

IN THE MIX

THE ROLE OF MIXED FARMING MODELS IN REDUCING VOLATILITY

As Australian agriculture has continued to evolve, the mixed farming model has continued to grow. While most Australian farmers were once more likely to specialise solely in sheep, cropping or cattle, it is increasingly common for farms to run a mixed operation of cropping with one or both varieties of livestock.

KEY MESSAGES

- Strong livestock prices and major advancements in cropping equipment and technology have seen many farmers shift to a specialist farming model;
- As farming models have changed in the past decade, increased grain finishing of livestock has occurred, with strong relationships emerging between cropping and livestock commodity prices;
- As a result, mixed farming models are receiving increased attention as a means to reduce commodity price risk across farming operations;
- For individual producers, mixed farming shows a range of benefits including relatively high but less volatile profits which takes advantage of the higher returns of cropping but lower volatility of livestock;
- Mixed farming also shows strong returns to scale with large operations displaying less volatility in profit than cropping, beef or sheep operations, suggesting that achieving scale across individual commodity types within a farming model remains an important factor in success.

In the past three decades, Australian agriculture has seen a pronounced change in its farming landscape. In that time, an increasing trend towards cropping has impacted mixed livestock and cropping farmers with the total number of mixed farmers dropping 58 per cent since 1990, and the agricultural land dedicated to mixed farming falling 31 per cent in the same time.

The rapid increase in land dedicated to wheat and other broad acre cropping has gone hand in hand with advances in plant and machinery, and widespread adoption of technologies such as auto steer has made cropping not only more efficient but easier to scale up. At the same time, the declining availability of labour on farms has also made cropping more attractive for some businesses. The wool price crash of the early 1990s also saw a large number of sheep farmers diversify into cropping or leave the sheep industry entirely.

As farms continue to consolidate, many operators are looking to different models to diversify their commodity risk, including mixed farming models. The current structural change in Australian farming is likely to see mixed farming grow in importance. In a pattern which has arguably been ongoing since the days of soldier settlements, the successful farmers who are continuing to consolidate – “buying the neighbours” – are also likely to be those seeing the next generation of their family join and grow the business. This combination of new, innovative thinking, new management skills and additional labour will continue to see mixed farming grow in scale.

Furthermore, the growth in mixed farming can have positive benefits for sustainability. These will vary by operation, however include increased options for integrated weed and disease management, and an opportunity for increased soil health and fertility driven by pasture phases in cropping the rotation.

THE RAPID GROWTH OF CORPORATE FARMING, PARTICULARLY DRIVEN BY THE INFLOW OF MAJOR VOLUMES OF NEW CAPITAL, WILL DRIVE THE MODEL FURTHER. NEW INVESTORS ARE PARTICULARLY KEEN TO SEE MINIMISED LEVELS OF RISK AND VOLATILITY - TWO FACTORS WHICH ARE INHERENT IN MIXED FARMING

TRENDS IN MIXED FARMING

Today, mixed farming accounts for around 18 per cent of farming enterprises and just over 6 per cent of agricultural land, making up the second largest number of enterprises after specialist beef producers. The total number of beef enterprises has stayed relatively stable since 1990, however both mixed farming and sheep enterprises have declined significantly in that time. The largest decline in the amount of land dedicated to mixed farming has occurred in Western Australia and, up until a few years ago, New South Wales. Since 2014, mixed farming in New South Wales and South Australia has seen strong increases, while the amount of land used for mixed farming in Victoria and Queensland has remained relatively stable since 1990, declining only 6 per cent in 27 years.

While mixed farming overall has suffered a decline since 1990 – largely as a result of a decline in sheep farming but also as a result of technology and machinery improvements improving the attractiveness of cropping – strong cattle and sheep prices in recent years, and lower grain prices as a result of competition in global wheat markets, are leading many farmers back to mixed farming to help boost profits and mitigate volatility.

Adding to the strategic options is the growing enthusiasm by many farmers to go beyond traditional cereal crops and diversify with new crop species. Beyond the best-known alternatives of barley and canola, mixed farming operators are increasingly planting different pulses, including lentils, chickpeas and lupins.

VOLATILITY IN COMMODITY PRICES

Mitigating volatility in commodity prices is one of the key benefits of the mixed farming model. This is not to say that volatility is always a negative, as upwards volatility can provide unplanned windfalls and profits. However negative volatility is one of the key risks to a farming business, leading to unplanned and entrenched losses which can set a business back for many years.

