The Dohne's Future in the Australian sheep industry, incorporating local Case Studies.

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SUMMARY

This paper has been generated using many referees whose expertises in this field are far greater than my own. Any deliberate plagiarism has not been the intention and I wish to thank all who are mentioned in the following for their prior work. A full list of references and URL links to the original papers has been supplied where appropriate, at the end.

PROLOGUE

As I was preparing this paper, my husband asked, "What is the content?" I said my topic was the past, present and future of Dohnes in Australia, to which he replied, "ok, that's quite broad, but easy". This is what he gave me…..

In the mid 1990's the profitability of the traditional Merino type sheep was beginning to fail, as a result of the wool stockpile that had been created by the reserve price scheme over decades. At the same time, technology and Research and Development in the grains industry was advancing quite quickly, resulting in increased competition for pasture area, particularly where mixed farming is carried out. This competition and the increase in red meat consumption lead to astute farmers assessing other cropping options or sheep types to suit current markets, and the key factor was profitability.

The Dohne entered Australia and has made its' mark. In 2016 and 2017, with the current increase in wool and meat prices, the profitability of stock enterprises is rapidly catching up to grain gross margins, creating a re-think back to mixed farming rotations.

The word profitability has been overused, however, it is the key to future sustainability of cropping and family farms worldwide. If we are not making a profit, equities do not last long. Every commodity we produce needs to be continually analysed and a little weight added or subtracted for synergisms or antagonisms in the rotation, looking for overall farm profitability.

The Dohne on our farm is under the same scrutiny as other commodities. At present, the profitability of the Dohne is "right up there," "every dog has its' day", as we say in Australia.
I believe the future is bright for the Dohne in Australia. The strict procedure of testing performance and ASBV generation creates a strong backbone to monitor key profit driving factors going forward. Increasing technologies in areas such as genomics, micro chipping, virtual fencing/mustering and other labour saving methods, combined with the Dohnes' do-ability in a moderately harsh climate like Australia, sets the Dohne up for an exciting future…and profitability.

INTRODUCTION

Australia is a vast continent consisting of three main climatic zones: temperate, tropical and hot arid. Less than 50 sheep first arrived in Australia with the First Fleet in 1788**,** but the wool producing industry which became the mainstay of the Australian economy for many years had its beginning with the arrival of Spanish merino sheep in 1797. After the Blue Mountains were crossed in 1813, the wool industry developed rapidly as the climate on the western side of the ranges was more suitable for sheep and space was unlimited. The wool industry was the major export earner for the Australian economy until the later part of the twentieth century. The original merino evolved slowly over time to adapt to the Australian climate, and with changing consumer demands, allow us to skip through the years to the present, where the Dohne has a genetic influence in over 22% of the nations sheep flock

and is transforming a significant portion of this flock to a more dual purpose sheep. The ability of the Dohne to thrive in a range of climatic, management and genetic systems sets the breed up for an exciting future in Australia.

The following case studies demonstrate a variety of production systems across Australia in addition to how Dohnes compare financially to other sheep breeds.

DISCUSSION

THE DOHNES ROLE IN THE AUSTRALIAN SHEEP INDUSTRY
Geoff Duddy, Sheep Solutions
Leeton, NSW Australia (2016)

The paper "The Dohne's Role in the Australian Sheep Industry", published by Geoff Duddy, Sheep Solutions, Leeton, NSW Australia, 2016 outlines some indisputable data that highlights the numerous positive attributes the Dohne possesses, placing the breed at the forefront of many profit driving factors.

The introduction of Dohne genetics into Australia in 1998 coincided with significant changes in breeding objectives and productivity within the Australian sheep industry. Persistent low wool returns and a continued growth in export access and demand for sheep meat products saw an increasing emphasis placed on sheep productivity, on-farm and breeding efficiencies, sheep meat production and importantly, cost of production considerations.
Over the past 2 decades we have seen an ever-growing focus on improving fertility, fecundity, lamb survival and growth rates, resilience of the breeding ewe base, increased focus on animal health and welfare practice, selection based on a sire/breeds genetic merit and the cost/benefit of sheep meat and wool production. These issues, combined with a declining national flock/breeding ewe base, and a greater focus on dual-purpose and/or composite breeds and crosses has seen an increased interest and accelerated use of Dohne genetics nationally.

