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How do some farm managers always seem to make the right decision?

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It is self-evident that good farm managers consistently make better decisions than poor managers. The best formal evidence of this is obtained from survey data and 'benchmarking' studies. Any collection of farm data sets will reveal relatively weak relationships between so called 'drivers' and profit. We know that the range of productivity and profit from the use of similar resources is at least threefold for virtually all farm data sets. There is very little doubt that the key variable and the key driver of profit is management skill but what exactly is meant by 'management skill'?

Farmers work in an environment where multiple variables with different risk profiles and complex interactions impact on their businesses. To the casual observer, good farm managers appear to have a mysterious capacity to make 'best-bet' decisions and implement them in a timely way. On closer analysis, they actually follow some 'rules' to achieve their success. Some of these rules are:

- When faced with a decision, identify the critical variables (there are usually only 2 or 3) and don't be distracted by non-critical variables. Experience, observation and a comprehensive 'world view' contribute to identifying the key items quickly. Smart farmers listen to 'experts' but don't follow them blindly because they know that experts only ever see part of the big picture.
- Act quickly and decisively. More often than not, the good options disappear quickly.
- It is usually better to make a near-ideal decision than to analyse a situation to death and as a result, miss an opportunity that depended on getting the timing right. The principle of diminishing marginal responses applies to analysis too.
- Doing nothing is a decision and sometimes the right one.
- Be prepared. Don't leave everything until the last minute. Have the paddock ready to go and the seed ordered ahead of time.
- Don't beat yourself up for decisions that turn out to be less than ideal when viewed with the wisdom of hindsight.

In summary, 'management skill' comes down to the ability to make good decisions in a timely manner. Whether to make the best/most profitable, 'best-bet', or most timely decision is the conundrum that dairy farm managers face all the time. These choices are not always mutually exclusive but often are.

- Due to the unpredictable nature of the environment that farmers work in, it is impossible to make ***best/most profitable*** decisions all the time. A decision that turns out to be the best/most profitable is therefore a best-bet decision that by chance, turned out to be the best possible decision with the wisdom of hindsight.

- ***Best-bet*** decisions take into account the range of options and the risks. A good decision at a point in time is one that is made on the evidence available at that time.
- ***Timing*** is often more important than exactness.

1. Examples of Relatively Simple Management Decisions.

1.1 Forward contracting grain in spring 2008.

In spring 2008, forward contracting appeared to be the right thing to do. There was a risk that grain prices could have gone higher. They had done so in several previous years and the consequences of a further rise from $400/t to say $500/t would have been severe.

- In reality, grain prices fell after harvest, so those who locked-in now appear have made a poor decision. They paid more for their grain than they needed to.
- Each individual's perception of the risk of prices going up or down and the consequences of each outcome had an influence on the decision they made. In effect this was a decision akin to insurance; weighing up the risk of one outcome against the other. The eventual 'premium' was the margin that the farmer who chose to contract has paid.
- Smart farmers will accept that this 'premium' was a reasonable price to pay to avoid the risk of a far worse outcome.

1.2 Sowing annual pastures in autumn.

Sometimes speed of action or correct timing has a major impact on the outcome. An example is sowing annual pastures (or crops) in autumn. Say a farmer wants to sow a paddock of annual ryegrass in autumn. He has had an unexpected fall of 20 mm of rain, it is mid-April and the paddock is almost ready to go. His problem is that he can't get the variety of seed he believes will give him 20% higher yield for another fortnight but he can get a cheaper variety with lower yield. What does he do?

- He can sow the cheap variety straight away in the knowledge that yield will be 20% lower than if he had been able to sow his preferred variety at that time, or;
- He can wait a fortnight and sow the higher yielding variety.
- He will know from research results and experience that sowing a fortnight later will automatically mean reduced yield. The size of the reduction might be say 10%.
- This yield loss could be exacerbated if the delay turns out to be more than a fortnight. Experience will tell the farmer that promises, like delivery times, are rarely kept.
- In a fortnight the available moisture might be gone and germination could be very poor. If this occurred, he would pay a high price for delaying sowing. Yield reduction could be 50% or more, even with the better variety.
- On the other hand, delaying could have some advantages. It might turn very hot in the next fortnight, resulting in high seedling death and a poor yield from a crop sown straight away.
- He might also get even better conditions in a fortnight, resulting in a better yield from the later-sown crop.

There are a lot of unknowns and unknowables. Even though this is a relatively simple decision it involves multiple variables and there are many possible outcomes to consider. The good manager will very quickly identify that available moisture and potential yield are the two key variables. The cost of the seed is probably the least important consideration.

The best-bet decision is almost certainly to get the seed in the ground ASAP, even though, in theory, this will preclude the best possible result. The farmer will have an understanding that the odds of getting a 'best possible' result are low anyway. He gives up 'best possible' for a higher probability of a good but not the best outcome.

