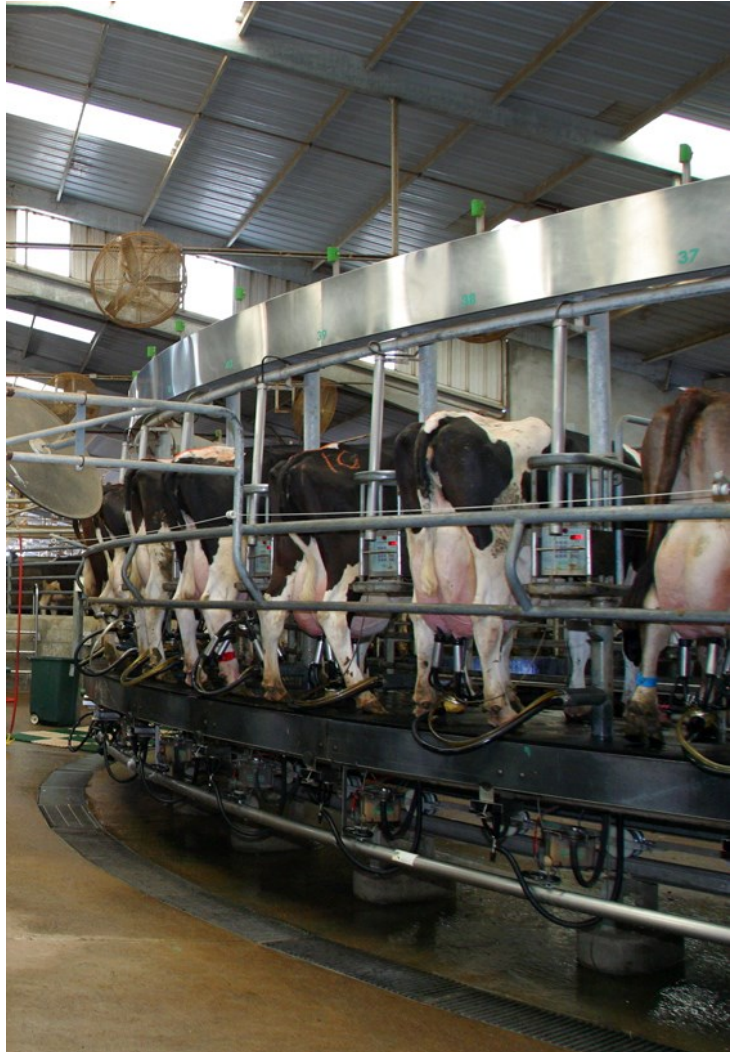
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