



Rangeland goat production in western NSW: Where are they now?

A review of 2012 case study enterprises

Title:

Rangeland goat production in western NSW: Where are they now?

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Disclaimer:

The information contained in this publication is based on knowledge and understanding at the time of writing (January 2019). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of Local Land Services or the user's independent adviser.

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Producers:

- John Vagg, Ivanhoe
- Greg Church, Wilcannia
- Rick and Joanne Gates, Wilcannia
- Randall and Tracey Graham, Ivanhoe
- Keith and Robin Francisco, Cobar
- Tony and Heather McGinty, Ivanhoe
- Rick and Floss Howard, Wilcannia
- Big Ampy Rangeland Goats, Menindee

Photo credits:

Front cover: Composite bucks bred by John Vagg on Orana Station, Ivanhoe NSW. Photo: Yohannes Alemseged.

Back cover: Six to seven month old composite bucks bred by Big Ampy Rangeland Goats, Menindee NSW. Photo: Big Ampy Rangeland Goats.

Western Life and Light photo credits:

- Greg Roberston - yarding goats
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- Chris Ferguson - loading goats at dawn
- Cassandra Burges - hornless



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Introduction

This report was developed as a succession to case studies that were produced in 2012 by Department of Primary Industries (DPI) Livestock Graduate Officer, Allie Jones. It was prepared to gain insight into western NSW goat enterprises, provide a resource for other producers within or entering the industry, identify challenges and opportunities faced by producers, and propose recommendations for further development of the goat industry.

Revisiting producers five years after the original report was developed has allowed the opportunity to identify how their businesses and the broader industry have evolved during this time. This includes identifying the degree to which past recommendations have been addressed or priorities changed.

Methodology

In undertaking this updated case study report, the same seven enterprises within western NSW were contacted.

Of the original seven landholders involved, the Homfray's from Fairmount Station have since sold their property, so were not available. Therefore, six of the seven businesses originally studied are included in this report. An additional two business were also included to gain the further perspective of newer entrants into the goat industry.

A producer questionnaire was developed as the basis for gathering information during property visits. The questionnaire captured information such as livestock breeding and selection, animal husbandry, land management, marketing, infrastructure and producer views on the future of the industry.

The author met with producers on their properties, using the questionnaire as a basis for discussion. Information was gathered to give a holistic overview of each business and allow changes and developments over the past five years to be seen. This information is presented as business based case studies.

Producer's comments and other information gained from the study were used to form the SWOT analysis. This allowed some assessment to be made as to the viability of a future rangeland goat industry and the synthesis of recommendations for future industry success.



Australia's goatmeat industry

Over the past five years the Australian goatmeat industry has seen a number of developments, most notably being price received by producers.

Goat prices sustained almost four years of uninterrupted growth, with the over the hooks indicator moving from below \$2.00/kg cwt in 2013 to a peak of \$6.83/kg cwt in July 2017. However, prices did undergo a substantial correction during August 2017, where they settled at around \$4.70/kg cwt before gradually increasing (MLA Market reports, 2018).

Australian goatmeat production in 2017 totaled 31,414 t cwt, a four per cent increase from 2016 and a slight decrease from the highs reached over the last five years (MLA, Mar 2018)(MLA snapshot, 2018).

The value of Australian goatmeat and live goat exports has increased from \$125 million in 2010-11 (Jones, 2012), to \$257 million in 2017 (MLA, Mar 2018). As there has been minimal change in export volumes between these years, the majority of this increased value has been realised through increased price (MLA, Mar 2018). Over this time, the industry break up between domestic and export sales has seen only small change, with exports equating to 91 per cent of total production in 2017 (MLA snapshot, 2018).

Within the export industry, Australia's largest market is still the US (taking 66 per cent of total exports). The biggest changes have been variations in tons received by countries within the top 10 export destinations (MLA snapshot, 2017). The export industry is split into live export and processed products, at approximately one per cent and 99 per cent by value respectively in 2017 (MLA snapshot, 2018).

