

Managing production risk in farming

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Risk is a natural and accepted part of farming. Australian agricultural production (based on value of output) is the most volatile in the world and the most volatile sector of the Australian economy (Keogh, 2013). This volatility conveys a level of risk that needs to be managed. Given most farmers are still operating despite two centuries of volatility suggest they have developed long term strategies and operational tactics to cope with this ongoing challenge.

There are many strategies farmers use to manage production risk. Diversification in crop and pasture type, enterprise mix, targeting multiple markets and property location are common strategies. So is managing input costs, especially when production and prices can be highly variable.

Understanding risk

When we talk about risk most of us immediately think about the negative consequences if an action goes bad. Dictionary definitions re-inforce this thinking. However this is only one aspect of risk. The word risk is derived from Italian word *risicare*, which means 'to dare'. To manage risk effectively we need to understand both the downside or potential harm from taking a risk but also the opportunities that taking a risk can offer.

There is no reward without risk. In farming risk is a necessary part of making returns. Managing risk is about making decisions that trade some level of acceptable risk for some level of acceptable return for an acceptable amount of effort. Decisions can be made to reduce risk, but it usually comes at a price, namely lower returns.

A common definition of risk is likelihood by consequence. In other words risk requires knowing how often an event happens (the frequency) and what is the impact (the value) when it does happen. A decision that increases risk will either increase the likelihood of an event happening and/or increased the consequence if it does occur. This increased consequence may be a greater return, not just a greater loss.

We must remember everyone has a different position on risk. Financial security, stage of life, health, family circumstances, business and personal goals can influence the amount of risk an individual is willing to take on. This position can change rapidly, sometime triggered by sudden events. Importantly no position is right or wrong, it is what the individual is comfortable living with.

Average values are commonly used in agricultural extension. We present average yields, average prices and average costs. While these averages convey a value (and are convenient), they rarely have the frequency of this average occurring. This would be fine if we consistently got these average values, but in agriculture we rarely do. The key drivers of

profit in agriculture, namely yield, prices and some costs have a range of values within and between production periods. If we use averages for analysis, it usually over estimates the profits and hides the volatility in those profits (Nicholson, 2013).

Managing risk is not about the middle or the average, it is the opposite. It is appreciating what happens at the extremes, the size or value of these extremes and how often they occur.

Managing risk

As described previously the derivation of risk is 'to dare'. This implies there is opportunity but it also implies a choice. As individuals we can influence how much risk we expose ourselves to by making choices.

Recent analysis conducted in the Grain and Graze program has helped understand the risk in a farming business and how making changes will potentially alter this risk. This helps inform future decisions.

In the Grain and Graze analysis a combination of historic information and gut feel are used to 'frame the odds'. Graphs are created that show the amount or value and how often this amount or value occurs. It includes extreme and average results and are referred to as distributions. The broader the range in values the greater the volatility or risk. An example of an annual GrassGro modelled pasture distribution for Burunah Plains (near Inverleigh) and Hamilton is presented (figure 1).