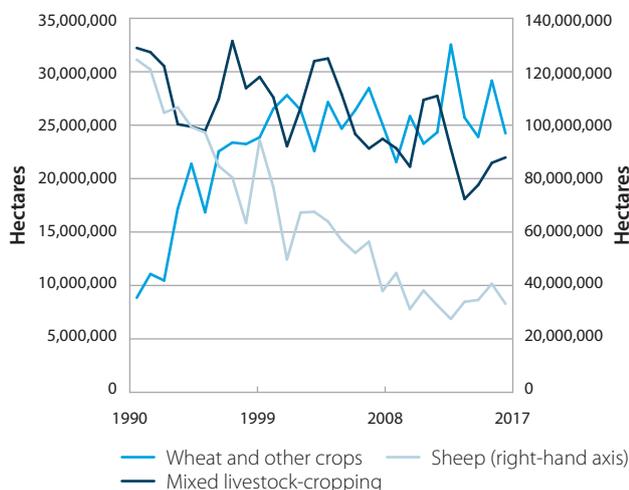
Diversifying the range of commodities produced by a farm is one means used to reduce overall volatility in profits. But which major commodities show the greatest volatility and do they tend to move together or separately?

Commodity volatility can be found by looking at the percentage variation of commodity prices from the trend. Table 1 shows volatility across the four major mixed farming commodities, the variation from short and long-term trends, and the positive or negative percentage variation from the trend.

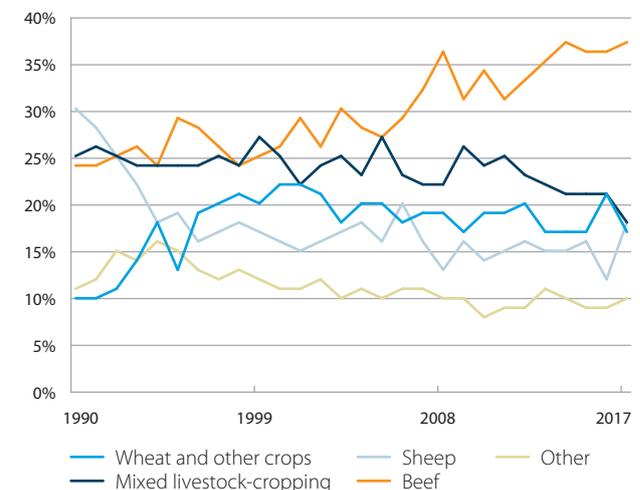
In the year until May 2018, wool showed the lowest volatility, while wheat showed the highest volatility. Over a five-year trend, while wool continues to display the lowest variation, beef price volatility is high due to the boom in prices in 2014 and 2015.

Over the long-term, 10-year and 30-year trends – which are the most useful for producers considering investing in stock, infrastructure and machinery to diversify their production – lamb prices show the lowest volatility while wheat, beef and wool all show differing levels of volatility across the different time scales.

TOTAL AREA FARMED BY INDUSTRY



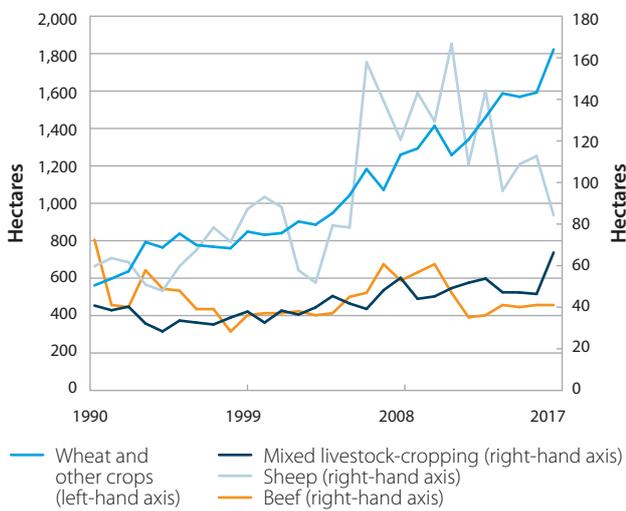
PERCENTAGE OF TOTAL FARMS BY SECTOR



Source: ABARES, ANZ



AVERAGE AREA CROPPED BY INDUSTRY



MAJOR COMMODITY PRICES 1998-2018



Source: Wheat – US no. 1 hard red winter AUD per Metric Ton; Beef – EYCI Ac/kg cwt; Lamb – ESTLI Ac/kg cwt; Wool – 19 micron spot price USD/kg