A very good risk manager might even consider managing risk even further by securing extra irrigation water for the early sowing or by hedging his bets: sowing one paddock that he will be able to irrigate now and leaving another for a fortnight until the better seed variety arrives.

Depending on what conditions actually arise, any one of these strategies could turn out to be the best. The trick is to make a quick decision and to act on it.

2. More Complex Management Decisions.

These two examples involved relatively simple decisions. Higher-order decisions are much more complex and often involve longer-term business impacts.

2.1 Herd size for 2009/10?

This is a decision that will be concerning *most* dairy farmers for the coming season, even those with a contracted milk price. It is actually an extremely complex decision and there will be multiple 'reasonable' solutions that are poles apart, depending on the circumstances of the individual case. The sorts of thoughts going through a non-contracted farmers head will be:

- 2009/10 looks like being an ordinary milk price year.
- The outlook for feed costs is also not terrific. (These are determined by markets and seasonal conditions as they impact on water availability, water price, grain cost and other fodder cost for an irrigator. Each farmer will have a different perception of these factors).
- Should I:
  - Reduce herd size and if so, which cows (or heifers) should I sell (or park) and when should I unload them?
  - Keep herd size the same in the hope that conditions will improve (milk price, feed cost or both)?

One way to answer these questions would be to develop a partial budget tool and use this to test the sensitivity to various values. A whole series of assumptions would be required to inform this tool – see Table 1 below.

Table 1: Possible set of assumptions

	Likely	Lower GM*	Higher GM*
Milk price ($/kg MS)	$4.00	$3.50	$4.80
Water allocation	40%	20%	80%
Water price ($/Ml)	$300	$400	$200
Grain price ($/t)	$280	$350	$220
Fodder price ($/t)	$250	$300	$200
Chopper value ($/cow)	$400	$200	$500
Milker value ($/cow)	$1,000	$700	$1,200

** Impact on Gross Margin*

Note that there is a hint in the values used that the feed cost items and even cow prices are not independent variables.

Research data will give us an idea of the feed requirements of a cow at a range of liveweights and production levels.

Table 2: Feed requirements of a cow at a range of liveweights and production levels

INCOME (per cow)	production (P+F)		Likely		Low		High
			$4.00		*$3.50*		*$4.80*
Milk	400		$1,600		$1,400		$1,920
Stock	(pro rata)	400	$60	$200	$30	$500	$75
Total income (per cow)			**$1,660**		**$1,430**		**$1,995**
COSTS							
Herd		100	$100		$100		$100
Shed		60	$60		$60		$60
Labour	(cash cost?)	400	$0		$0		$0
Non-feed costs			**$160**		**$160**		**$160**
Feed required per cow (t DM)	4.9	($/t)	4.9	($/t)	4.9	($/t)	4.9
grain (t/cow)	1.0	$280	$280	$350	$350	$220	$220
fodder (t/cow)	3.9	$250	$973	$300	$1,168	$200	$779
Total variable costs			$1,413		$1,678		$1,159
Operating Margin ($/cow)			**$247**		**-$248**		**$836**

We are now in a position to use the available data to build a partial budget.

As a starting point, say this farm had:

- 550 kg cows
- Intended to feed to produce about 450 kg MS/cow

Annual feed requirement (from the table) would therefore be about 4.9 t DM for a 300 day lactation.

We make the assumption that all of the available pasture on the farm will be consumed by a herd size 10% smaller than we milked last year; in other words, we have to buy all the feed for the last 10% of herd (this might not be true at 80% allocation in a good season). This assumption is saying that, in effect, we have to buy the whole 4.9 t DM for each of the last 10% of the cows. The farmer adds that he has traditionally fed at least 1.0 t/cow of this as grain.

There are a number of ways we could provide the balance of the feed but, for simplicity, I will call it hay.

We also make the assumption that there would be no cash saving in making a small reduction in herd size (therefore, no figure for labour saving).

The partial budgets for our range of outlooks take shape as below.

Ready reckoner for annual feed requirement (300 day lactation)
Annual intake in tonnes of DM/cow @ 11 MJ ME/Kg DM.