Since 1998/99 wool category premiums have constricted and the median micron average nationally has shifted slightly higher to sit around 20 microns. Improvements in 19 to 21-micron wool returns have meant that the Dohne has been increasingly competitive against finer categories.
Sheep meat returns have also shown a strong upward movement since 1998/99. Driven by strong export demand, sheep meat remains the primary profit driver with Australia's sheep industries gross value of production - now estimated as 60:40 for meat (slaughter lambs, mutton, and surplus ewe sales) and wool (ABARE 2015) across all sheep-based enterprises nationally. Dohnes, as a true dual-purpose breed, are therefore increasingly well positioned to benefit from improvements in sheep meat, breeding ewe and wool receipts.

An increase in clean fleece weight (CFW) has major implications for on-farm productivity and income share with selection for 'high CFW' negatively impacting on the rate of survival of lambs to weaning (Hatcher and Atkins 2006). This may, in part, explain why historical Merino weaning percentages have remained well below potential lamb numbers based on scanning data.
Balancing the relative emphasis placed on both carcass and wool traits, is critical for maintaining the Dohnes dual-purpose nature. Thankfully this has continued to be the case within the breed in Australia.
The Dohne potentially offers improved fecundity, fertility, mothering ability, growth rate to weaning and an ability to perform in a range of environments (including pastoral areas). Improvements in weaning rates, driven principally through increased twin lamb survival, are a critical profit driver and a means for reducing costs/kg of product produced.
Despite the Dohnes comparatively heavier maternal body weights; their ability to convert many poorer quality feeds and feed seldom grazed by the traditional Merino, improves pasture utilization efficiency.

Vipond (2011) has shown that increasing lamb number per ewe reduces energy required by ~ 40% per kg of carcass produced, improving ewe and production efficiencies. Given also that ~ 60% of total annual feed requirements are required for ewe maintenance (Fogarty et al 2005), heavier mature ewe weights need not be a major concern if lamb turn-off remains appreciably higher compared to (say) a traditional Merino ewe enterprise.
The Dohnes plain bodied, open faced, bare breech/mules free nature not only improves reproduction efficiency and reduces flystrike/grass seed issues but lends itself to appeasing powerful welfare and animal activist lobbyists intent on undermining and controlling livestock production world-wide. A self-replacing breed, the Dohne also offers greater prevention and control of disease introduction than enterprises based on buying-in replacement stock.

The dual-purpose self-replacing nature and use of performance recording of commercially relevant traits of the Australian Dohnes lends itself to
• capitalizing on short to long-term changes in wool/sheep meat and breeding ewe values
• use as both a terminal and maternal sire
• increasing the national breeding ewe base
• retention of on-farm quality assurance status
• improvements in lamb survival, growth rates, wool and meat production efficiencies
• improvements in ewe efficiency and resilience
• increased speed of genetic gain for replacement breeders (reduced generation interval, earlier mating of ewe progeny) and
• reduced costs of production/improved benefit/cost ratios and therefore the Dohne plays an increasingly important role within the Australian Sheep Industry.

THE MATERNAL QUALITIES OF THE DOHNE
Wayne Hawkins
Circle H Farms Pty Ltd Conkar Rd Frances South Australia. (2016)

On the Hawkins' property, Dohnes have proven their superior mothering ability and growth rates to meet lamb market specifications and also produce a merino quality fleece at shearing.

To back this up, the Hawkins Family were the ***Winners of the JBS Lamb Producer 2015***. The Circle H Farms' Dohne lambs had to constantly meet specifications to win, and Wayne believes it was the management of their lambing programme that had a big part to play.
He attributes this success to the incorporation of irrigated Lucerne circles into the lambing period. This ensures the ewes have plenty of nutritious feed and are at optimum condition when they lamb. Together with good feed and the strong maternal qualities of the Dohne ewes, the lambs have the best start in life. The lambs are born easily, they receive lots of milk and they gain weight quickly. Lambs are weaned after 12 weeks and are given priority of feed on the property, with marketing commencing as soon as they hit 48 kg. Weight and condition score must meet specifications, and they are weighed every month.