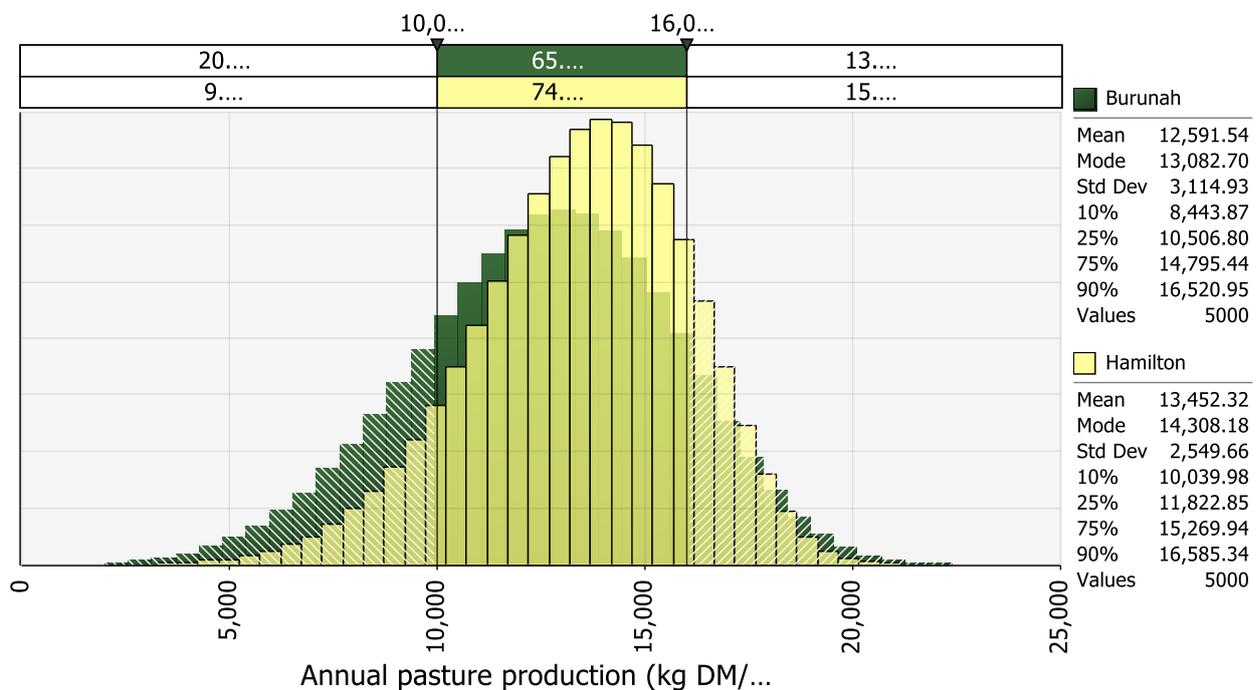


Figure 1. Distribution in annual pasture growth at Burunah Plains (Inverleigh) and Hamilton.

The average annual pasture production at Burunah Plains is 12.6 t/ha and at Hamilton 13.5 t/ha, suggesting Hamilton grows about 900 kg/ha more pasture than Burunah Plains each

year. However the shape of the two distributions are different, with Hamilton pasture production less broad (narrower) than Burunah Plains. This indicates less volatility or range in pasture production and therefore less risk. The distributions also show there is a 20.5% chance (1 year in 5) of pasture production being 10 t/ha or less at Burunah Plains but only a 9.8% chance (1 year in 10) of less than 10 t/ha at Hamilton.

The Grain and Graze analysis creates and uses distributions for yields, prices and some costs to generate a range of enterprise and whole farm profits. These profits can then be compared and discussion around how acceptable this range and volatility in profit are given the level of risk the farmers wishes to take on.

Close to 30 farms in South west Victoria and Southern NSW have been analysed. While no two farms are the same, there are four generalisations are worth highlighting.

1. Cattle are usually less risky than sheep

In general the average profit from cattle is less than sheep, although there isn't a lot of difference in downside risk, it is just that sheep have more upside risk (figure 2).