TABLE 1: COMMODITY VOLATILITY¹

Trend to 2018	Wheat	Beef	Lamb	Wool
1 year	8.1%	4.3%	6.9%	3.0%
2 year	9.5%	5.9%	7.5%	4.5%
5 year	9.1%	17.6%	9.6%	7.5%
10 year	16.8%	18.3%	14.0%	16.9%
30 year	20.8%	17.8%	17.8%	20.4%

TABLE 2: 5-YEAR CORRELATION BETWEEN MAJOR COMMODITIES (2012-17)

	Wheat	Beef	Lamb	Wool
Wheat	1			
Beef	-0.8795	1		
Lamb	-0.61018	0.732082	1	
Wool	0.182364	-0.3978	-0.47397	1

For relatively new investors into agriculture, the 10-year period is likely to be the one which is of most interest. This is due to it being around the minimum time frame, over which many agricultural funds will require investors to retain their investment before they are able to exit, with investors hopefully receiving capital returns, on top of operating returns over the period of the fund. The 10-year time frame is seen as one in which a normal agricultural cycle is likely to average out from any volatility due to factors such as weather or commodity markets. With new investors likely to seek minimal volatility in a sector with which they are unfamiliar, the performance of mixed farms against single industry farms will be an important factor in their decision making.

Correlation – do commodities move together?

When looking to diversify between commodities, an equally important question, alongside ‘how big’ price movements are, is in ‘which direction’ do they move? That is – if wheat and wool tend to move together, producing both is likely to increase price risk rather than mitigate it.

An analysis of commodity price data from 1990 to 2017 shows a relatively strong positive correlation between lamb and wool prices and beef and wool prices; moderately positive correlation between wool and wheat, and beef and wool; and a weak positive correlation between wheat and lamb. Lamb and wool correlation is likely to be largely due to relative sheep numbers impacting both products. The long-term data also shows a very weak negative correlation between wheat and beef prices. As a result, over the long term, only wheat and beef prices are likely to move contrary to each other and mitigate commodity price risk.

Comparing the long-term correlation between 1990 and 2017 with the five-year correlations between 2012 and 2017 shows how much Australian agriculture has changed in this time. Long-term correlations between wheat and beef, and wheat and lamb, are relatively weak, however as farming practices and markets have changed markedly over recent years with the increase in the use of feed wheat to fatten both cattle and lambs, an interdependence between wheat and livestock prices has emerged. The 5-year correlation results show a stronger case for reducing commodity price risk through diversification.

Over the past five years, there has been a strong negative correlation between wheat and beef prices; and a relatively strong negative correlation between wheat and lamb ie, as wheat prices go up, beef prices go down, or vice versa. There is a weaker negative correlation between beef and wool and lamb and wool. A strong positive correlation is, as expected, revealed between beef and lamb which are substitute products in the domestic market, and a weak positive relationship between wheat and wool.

This suggests that, based solely on commodity price movements, a mixed farming enterprise based around wheat and livestock or, to a lesser extent, wool and livestock is likely to reduce the risk of large shifts in commodity prices by producing goods with prices that typically move counter-cyclically to each other.

¹ Measured by 1 (one) standard deviation from trend in percentage terms. In a normal distribution, prices can be expected to vary from trend by ± 1 standard deviation in 68 percent of cases, and within ± 2 standard deviations in 95 percent of cases.

TABLE 3: FARM FINANCIAL VOLATILITY 2007-2017 - BY SIZE AND INDUSTRY

All farm sizes			
	Receipts	Cost	Profit*
All broadacre farming	7.9%	8.1%	79.8%
Wheat	6.1%	4.3%	62.9%
Mixed	13.0%	11.2%	107.1%
Sheep	10.2%	9.8%	147.3%
Beef	23.2%	20.1%	133.6%
Turnover of less than \$500,000			
	Receipts	Cost	Profit*
All broadacre farming	6.0%	7.4%	92.6%
Wheat	9.8%	12.8%	92.5%
Mixed	9.1%	12.1%	119.6%
Sheep	7.1%	9.5%	151.5%
Beef	8.2%	5.8%	65.6%
Turnover between \$500,000 and \$1 million			
	Receipts	Cost	Profit*
All broadacre farming	5.1%	11.8%	23.8%
Wheat	7.4%	6.6%	32.8%
Mixed	7.2%	12.5%	38.5%
Sheep	7.0%	11.6%	29.2%
Beef	7.1%	18.2%	26.6%
Turnover over \$1 million			
	Receipts	Cost	Profit*
All broadacre farming	6.7%	16.2%	17.4%
Wheat	5.6%	8.3%	22.3%
Mixed	6.3%	9.0%	15.1%
Sheep	9.5%	15.0%	37.8%
Beef	11.4%	43.7%	25.1%