Whilst on a MacKillop Farm Management tour in 2000, he looked at some Dohne operations in Western Australia. It was then that Wayne realised he was breeding sheep for wool. Wool prices were low at this stage and he needed to make more money. The world needed to be fed, and meat was a great source of protein in the human diet. His focus changed; it went from wool to meat. He wanted to produce quality prime lambs. This started his journey to find the ideal sheep that would have the attributes he wanted – decent micron wool, good quality meat and be an excellent breeder.

Wayne's goal was to have a highly functioning self-replacing Dohne flock.
In the early 2000's, he purchased 2000 purebred Dohne ewes from Western Australia. These ewes added to his existing flock and boosted numbers considerably. The Hawkins' were eager to multiply their purebred status as quickly as possible; all ewes from then on were mated to a Dohne ram. It was so much easier due to the maternal qualities of the Dohne ewe. They bred easily and they produced a lamb that lived.
At their peak they had 20-22,000 breeding ewes and 860 bales of wool.

One area which excited Wayne the most was being able to increase his flock significantly quicker than he had been doing, due to the improved fertility and successful lambing of the Dohne ewe. Once the rams were put out it would seem that the ewe fell pregnant almost instantly. This is apparent at lambing time when the ewes basically all lamb around the earliest lambing date. It is heartening to see the ewes give birth so easily, whether it be single, twins or triplets. The lambs are strong and healthy and the mothers produce plenty of milk. Dohne ewes can easily manage lambing percentages of 115-125%.
The lambs are fast growing and they have significant weight gain, allowing them to be marketed earlier. Even though they have a quick weight gain, they maintain their muscle definition and structure.

The excellent lambing percentages, coupled with the early turn off of lambs permits Wayne to maximise productivity.

Benefits of Dohne ewes
• They are fertile, natural breeders with a high libido and are excellent milk producers
• Great mothers – caring sheep that look after their lambs.
• They have lambs that want to '*get up and live'*
• Their lamb percentages are consistent and high, normally 115% – 125%.
• They have the ability to hold condition after lambing, even in tough conditions.
• They breed lambs that have high weight gains within 5-8 months of age, while maintaining a good fat cover.

It is difficult to argue against the maternal qualities of the Dohne ewe being perfect for Australian conditions. They are survivors - resilient and fertile. They are natural mothers who produce and rear high performance lambs. As farmers, the challenge is to manage them more effectively to get the optimal results using their exceptional mothering abilities.
'Stick to the Dohne programme.' Wayne believes the Dohne industry should be the benchmark that all other breeds look to. The Dohnes more than adequately cover all aspects of what a good breed can achieve. Breeding is a long term process and it is proven that over time, the Dohnes will always do well, whether it is wool or meat that is the stronger commodity at the time, due to their strength in both areas.

Wayne questions why farmers sometimes switch their breeding programme to fit in with the latest commodity prices/stronger cycle, with a chop and change attitude to chase the markets. For example, putting Merino rams over Dohne ewes to get a larger cut of wool. "You don't want to do anything at the expense of the strengths of the Dohne, in this case, their strong maternal attributes. My advice is "stick to the programme". The long term benefits will outweigh any short term gain."

FEEDLOTTING DOHNES AT RIVALEA
Barry Hutton
Rivalea Australia, Agricultural Manager, Corowa NSW, Australia (2016)

Rivalea is a vertically integrated company, which processes 700,000 pigs a year, 250,000 tonnes of grain through its feed mill and employs approximately 1000 employees at a variety of locations around Australia.

Rivalea also has interests in the sheep meat and wool industry. Since the inception of the Dohne at Rivalea, the company has seen the benefits of improved mothering ability, increased lamb survival and better turn off of wethers within 12 months, into the lamb slaughter market. The improved growth rates and finishing ability of the Dohne is a hallmark trait of the breed and in this instance has met all expectations. Rivalea is aiming to further capitalise on these attributes into the future.