Recent live export data indicates 2016-17 exports are the lowest since 1994-95 (Uchida, 2018). Malaysia is the dominant buyer of live export goats, at 11,523 head in 2017. Total live exports in 2017 were 12,209 head, an 83 per cent reduction from the five year average (MLA snapshot, 2018). Live export goats are carried via air freight, opposed to being shipped. Almost all processed goatmeat is exported as frozen whole carcasses, with both skin on and skin off products (MLA snapshot, 2017). On a global scale Australia is not a large goat producer. However, we are the world's largest exporter accounting for around 50 per cent of total trade (O'Connor, 2016).

International demand for goatmeat is underset by it being the world's most widely consumed meat (Jones, 2012). With few to no religious restrictions, it is a staple of many cultures. The substantial Hispanic and Muslim populations of North America are a driving force behind the demand for Australian goatmeat in the USA (Keenan, 27 Feb 2018).

Rangeland goats produced in western NSW are almost entirely utilised through export markets. 2017 population numbers (both wild and managed) in western NSW are reported at 3.49 million (McLeod, 2017), indicating a substantial decline in numbers from 2016 estimates of 5.8 million (MLA, 28 Sept 2017). These figures align with landholder observations and theorised impacts of high prices and diminishing seasons. This ends the sustained growth seen in western NSW goat populations since 1999 (MLA, 28 Sept 2017). While a large number of goats are still wild harvested, anecdotal evidence suggests an increase in managed and semi-managed systems.

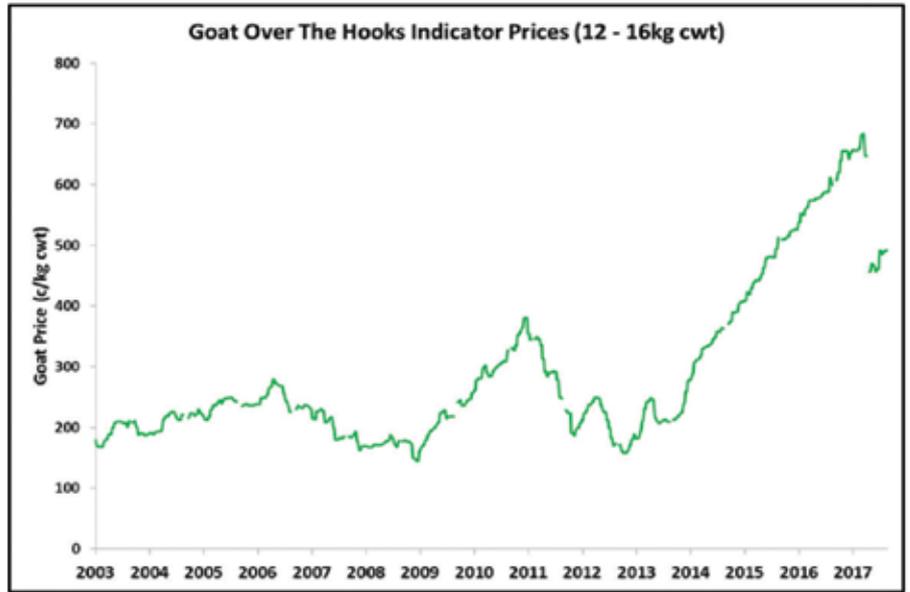
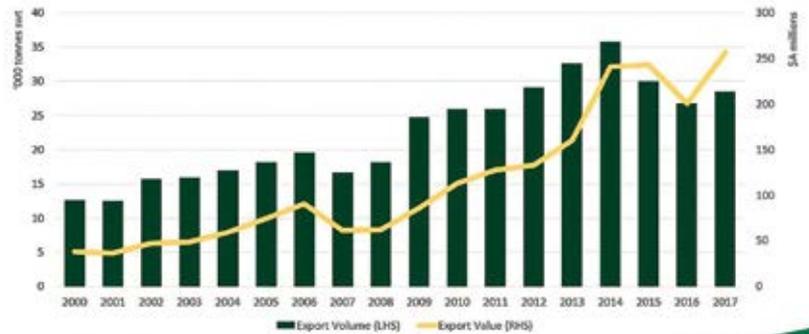