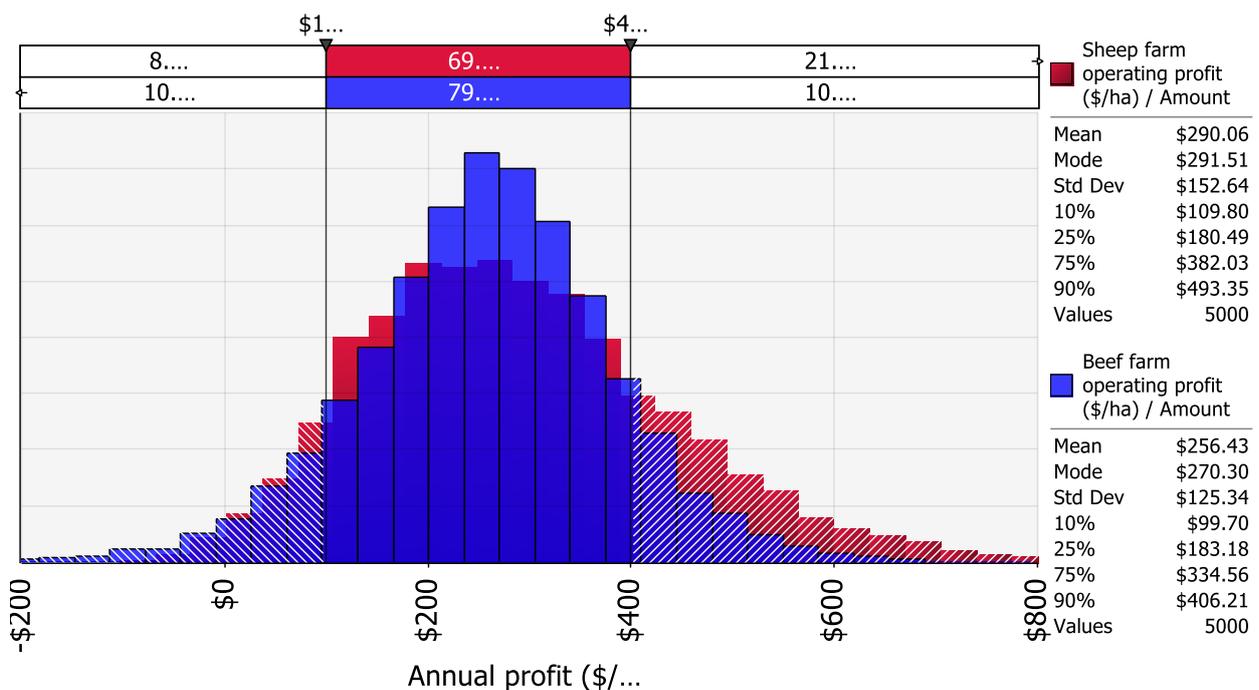


Figure 2: Annual profit distribution for a sheep enterprise (merino ewes, self-replacing, with older ewes joined to meat rams) compared to a cattle enterprise (self-replacing herd, feeder steer market) for a farm near Geelong.

2. Cropping is usually more risky than livestock

This is usually true, however risk also includes upside as well as downside risk. This example clearly illustrates the contrasting profit distributions (figure 3). The cropping enterprise is flatter and wider compared with the sheep enterprise, indicating greater volatility in possible profits. If this farm business needed to make \$75/ha to cover financing, tax and

other investments, then there is 9.0% chance of not achieving this with the sheep enterprise (1 year in 11), but a 13.2% chance (1 year in 7) of not achieving it with the cropping enterprise. On the flip side, the chances of making more than \$750/ha profit with the sheep enterprise is minimal (1 yr in 30) compared to 1 year in 7 with cropping.

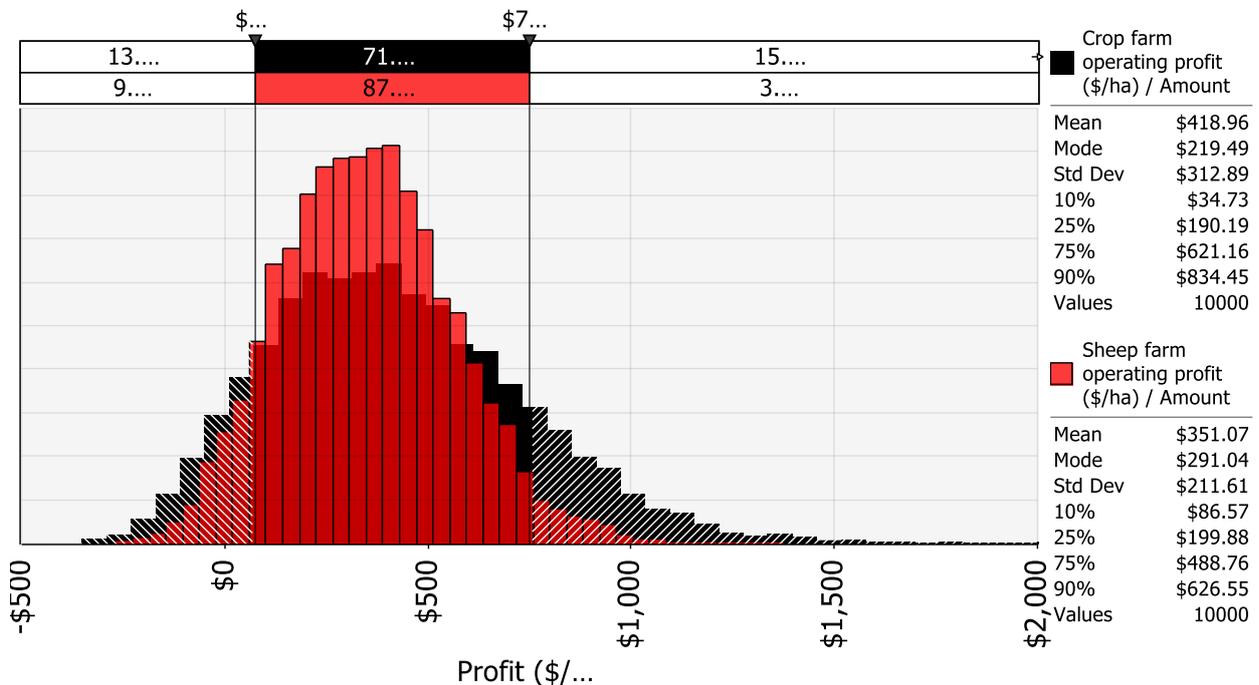


Figure 3: Annual profit distribution for sheep enterprise (composite ewes) compared to a cropping enterprise (canola, wheat) for a farm near Colac.