Rivalea owns two sheep and wool producing properties in New South Wales, originally stocked with medium wool Merinos, focussing on running a self replacing flock and selling wether lambs before the age of 12 months. However, both properties had difficulty reaching the required slaughter weights before they reached hogget age, and lambing percentages were also below the industry average.

Rivalea set out with the breeding goals of:
• Reaching acceptable slaughter weights of wether lambs within 12 months of age
• Increase lambing percentages above industry average for each of the properties, without needing greater inputs
• Understanding the breeding value of the Dohne ewe when mated with their maternal sires
• Achieve acceptable staple lengths to justify shearing every 6 months.

All these objectives were evaluated by Rivalea on an on-going basis to assess the effectiveness of the breed.

The Dohne offspring were weaned at 3 months of age onto improved lucerne pasture at both properties. Once weaned and grown out the wether portion were put into a feedlot for a total of 44 days or until they reached an average live weight of 52 kg ready for a targeted carcase weight of 25kg.
The growth rates and feed conversion efficiency of the lambs was calculated at the start, middle and end of the period the lambs were confined to the feedlot and is provided in Table 1.

The progeny displayed exceptional feed efficiency which increased as the time passed. The average weight gain was fast and consistent until the appropriate weight range was achieved to slaughter. Anecdotal reports suggest that the growth rates achieved by the Dohne breed were greater than what was achieved in the Merino enterprise before the change in breed.

Table 1. Feedlot performance of Dohne lambs at Rivalea.

	Start	Middle	End	Average
Average weight (kg)*	31.6	38.9	45.6	NA
Average daily intake (kg/day)	NA	1.37	2.00	1.71
Weight gain/sheep/day∞ (g/day)	NA	364	279	318
Feed conversion ratio (kg)	Not estimated	3.80	7.21	5.39

Rivalea maintains an ethical approach to sheep meat production and has put in place a number of management practices that aid in animal welfare and ultimately increased production. The installation of shade, regular weighing of lambs to monitor and specifically manage underperforming individuals through shy feeding and maintaining appropriate sheep densities all contribute to the ethical treatment of their livestock.

DOHNES: HOW THEY STACK UP FINANCIALLY

Dr Graham R Lean
Agrivet Business Consulting
Hamilton VIC Australia (2016)

Since its inception the aim of the Dohne Merino has been well defined with the breeding objective to improve meat, wool and reproductive traits. This analysis modelled the Dohne, Fine wool Merinos and a crossbred Prime Lamb enterprise run in three different environments and found the Dohne Merino is more profitable based on the last 10 year prices whether it is being run in high, medium or low rainfall environments. It would appear that the adoption of objective measurement and modern breeding tools has meant that the breed's objective has been well implemented over the last 50 years.

The Dohne sheep presents a very different alternative to sheep producers than previously available sheep genetics in Australia. With emphasis on both meat and wool traits, it presents the potential to have a true dual purpose sheep, which provides an alternative to the fine or medium wool Merinos and specialist prime lamb breeds or composites that have been traditionally used in sheep enterprises.

GrassGro® is a CSIRO developed computer program that models the returns and productivity of different sheep and beef cattle enterprises over the long term. It uses soil, weather data, financial data and animal production traits to simulate a grazing system. GrassGro® calculates animal production and subsequent financial performance for each year and presents the average for the simulated period as well as the variation in results over the simulated period. GrassGro® has been validated numerous times in different Australian locations (Donnelly et al. 2002).