Figure 1: Australian 'over the hooks' indicator goat prices (c/kg cwt) (DPI, March 2018)



Australian goatmeat exports



Source: DAWR, ABS



Figure 2. Australian goatmeat annual export volumes and values (MLA, Mar 2018)

As a function of the large goat populations in western NSW, approximately 68 per cent of national annual production originates from NSW; a figure that has remained relatively stable over the last five years (MLA, 16 Nov 2017). Despite this, almost all of these animals are processed interstate. Predominant processing and exporting states are Queensland, Victoria and South Australia. It is likely that this may change within the coming years as a new abattoir is being built in Bourke, with an expected completion date in 2019. This plant will have a processing capacity of 6,000 animals per day (Adams, 2017). When considered in the context of the national kill, being 2.08 million head in the 2016-17 fiscal year (approx. 5,700 per day), the potential impact of this plant on the goat industry becomes clear (MLA, 28 Sept 2017). As this facility will also process lambs, there is no doubt that its establishment will be felt throughout the processing sector.

Producers in the region will also be provided with a more local sale destination, possibly reducing transport costs. Also relevant to producers in the south west of NSW is the refurbishment of the Meatco abattoirs in Mildura. This plant will take up to 6,000 sheep, lambs and goats per week (Pulford, 2018).

The domestic market is predominately supplied by farmed goats from agricultural regions of the country. Animals are generally of a more identifiable breed than rangeland goats, with Boers common. Domestic consumption focuses largely on high end restaurants and health conscious consumers.

Rangeland goats offer a low input enterprise, with the ability to better utilise browse plant species that are seldom touched by sheep and cattle (Osoro et al, 2013)(Lu, 1988). Joining is generally unmanaged, with kids being born year round but peaking during cooler months. Due to the combination of a short gestation period (150 days), frequent multiple births (average 1.3 kids per litter) and the general hardiness of rangeland goats, they can prove to be a productive and profitable enterprise under good management (DPI, 2018).

Goat depots continue to play an integral role in the Australian goat industry. They allow numbers to be consolidated in order to target animals to markets they best fit and market animals on an efficient scale (MLA GiG, 2018). The flow of goats through the supply chain is displayed in Figure 3.



Rangeland goat production in Western NSW: Where are they now?

National Livestock Identification System (NLIS) requirements for goats are dealt with under the mob based system. Exemptions do exist to accommodate for the harvest of 'feral' goats, and the traceability, safety and economic challenges they poses.

A feral goat is defined as "one that has been captured from a wild state, has not been born as a result of a managed breeding program, and has not been subjected to any animal husbandry procedure or treatment" (DPI, May 2018).

As with all mob based stock movements, records must be updated by the receiver of stock. Feral goats are exempt from tagging when being moved from the property of capture to an abattoir, to a depot, or from a depot to an abattoir (within 10 days).

Other movements such as from property of capture to another property or saleyards, and from one depot to another depot or saleyards requires animals to be tagged with NLIS post-breeder tags.

All movement of goats requires a National Vendor Declaration (NVD) or Traveling Stock Statement (TSS) completed by the property of origin (DPI, May 2018). Further information on traceability requirements of goats can be found in DPI Primefact 1265.

It should also be noted that the maintenance of current exemptions and operation under a mob based system relies on demonstrated industry compliance.