Source: ABARES, ANZ

IN THE PAST FIVE YEARS, HOWEVER, CORRELATIONS BETWEEN COMMODITIES HAVE CHANGED AS FARMING MODELS HAVE CHANGED AND CLEAR BENEFITS FOR MITIGATING COMMODITY RISK HAVE EMERGED FOR MIXED FARMING MODELS. CLEAR AND STRONG RELATIONSHIPS HAVE EMERGED BETWEEN GRAIN AND LIVESTOCK WHICH MAY HELP MAINTAIN STABLE RETURNS ACROSS A MIXED FARMING ENTERPRISE

*Profit volatility is variability from average. Receipt and cost variability are variability from trend



FARM MANAGEMENT - VOLATILITY IN PROFIT, RECEIPTS AND COSTS

Management of commodity price movements is only one aspect of farm management and diversification. Indeed, the key measure of volatility is profit volatility – whether a farm’s production system is able to adapt to lower than anticipated receipts.

Analysis of Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) farm survey data has been undertaken to determine the variability of average farm receipts and costs from the trend, and variability of profits from the 10-year average. The figures in Table 2 represent the percentage variability from either the trend of farm receipts or the average of farm profits.

This analysis demonstrates the volatility in annual receipts, costs and profit for an average farm across different industries and level of turnover. While the volatility of receipts is more directly attributable to market conditions, volatility in costs are often a direct result of on-farm management decisions. With the exception of inputs with widely fluctuating prices, such as fertiliser and feed, a high volatility in costs may actually highlight a commodity where production costs can be managed with a level of flexibility in response to market conditions and anticipated receipts.

The analysis shows different results across industries for farms of different sizes. Most interestingly, it shows that profit volatility for mixed farming is relatively high for small and medium-sized farms, but shows the lowest profit variability for large farmers. This suggests that scale in commodity production for each farm remains a key factor in determining profit levels, such that scale across each commodity being produced by a farming enterprise is also required for strong and reliable profitability.

The relatively low volatility of costs identified in larger scale mixed farming models may also identify the efficiency gains which can be achieved through scale. Successful larger operations are likely to be run by innovative operators who will adjust the mix of scale of each part of their operation to achieve maximum profitability. As part of this, successful operators are likely to seek maximum utilisation of their cost of inputs across all enterprises on their farm, while achieving strong receipts through good management of their annual production levels.

ACROSS ALL INDUSTRIES AND FARM SIZES, MIXED FARMING SHOWS A HIGHER PROFIT VARIABILITY THAN LIVESTOCK, BUT LOWER THAN WHEAT AND CROPPING, AND THE BROADACRE AVERAGE. MIXED FARMING ALSO SHOWS A RELATIVELY HIGH VOLATILITY IN RECEIPTS AND COSTS - SECOND ONLY TO THE BEEF INDUSTRY