GrassGro® was used to model a Merino fine wool flock along with a Crossbred prime lamb flock, as well as a Dohne flock for the period from 1965 to 2015. There are published differences between medium wool Merino and Dohne sheep (Cloete and Cloete 2015) from South Africa. Other trials have shown a higher reproductive rate in the Dohne and this is summarized by Graham and White (2005), who put the Dohne reproductive rate 17% better than a fine wool Merino.
In this modelling exercise, GrassGro® simulated the breed reproductive rates, while the wool and bodyweight characteristics were taken from Cloete and Cloete (2015) and entered into GrassGro. Bodyweight was 20% higher than a fine wool Merino, with wool cut 10% less and fibre diameter about 1.9 μ broader

Prices were based on real (inflated adjusted) prices for wool based on weekly AWEX quotes for the last 10 years to reflect the normal variation in economic activity that impacts on the demand for wool. There was no wool stockpile sales in this 10 year period so that abnormal supply was not detrimentally affecting prices, something that would not be anticipated to occur in the future. Meat prices were based on the last 10 year real (inflation adjusted) meat prices as quoted by MLA. This period was chosen so that the substantial sell off of the Australian sheep flock prior to and culminating in the 2006/07 drought did not skew meat prices down abnormally. Again, it would not be anticipated to see a major sell off of sheep numbers in the future that might depress meat prices.

The simulations were based on the three flocks grazing highly improved and fertilized perennial ryegrass and sub clover pastures at Hamilton VIC, phalaris and sub clover pasture at Kybybolite SA and an annual grass and medic pasture at Roseworthy SA. These three locations were chosen to provide a comparison of performance at higher rainfall (approximately 685 mm, 525 mm, and 490 mm respectively. The stocking rates are consistent with the optimum stocked plots of the Long Term Phosphate Stocking Rate trial run at the Victorian DEDJTR Research Centre (Cayley et al 1999) and other stocking rate trials (Saul and Kearney 2002). This level of stocking rate and fertilizer was chosen to reflect “best practice” in this location and was extended to the Kybybolite and Roseworthy locations. This stocking rate is comparable to that achieved by some of the top farms of the Victorian DEDJTR Livestock Farm Monitor Project given similar rainfall (Blackshaw P. and Ough, M. 2015). The main issue with the Roseworthy site is that GrassGro doesn’t take into account other farm feed sources, such as stubble, which can be significant in these lower rainfall locations.

The different breed systems resulted in different reproductive rates, with the lamb marking percentage in the Fine wool Merino averaging 77%, the Dohne at 94% and the Crossbred ewe enterprise at 115% at Hamilton. This is in line with farm benchmarking results and industry experience (Blackshaw P. and Ough, M. 2015).

They were all stocked at similar dse levels and pasture availability was similar across the three different simulations.

Table 1 outlines some key financial output from the three sheep production systems at the high rainfall location, Hamilton VIC. The Dohne is the most profitable, but the Fine wool Merino has the least variable gross margin due to the reliance on wool income, rather than meat income, which is more variable as it is highly dependent on seasonal conditions. On the other hand, the Crossbred prime lamb enterprise, which is far more dependent on meat income is more variable in gross margin returns than the Merino and the Dohne enterprises. Further it is the least profitable on this analysis.

	Fine wool Merino	**Dohne**	**Prime lamb**
Wool Income/dse	$30	$19	$10
Young stock sales/dse	$1	$29	$46
Cast for age sales/dse	$17	$8	$10
Total Income/dse	$48	$56	$66
Total variable costs/dse	$15	$17	$39
Gross Margin/dse	**$33**	**$39**	**$27**
Gross Margin variability/dse	$4	$6	$9

Table 1: Key financial output from GrassGro for different sheep breeds and production systems

Table 1: Key financial output from GrassGro® **for different sheep breeds and production systems**

Note, in Table 1, the cast for age sales are elevated for the Prime Lamb ewe enterprise due to no replacements kept and variable costs are similarly elevated due to replacements purchased in at $180 per crossbred ewe hogget. Lower ewe replacement costs would have a positive impact on the Prime Lamb ewe enterprise, but this value reflects industry averages over recent years for this type of ewe.

This analysis does not take into account:
• Variation in commodity prices from year to year. For example, wool traditionally has been the most volatile of commodities, however over recent years it has been more stable.
• Environmental impacts other than rainfall, such as very wet soil conditions.
• Differences in labour input with different enterprises.
• The impact of easy care sheep, such as the Dohne or prime lamb breeds on labour costs.
• Overhead costs or interest. A gross margin has been developed, but that is not necessarily profit as labour and overhead costs should be taken into account. The capital values of the three enterprises are different too.