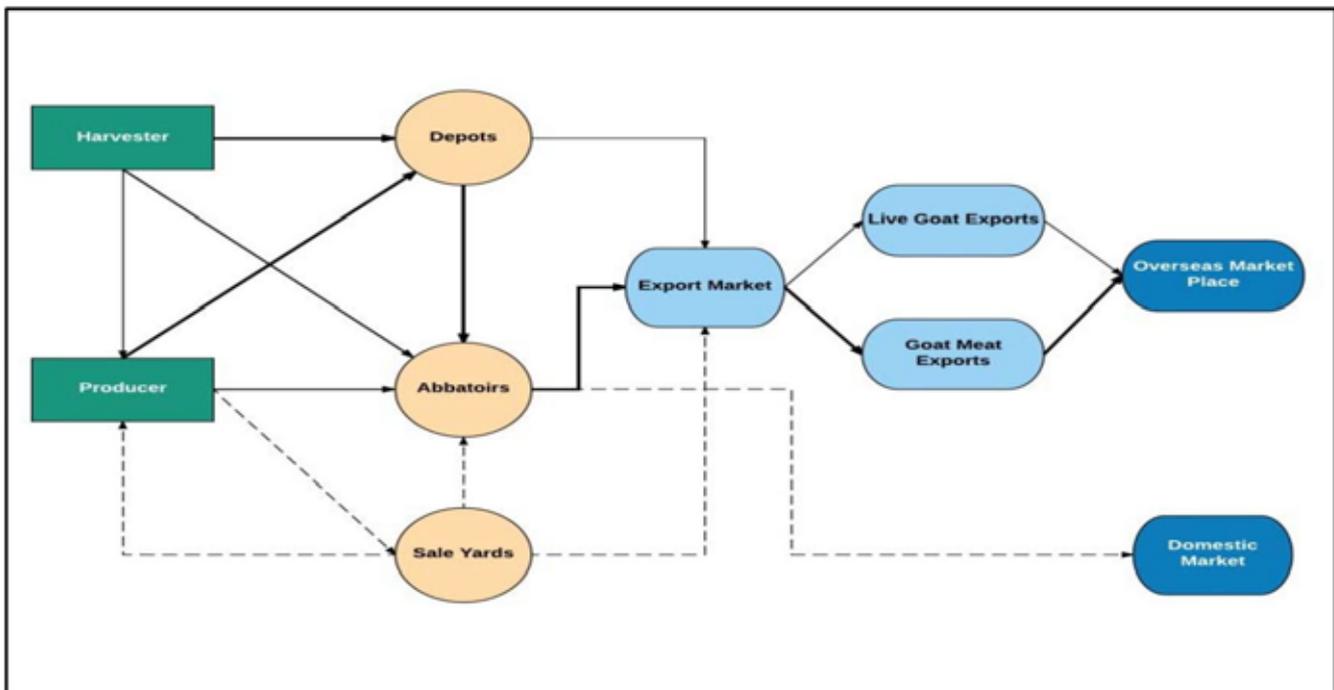


Figure 3. Goat industry supply chain. Heavier lines indicate prominent supply chain flow (DPI, March 2018).



Review of 2012 report findings

This section will aim to address the recommendations compiled in 2012, in order to identify areas of development and situations that may have changed. Recommendations from 2012 followed five key areas within which specific points were listed. These are as follows.

Market development

Total tonnes of goatmeat shipped in 2017 were 28,426 t shipped weight (swt), a reduction from the five year high of 35,780 swt in 2014 (MLA snapshot, 2018)(MLA, 2016). This is below the five year average but above the 10 year average (Uchida, 2018). Some substantial changes did occur with the quantities of product purchased by countries within the top 10 export destinations. Most notable were Fiji, Vietnam and Korea, which from 2012 to 2016 increased Australian goatmeat imports by 94 per cent, 67 per cent and 53 per cent by weight respectively. As a whole, the top 10 export destinations also increased their proportion of total exports from 94 per cent in 2012 to 99 per cent in 2016 (MLA , 2016).

Opportunity for export growth is particularly evident in Korea and China where free trade agreements were signed with Australia in 2014 and 2015 respectively. From initial tariff rates of 20 per cent (China) and 22.5 per cent (Korea), goatmeat exports to each country will reduce at a constant rate until they reach zero in January 2023 (Uchida, 2018).