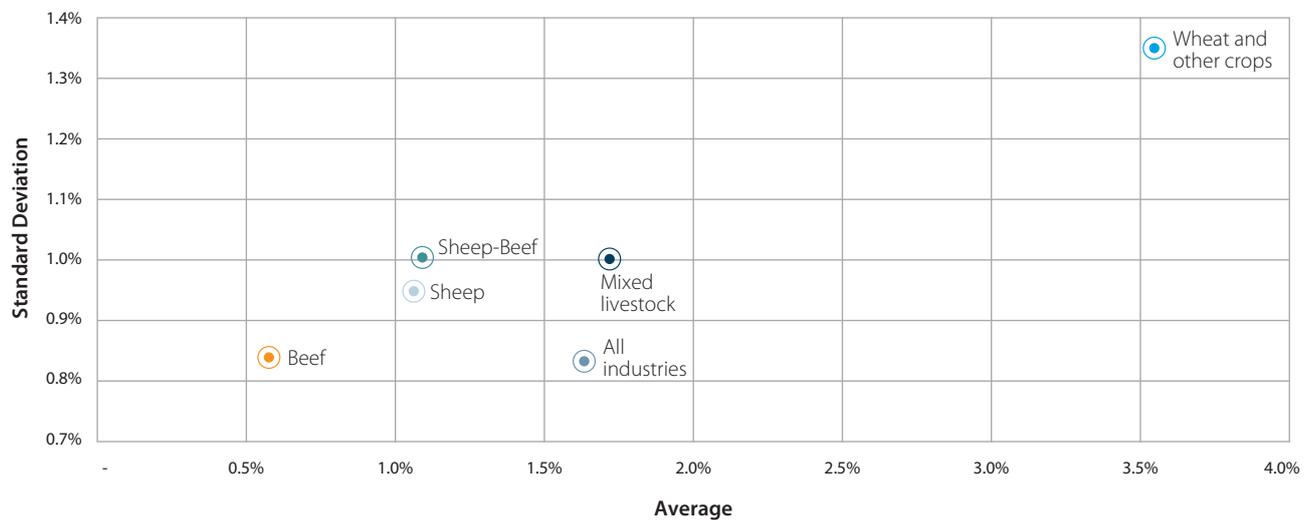
In addition, it is increasingly likely that larger operations will be spread far wider than one centralised farm, or will take advantage of leased country when necessary. As a result, this is further likely to reduce the volatility of returns, through factors such as reducing geographic risk.

In analysing volatility, it could be argued that moving from more volatile receipts and cost structures (such as beef) to low volatile receipts and cost structures (such as wheat), volatility in profit isn't necessarily reducing, especially for small farms.

In this way, if we compare the average rate of return to the standard deviation rate of return (over past 10 years), it indicates that mixed farming occupies a sweet spot in terms of returns – ie, high mean returns with relatively similar volatility in returns compared to sheep or beef enterprises. While wheat/cropping systems provide a greater return, they are also high in terms of volatility, reflecting high crop output variability.

In terms of overall profitability, ABARES data highlighted the strength of mixed farming over the past decade, though well behind cropping, which has been driven in that time by enhanced technologies, new capital, and strong global demand.

RATE OF RETURN (EXCLUDING CAPITAL APPRECIATION) AVERAGE VS STANDARD DEVIATION COMPARISON 2007/08 TO 2016/17



Source: ABARES, ANZ

Absolute Return (%)	Rate of Return (excl. Capital appreciation)			Rate of Return (incl. Capital appreciation)		
	1 year	5 year	10 year	1 year	5 year	10 year
All Industries	3.2%	10.0%	17.5%	7.3%	15.9%	31.3%
Beef	2.1%	2.8%	5.9%	4.9%	7.4%	11.9%
Mixed livestock	3.6%	11.4%	18.5%	9.9%	16.9%	38.0%
Sheep	2.3%	4.8%	11.1%	5.8%	10.3%	29.1%
Sheep-Beef	2.7%	5.9%	11.7%	7.6%	14.0%	30.9%
Wheat and other crop	5.4%	23.7%	41.5%	9.6%	31.1%	60.6%

Source: ABARES, ANZ

CONTACTS

MARK BENNETT

Head of Agribusiness, & Specialised
Commercial, Business and Private Banking
T: +61 3 8655 4097
E: mark.bennett2@anz.com

TAMMY MEDARD

Head of Diversified Industrials
Institutional
T: +61 3 8655 7685
E: tammy.medard@anz.com

JAMES MCKEEFRY

State Agribusiness Manager,
Victoria/Tasmania
T: +61 4 2302 4503
E: James.McKeefry@anz.com

ALISTER BENNETT

State Agribusiness Manager
New South Wales
T: +61 4 3596 5226
E: Alister.Bennett@anz.com

STEPHEN RADESKI

State Agribusiness Manager,
South Australia and Northern Territory
T: +61 4 2161 8371
E: stephen.radeski@anz.com

CONTRIBUTORS

MADELEINE SWAN

Associate Director Agribusiness Research,
Business and Private Bank
T: +61 3 8654 5821
E: madeleine.swan@anz.com

ALANNA BARRETT

Associate Director Agribusiness Research,
Business and Private Bank
T: +61 2 5933 0209
E: alanna.barrett@anz.com

MICHAEL WHITEHEAD

Head of Agribusiness
Insights, Institutional
T: +61 3 8655 6687
E: michael.whitehead@anz.com

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