These factors can be significant and will vary from farm to farm. For example, farm benchmarking performance highlights that there is a large variation in performance level within each farm enterprise that is usually of greater magnitude than the difference between enterprises.
The gross margin performance over the three sheep enterprises in the three different locations is summarized in Figure 1. The Dohne is the most profitable in all three locations.

The profitability of the low rainfall site at
Roseworthy SA is reduced due to heavy supplementary feeding due to time of lambing, which in actual fact is likely to be largely supplied at no direct cost from stubbles in this location. At the medium rainfall site all three enterprises benefited from higher lambing percentages due to better survival rates thus benefiting the Prime lamb enterprise.

The Dohne sheep perform well in this analysis, which is not surprising given their dual purpose nature and the high prices that have been on offer for meat and wool over the last 10 years. It is in line with results from previous analyses that have been undertaken by this author (Graham Lean) and also to an extent with Graham and White (2005), whose analysis predates recent higher wool and meat prices.

Of course, like any enterprise, poor management or animal health issues could easily erode these advantages, so to realize this potential good management inputs are required, just as it would be with the other enterprises. Further, breed averages have been analysed in this paper. Individual flocks could have better genetics in any of these three breeds, which will change the financial outcome significantly.

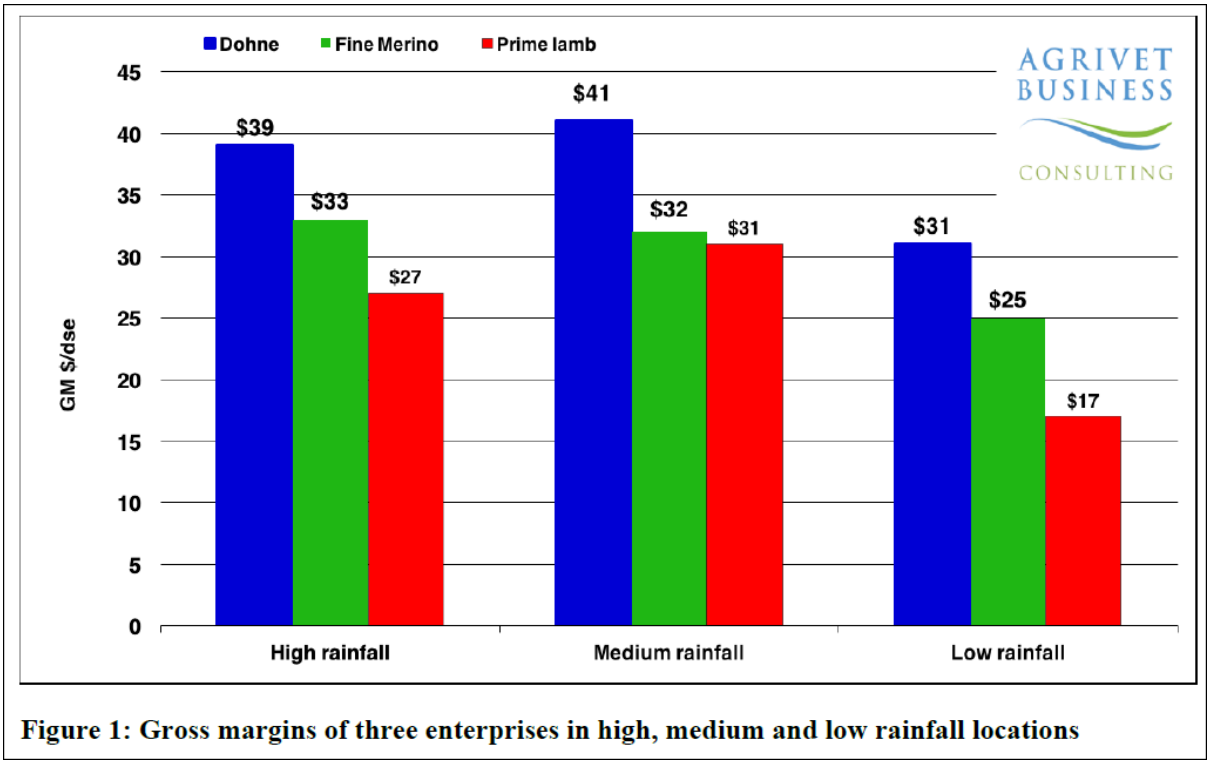

Figure 1: Gross margins of three enterprises in high, medium and low rainfall locations