3. Enterprise diversity usually decreases risk

This generally holds true. If we compare the whole farm profit of the farm in figure 3, generated by the combination of cropping and livestock, then the chances of making \$75/ha or less is reduced compared to the results we achieved from either enterprise alone. When combined, the chances of not making \$75/ha are reduced to 1 year in 26 (figure 4)

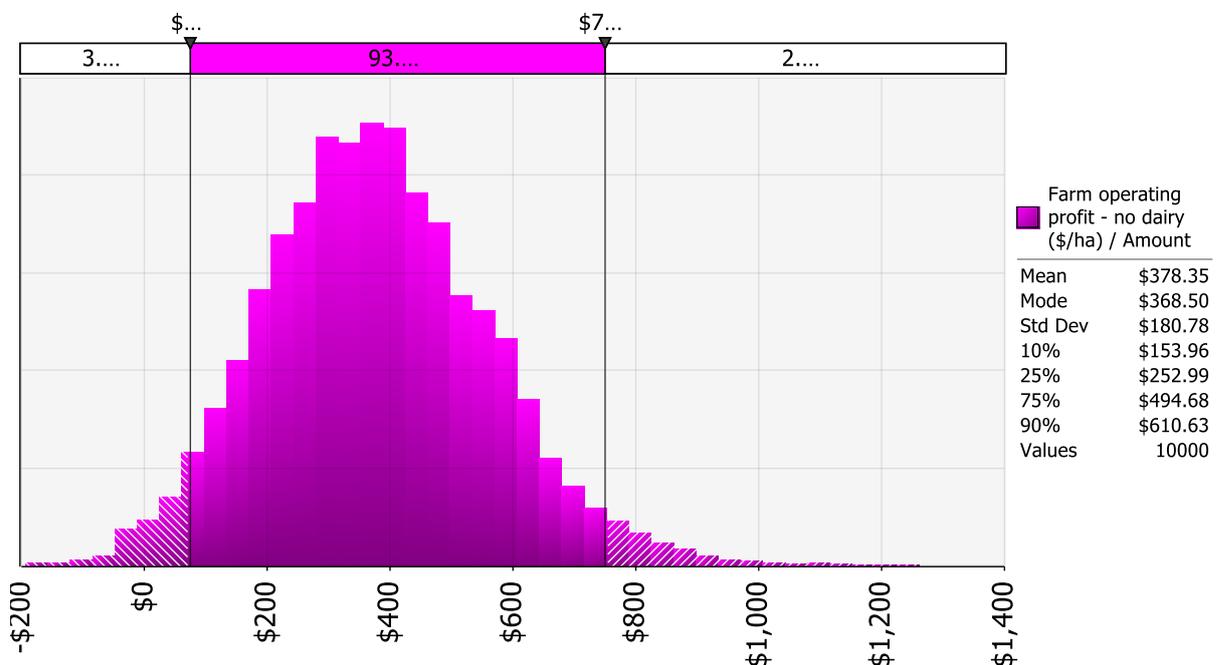


Figure 4: Annual profit distribution for mixed enterprise farm (sheep and cropping).

4. Intensification usually increases risk

Most people would think that intensifying a farming operation should increase profit but probably also increase downside risk. The analysis that has been done so far in the Grain and Graze program would suggest there are often opportunities to improve profit through intensification without increasing risk and in some cases even diminishing downside risk.

Consider the example of a beef operation in South west Victoria that is thinking about increasing stocking rate by running more breeding cows. This will increase some input costs eg animal health costs, fertiliser, selling fees and possibly some other expenses such as labour and pregnancy testing. However these costs are not risky as they are usually known in advance, stay relatively consistent in price and are at the discretion of the manager how much is spent. The more risky variable identified in this business to increasing stocking rate is the amount (and cost) of supplementary feeding that may be required.

Two scenarios were calculated, one with the current operation and another with a 15% increase in stocking rate. All per head input costs were increased accordingly.