Domestic goatmeat consumption has also seen little change on a total weight basis, with 2,988 t carcass weight (cwt) entering the domestic market in 2017. This equates to 10 per cent of total production (MLA snapshot, 2018). Domestic goat consumption is centered largely around the ethnic population, with only eight per cent of Australians regularly eating goat (MLA snapshot, 2017).

The greatest hurdle to domestic goatmeat consumption is a lack of familiarity. However consumer perception studies conducted in 2016 indicate that Australians see goatmeat as one of the leanest meats available, and score it very favourably (second only to kangaroo) for animal welfare and environmental impacts (MLA snapshot, 2017). This indicates that there is opportunity for increased consumption of goatmeat within health conscious and morally driven consumers. There is however still no substantial market for organic produce.

Over the past five years, the involvement of rangeland producers in the domestic market has reduced from already low levels. This is a result of the competitive prices offered in the commodity based export market.



The need for supply chains to be better developed has been identified as restricting industry growth by both producers and industry bodies (Jones, 2012)(Hutchinson, 2014). In 2013, a MLA funded review was published assessing the extent and capacity of goatmeat supply chains (Hutchinson, 2014). Key findings and recommendations from this included the following:

- Shift from a supply chain to value chain approach. This primarily shifts focus from the supply base to the customer base in order to provide value to all participants within the supply chain. For example, suppliers want greater feedback on their product, processors want supply security through feeding information forward, industry wants greater information on product movement.
- Investigate key quality attributes (additional to weight) that producers and processors want.
- Investigate impact of weather and seasonal harvest on supply chains (Hutchinson, 2014).

In order to begin addressing some of the uncertainties of supply, a project was established between Meat and Livestock Australia (MLA) and Department of Primary Industries (DPI). This involved forecasting goat population and slaughter numbers using information from aerial surveys, state departments and industry bodies (Crothers, 2017). With the initial project being funded to 2020, the intention is to develop a process for reporting of data that allows supply information to be forecast into the future (Atkinson, 2018).

Research and development

Research and development is an area where endless opportunities exist. While many questions remain unanswered there has been valuable development in this space. Majority of work undertaken in this space is industry funded, with 45 per cent of producer levies going towards research and development. The remainder of the 37.7c/hd levy paid by producers is used to fund the National Residue Survey, Animal Health Australia and marketing programs (MLA levies, 2018).

The total annual revenue received by MLA via the goat levy has fluctuated between a low of \$700,000 and a high of \$900,000 between the 2013-13 and 2016-17 financial years (MLA, Sept 2017).

At the time of writing, MLA had a total of 13 research, development and adoption type projects underway. These include sponsorship of goat producers to undertake leadership training, literature reviews into production factors, and the development of educational resources (Petty, Apr 2018). An impact assessment of MLA expenditure from 2010-11 to 2015-16 indicated that investment into the goat industry achieved a benefit cost ratio of 6.7:1 (CIE, 2016).

Research and development projects are prioritised via a range of industry consultation processes and alignment to relevant strategic plans. The primary guiding documents are the Goat and Livestock Industry Strategic Plan 2020 and the Meat Industry Strategic Plan 2020. The Goat Industry Council of Australia (GICA) is consulted throughout the project planning and selection process. Producer forums are also held annually to gain input into the desired and most beneficial investment of levies (MLA levies, 2018).

Literature reviews have been published in recent years regarding goat nutrition (Jolly, 2013) and factors affecting growth rates (Alemseged et al, 2015). These add to a growing body of resources directly relevant to Australian goat producers.

Following the wet summer of 2010 and 2011, many producers reported the need for a registered pour-on anthelmintic for goats. At the time of writing, there is still no registered pour on available for goats. There has however been some work done in the area of parasite control.