		Liveweight (Kg)								
Production (kg MS/cow)	**litres/cow**	**400**	**450**	**500**	**550**	**600**	**650**	**700**	**750**	**800**
300	3529	3.5	3.6	3.8	3.9	4.0	4.1	4.3	4.4	4.5
350	4216	3.8	4.0	4.1	4.2	4.3	4.5	4.6	4.7	4.8
400	4942	4.2	4.3	4.4	4.6	4.7	4.8	4.9	5.1	5.2
450	5713	4.5	4.6	4.8	4.9	5.0	5.1	5.3	5.4	5.5
500	6536	4.8	5.0	5.1	5.2	5.4	5.5	5.6	5.7	5.9
550	7418	5.2	5.3	5.5	5.6	5.7	5.8	6.0	6.1	6.2
600	8370	5.5	5.7	5.8	5.9	6.1	6.2	6.3	6.4	6.6
650	9401	5.9	6.0	6.2	6.3	6.4	6.6	6.7	6.8	6.9
700	10526	6.3	6.4	6.6	6.7	6.8	6.9	7.1	7.2	7.3

Note: Gray shaded cells are unlikely production targets as they would require intake of more that 4% of LW/day.

One error we have introduced already is to link poor milk price to poor seasonal conditions. Putting this aside, the partial budgets are predicting a range of margins from -$208 to +$836 with our 'most likely' outcome at +$247/cow.

The simplest interpretation of this partial budget is that if we believe that a 'low' outcome is likely, reducing herd size by 10% should result in a smaller loss. However, we also need to test sensitivity.

- Sensitivity to milk price is clearly very high. We should test this as an independent variable by including the full range of possible milk prices at the full range of seasonal outcomes. For example, for our likely seasonal conditions, the outcomes per cow for milk price are all positive:
    - Likely $247
    - Low $87
    - High $567
- In this case, the assumption that there would be no cash saving in labour is also important. If we deduct $400/cow for labour, even the 'likely' seasonal outcome with 'likely' milk price becomes negative.

The evidence is still pointing towards reducing herd size but there are other considerations. While we can make a decision to reduce herd size in the short term, there are potential longer-term impacts.

- If we have reduced herd size and things turn around (season, milk price or both) we have reduced the potential to make a better profit. We also need to think about recovery. Recovery in a good year following a bad year is always strongly linked to herd size.
- There is also a balance sheet effect. If we sell cows now, they will very likely be choppers. We are therefore turning $1,000 milkers into $400 choppers and making an instant $600/head loss on the balance sheet.

Getting the decision 'right' becomes even less clear. To make matters worse, if we made a decision to sell 10% of the herd now (which appears to be a logical thing to do if we ignore the balance sheet argument) it could turn out to be entirely the wrong thing to have done in as little as 6 months.

To complicate things even further, if we were to include values for a different farm (600 kg cows, 550 kg MS/cow, 1.8 t grain, $400/cow for labour, etc.) the partial budget would give us quite different answers.

This is a somewhat complex example of a change decision faced by a farmer but by no-means the most complex that farmers face. The value of this partial budget tool in decision making is not in the answers it provides; its value is in getting the thinking behind the decision out into the open. To achieve this, a service provider would have to work through the process and effectively develop the tool and assumptions with the farmer. On the surface it looks like a simple tool but this belies some of the concepts it introduces (fixed and variable costs, opportunity cost (labour), marginal thinking (extra feed requirements)). In this respect simple tools are invariably more valuable that complex ones as the logic behind complex tools and models is never transparent. As an illustration of this point, there is one well known farm model that includes fundamental errors of logic;

- it locks in some variable costs (calling them fixed or 'core' costs);
- it fails to distinguish between cash labour costs and imputed labour costs, therefore thoroughly confusing opportunity cost;
- it ignores marginal/diminishing responses, instead assuming linear responses that go on forever;
- it makes no reference to balance sheet impacts.

Not only does this model provide answers that are often wrong, it is going to be almost impossible for a farmer using something like this to get an understanding of the critical relationships that drive the model. In effect it becomes a 'black box'. You put a question in one end and get an answer out the other without ever having explored the principles behind the decision.

Whole farm models like 'Udder' are much more sound. Behind 'Udder' there are research-based equations that allow for complex interactions between variables. These relationships are not transparent though, and an additional problem with Udder and programs like it is that the volume of data, calibration and time required to make them relevant to a specific farm render them unaffordable for anything but research.

Good farm managers understand decision making intuitively and often show very few signs that they have engaged in any formal analysis of the process. Consequently, they often have difficulty describing their process to anyone else. To an outsider (or another family member) it can appear that decisions are made by instinct (or luck). With an understanding of how farmers think, it becomes apparent that there are sound decision making principles behind the processes that good decision makers use. This is a fundamental conundrum of teaching farm management decision making skills. Teaching decision making is a very difficult process.

3. Will a more sophisticated model do the job?

This is unlikely. There are so many variables (not the least of which is the range of farmers) that it is very unlikely that a decision making model, regardless of how sophisticated it is, will ever be of much help in making 'best-bet' decisions. Even if the options it revealed were reasonable, its use would probably have defeated the purpose (a) because the 'model' had been a distraction and prevented the user understanding the logic behind the question, (b) because it took so long to enter the data that the farmer has lost interest (or else dangerous shortcuts were made in data entry), and (c) because it is very difficult to see how a model like this could allow for both short-term answers and potential long-term impacts (e.g. the herd size for 2009/10 decision).