Supplementary feeding was adjusted for the higher stocking rate, increasing the 'typical' amount of hay used from 165 kg/hd (1/2 round bale) to 330 kg/hd (1 bale). In a worst 1 year in 10 scenario feeding was increased from 300 kg/hd to 990 kg/hd.

The change in stocking rate did alter the risk profile of the farming business, but created more upside risk than downside risk (figure 5).

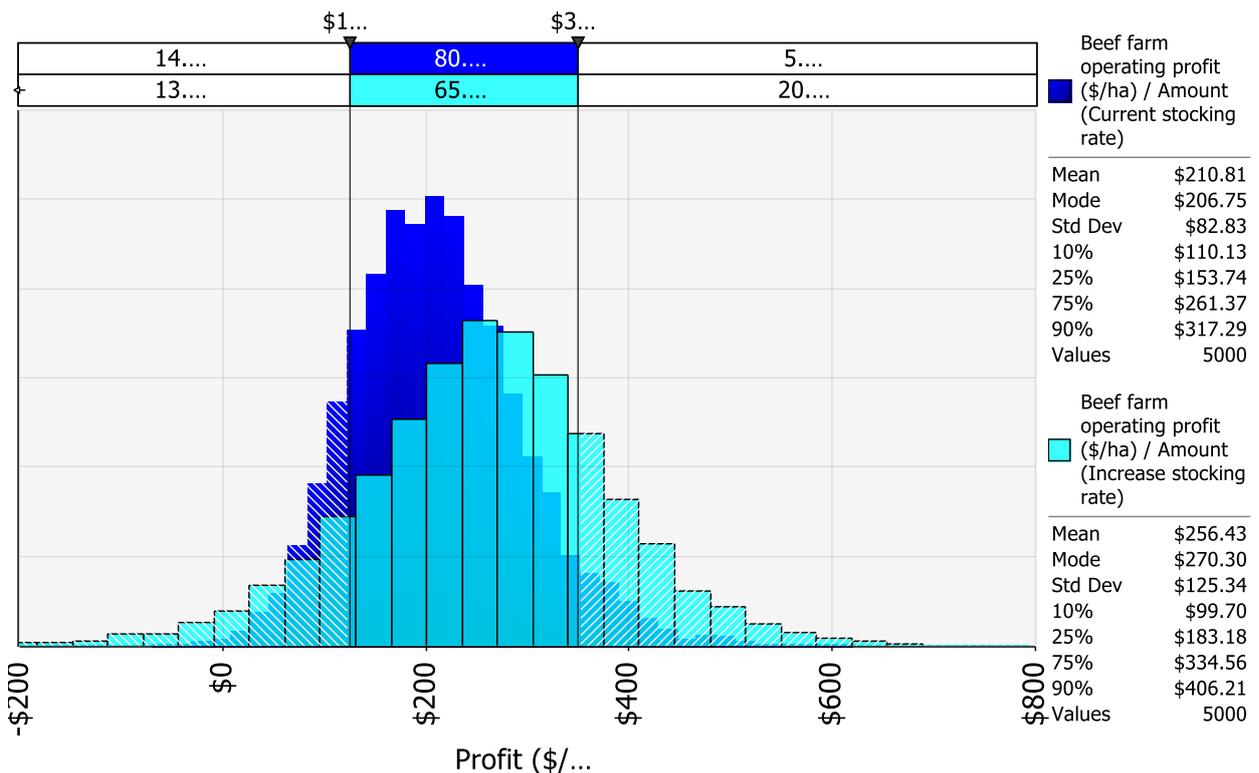


Figure 5: Change in distribution of farm profit with increasing stocking rate.

There are several areas of interest with the proposed increase in stocking rate;

- Farm profit would rise by 21%, from \$211/ha to \$256/ha
- There would be a change in the shape of the distribution, becoming flatter and wider, indicating that volatility in profit would increase.
- The distribution has shifted significantly to the right, indicating a large amount of upside risk.
- If this business had to make \$125/ha to cover financing, tax and other expenses, the chances of not achieving this have decreased slightly from 14.2 % to 13.5%.

Conclusion

There is no single way to manage production risk. Many 'levers' influence the ultimate risk profile of a business and it is up to the individuals in that business to determine and feel comfortable with a level of risk that matches the rewards they seek.

Having said this, managing risk requires making decisions. The type of analysis used in Grain and Graze provides a very useful platform to inform discussion and decisions around risk.

References

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