An MLA funded study was completed in 2014 assessing the efficacy and dosing practices of anthelmintics used on goats. Recommendations were made for effective chemical combinations and products to manage parasite resistance (Knox et al, 2014). Further to this work, Caprimec® was commercialised and registered for goats in 2017. This provided an additional chemical group available to goat producers to treat internal parasites. Previously, the only registered anthelmintics for goats were the benzimidazole group. This meant producers didn't have access to the more effective macrocyclic lactones and the resistance management options they provide (MLA, Jul 2017). In order to overcome the commercial barriers to development faced by private companies, GICA co-invested with Virbac® to develop and register the product (MLA, Jul 2017).

By including goats in the Wormboss program from 2016 also provided information and support to producers when making decisions about worm management (Kahn, 2016).



On farm productivity

On farm productivity is clearly linked to developments in a number of other industry areas, however a few key priorities were raised. Industry benchmarks are important in being able to assess enterprise productivity, and profitability.

NSW DPI has produced industry gross margins for goat enterprises, however these are in need of being updated (DPI, 2006). In 2016, a MLA funded study was published outlining the economic impact of including goats into established farm businesses. By using case study properties, this considered a range of production systems across a range of environment types. It was concluded that in five of the six businesses analysed, goats provided an increase in profitability (Agripath, 2016). This report provides a great resource for those considering entry or diversification into a managed goat enterprise.

The Cost of Production calculator is another very useful tool that has been developed with MLA funding. Completed in 2014, it allows producers to calculate, track and compare their cost of production (Francis, 2014). This is critical in understanding enterprise profitability and measuring performance over time.

Until February 2016, depots operated without any specific regulation, however they are now required to be registered under the National Livestock Identification System (NLIS) (MLA, Feb 2017). This involves the depot Property Identification Code (PIC) being accredited with Livestock Producer Assurance (LPA), passing an annual LPA audit, having a goat depot NLIS database account, a letter from a goat processor indicating intention to purchase stock, and compliance with all NLIS requirements. Gaining registration allows depot operators to continue to trade under the mob based NLIS system without the need to tag goats (GICA, 2018).

This change was initiated in order to ensure industry standards were maintained. Associated Standard Operation Procedures were developed by the Goat Industry Council Australia (GICA) and Australian Meat Industry Council (AMIC).

Boer goat survival and joining success in the rangelands is an area of interest and frustration for producers. While clear benefits have been displayed by establishing Boer-rangeland crosses, much difficulty has been faced in achieving reasonable survivability of introduced bucks. This is compounded by poor kidding rates to Boer bucks.

Research into this was done in 2007 on Bushley Station (Atkinson et al, 2007). Results indicated that Boer goats were more susceptible to nutritional deficiencies and internal parasites than rangeland goats. These factors, along with mouth issues and seasonal conditions resulted in the majority of mortalities. However this trial did demonstrate that through closer management and a sound induction/acclimatisation process, reasonable survival and kidding rates can be achieved.

Purchase weight was identified as a primary variable influencing survival, with heavier goats being most likely to die. This indicated that acclimatisation of goats at a young age is important. Limiting access of rangeland bucks to does also increased the marking rate of kids sired by Boer bucks (Atkinson et al, 2007). No additional research has been done on this topic.



Producer skills and development

In line with the large amount of work done in the research and development space, there has also been extension programs and tools developed for the goat industry. The MLA Going into Goats program has been established for some time (MLA GiG, 2006). The associated best practice guide is a valuable resource for producers. More recently, an additional module was added which is specific to rangeland goat enterprises. This not only adds value to the document for rangeland producers, but acknowledges the importance of rangeland goat enterprises in creating a more robust industry (MLA GiG, 2018).

KIDPLAN is another decision support tool available to goat producers, however few actively contribute data. In 2014, associated communication material and relevant modules in the Going into Goats program were reviewed to ensure accuracy and relevance (Puxty et al, 2014).