Figure 1: Gross margins of three enterprises in high, medium and low rainfall locations

The Fine Wool enterprise has least production risk, hence translating into less business risk in this analysis. As noted previously, in reality commodity price risk would need to be taken into account too. The prime lamb enterprise has considerably more risk due to more reliance on seasonal variation to drive production and hence financial results. The Dohne being more diversified into meat and wool is not so exposed to seasonal factors, while being more profitable.

In conclusion, it would appear that the Dohne does stack up well financially and its performance is testament to clearly stated breeding objective and achieving that through the efficient implementation of modern genetics tools.

INTEGRATING DOHNES WITH BROADACRE CROPPING IN WESTERN AUSTRALIA

Rachel Browne
Browne Farming, Owner/Manager, Nyabing, Western Australia (2018)

Browne Farming is our family owned and operated mixed crop and livestock operation, based in Western Australia. We are typical of many farms in our area, sowing seasonal dryland crops and operating a successful sheep enterprise. In 2018, about 7000 hectares of wheat, barley and canola and over 2000 hectare of clover will be sown during March-May. In conjunction with this seeding program we run 3500 commercial Dohne breeding ewes and 1000 stud Dohne breeding ewes, all which lamb March-May.

Our business has always had a mix of cropping and sheep. For the most part, the enterprises are complimentary, such as weed management, biomass reduction, utilisation of stubble from harvested crops and providing an alternative income stream to cropping. There are some antagonistic points however. Cropping creates very clean and generally weed-free paddocks, resulting in little early germinating grass components to pastures, with a high dominance of clovers with limited early season biomass production. Dohnes are excellent in their non-selective grazing habits and perform very well on the low quality stubbles, and managing stocking rates and protecting soil from erosion is very important.

The sheep are managed under a broadacre production system. We do not feedlot, and do not have irrigated pastures. Our growing season is confined to April through to October, with a lack of pasture growth in June and July. During the crop growing season, sheep are limited to pastures only. We have conducted grazing trials of cereal crops, but the opportunity cost of grain production if the rainfall is insufficient at the end of the season for grain fill, outweighs the benefits to the sheep enterprise.

Our aim is to sell as many wether lambs "straight off the ewes" at weaning, having reached a weight of 42kg live weight and a fat score of 2 or 3. In Western Australia, this is the most profitable age (16 – 20 weeks) for us to sell these wethers, with meat prices usually at $6.20AU per kg and skin value of $4AU.
Climate plays the most critical role in the efficiency of our production. A tight spring leads to lambs being weaned onto the best pastures and being grown out until the end of the growing season and before the emergence of spring grass seeds. This usually coincides with live weights of 42kg+ being achieved. We aim to sell all wethers before summer.

Ewes and lambs are used as a weed management tool post selective herbicide application to "clean up paddocks" in spring ready for the following seasons' cropping program. Summer weed control is also performed by the Dohnes and with chemical means where necessary.

The ewe portion of our flock utilise stubbles over the summer period, starting on canola, moving into wheat and then lambing into the previous years' barley stubble. If rainfall events occur over the summer period, feed quality is lost and supplementary feeding may commence. This is either in the form of pelletised grain/hay or opportunistically baled hay if we have had a severe frost event that has compromised grain production in the cereal crops.

Dohnes have proven to be a successful addition to our farming enterprise, first arriving in 2003. We have found them to be exceptionally good doers, repeatedly performing well in our environment. Our production of meat in the last 15 years has become more efficient, our wool production has not been sacrificed and our sheep are more robust and hardy compared to the Merinos we used to run.

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