There have been suggestions that 'models' can be improved by collecting more data. Data, by definition, is historic. There is a fundamental problem in using history to predict the future, especially in situations like farming where so many variables occur and where relationships between variables are not well understood or predictable.

In my opinion, collecting mountains of data will not provide a sound basis for a better predictive model. Here are a few observations that can be made out of nearly any set of farm data:

- A data set that attempts to relate any technical measure with profit will produce a scatter that looks like someone fired a shotgun at a sheet of paper from about 20 meters. This should not be surprising given the number of variables involved.
- Statistical relationships between any technical measure and profit (i.e. regression lines from such a data set) are usually quite weak (e.g. production per cow, t DM consumed/ha, etc.).
- The most profitable farmers in a group (as measured by EBIT and RoC) are virtually never the best technically in any category but are almost always in the top few farms for almost everything.
- Farmers with quite ordinary technical measures in a number of areas can be very profitable if they don't get anything badly wrong.
- A single year of data is a dangerous comparison of 'most profitable' business. Not only are there potential distortions in data collection, but a different year with different circumstances will impact quite differently on ranking and profit.

4. A few more thoughts.

In an environment as variable as the one we work in, there is no universal/ideal farming system that maximises profit and minimises risk. Farmers build 'systems' based on their understanding of their own skills, the resources at their disposal (quantity and quality), external constraints (e.g. credit limits), their stage of life and their perception of risks.

Most farm decisions are about 'tweaking' an existing system, not creating a new 'ideal' system. Some of the understandings required to ensure 'tweaking' is right more often than not include the following.

- More is not always better. Biological response relationships are only ever linear over a narrow range of values. Decisions at the margins in agriculture are subject to diminishing returns. As input levels have increased it is becoming much more common to find situations where less is better (e.g. less supplementary feed or fewer cows leads to more profit).
- Complexity and risk are strongly associated in farming systems but so are risk and reward.
- Good farm managers have a very clear understanding of the complex relationships between their farming 'system' and rest of the world. This does not necessarily give them insight into impacts on a different farming system. (The implication of this is that it may not be a good idea to seek advice from a farmer with a very different farming system.)
- Conversely, poor farm managers have a very poor understanding of the complex relationships between their farming 'system' and rest of the world. It is not uncommon for them to make decisions that result in an increase in risk and/or a decrease in profit when, for example, they adopt technology that was successful elsewhere under a different set of circumstances (e.g. the farmer with poor timing who grows maize and gets a poor yield).
- Very few service providers have the meta-thinking skills required to comprehend a wide range of farming systems. This skill requires being able to see the world from the perspective of the farmer who has developed the system. Many service providers spend their lives trying to push farmers towards their perception of some 'ideal' farming system in the mistaken belief that there is a single 'ideal' system, often greatly increasing risk for the farmer in the process. This is an almost inevitable outcome where a service provider without meta-thinking skills relies on a data base, model or decision making tool.
- An understanding of marginal decision making logic appears to be very difficult to grasp yet is inherent in most change decisions in everyday life. It almost appears that the more formal education a person has had the more likely they are to use averaging rather than marginal logic.
- There are some commonly used catch phrases and 'tools' that have an element of truth behind them that are often used in a way that exacerbates misunderstanding and defies good marginal logic. One of the most common of these is the phrase, "Dilution is the solution". One potentially misleading tool is 'Margin Over Feed Costs'. At some point in business development, applying both the phrase (increasing output) and the tool will result in increased profit but both involve average, not marginal thinking and if pushed too far will end in disaster. The blind use of catch phrases and tools like these has done quite a bit of damage in the dairy industry.
- The Australian dairy industry has been sold a lemon in recent years. It now talks in terms of litres and cents per litre. The adoption of litres as a measure has led to increased costs of production and higher risk through very poor marginal decision making. It is proving incredibly difficult to turn this trend around.

5. How do good service providers teach decision making?

There is certainly room for a range of teaching styles and methods. Not only are farm businesses very different, farmers also learn in different ways. We have some excellent examples of successful teaching styles in current use. In my view the key to the success of these individuals is that ability to see the world from the perspective of the farmer they are dealing with and then to instil good evidence-based decision making principles. Data collection certainly plays a part in establishing a closer understanding of the 'farming system' they are dealing with but this is secondary to their ability to impart the principles that apply to change management.

In my opinion the real challenge for the dairy industry is to work out how we can:

- teach the principles of change management to service providers and;
- teach meta-thinking skills to service providers also.