Regarding collaboration between industry and government bodies, many of the projects outlined throughout this section have involved input from both parties. A position paper on the goat industry was also recently published by NSW DPI. This outlines the commitment of government in supporting the development of the goat industry and the substantial opportunities for collaboration (DPI, March 2018).

Meat and Livestock Australia has recently developed a number of extension programs under the Profitable Grazing Systems Program (MLA PGS, 2018). This has the capacity to include goat specific programs if sufficient demand exists. A National Goat Roadshow will be delivered to present information relevant to the goat industry and gauge interest for goat specific supported learning programs.

In terms of attracting young people to the industry, there has recently been a push by both government agencies and industry groups to promote and facilitate the movement of young people into agriculture. An example of this is the Young Farmer Business Program, a joint initiative between NSW Farmers Association, NSW Young Farmers Council and NSW DPI. After an initial 12 month pilot program, the NSW government committed funding for an additional four years (DPI YFBP, 2018). However this program is not specific to goats. Anecdotally, young people considering entry into agriculture want to make data driven decisions that result in a profitable business. Therefore, industry tools and case studies that allow producers to make more objective decisions and present the opportunities of the goat industry are very beneficial.



Marketing and promotion

The prominence of the goat industry has risen dramatically over the last five years, largely as a result of sustained price rises. This culminated in 2017 with the over the hooks indicator approaching \$7.00/kg (MLA Market reports, 2018).

Media coverage about these historic prices brought the goat industry to the attention of those within and outside of the broader agriculture sector. This outlined the substantial presence of the industry, particularly in western NSW, and also presented the opportunities available to producers. Such substantial coverage also provided a platform for industry to promote goatmeat to consumers.

A great example of this is the Landline episode that aired in November 2017 (Adams, 2017). As covered by Landline, MLA has recently developed a series of videos to display preparation methods for goatmeat. These will aid in raising awareness of meal options involving goat and promote domestic consumption.

A MLA funded study exploring the opportunities for growth and value adding in the domestic goatmeat industry was published in early 2018.

This identified an estimated potential growth of 360 t and \$13.3 million per annum (Jenkins, 2017). Particular consumer segments identified as targets for this growth were young families, adventurous cooks, millennials, empty nesters and professional couples. MLA is now seeking co-investment from relevant private businesses to begin developing the recommendations outlined in this study (Jenkins, 2017).

The varied and evolving history of goats in Australia has resulted in a range of perceptions being held by the public and stakeholder groups. In the context of an emerging industry centered largely on the harvest of wild populations, this has caused some conflict. Most contention arises between government and industry bodies.

Government agencies have a responsibility to acknowledge and address the risks posed by wild goat populations, while industry groups are working to develop markets. Such markets may be sensitive to perceptions of goats being a pest species. Greater alignment between government and industry is now being seen in the promotion of managed goat enterprises as an alternative to opportunistic harvesting. However, there are still substantial points of inconsistency. This includes South Australia's restrictive regulations around the ability to hold captured wild goats or farm goats on pastoral leases (Adams, 2017). The impact of South Australia's regulations on the goat industry was explored in an MLA funded paper, published in 2014. This outlines that for the primary objective of landscape health to be achieved, it would be beneficial to move away from the 'pest eradication' stance. This would require legislative changes to allow landholders the opportunity to capture, manage and market goats as a domestic enterprise, rather than a reliance on opportunistic harvesting (Pitt, 2014). A key step forward is the construction of fence infrastructure that retains captured goats and prevents incursion of unmanaged goats (Pitt, 2014).

Additional to policy changes that best support the development of the goat industry, it is also important that all stakeholders maintain an awareness of industry goals. This includes ensuring consistent terminology and messaging.



Overview of findings

When speaking with producers in the development of these case studies, a number of key themes emerged. Initially there is the fundamental point that rangeland goats provide a profitable alternative to more traditional livestock enterprises. Additional benefits of reduced work load, lower costs and an improvement in landscape health can be realised under certain management strategies. Second to this is the critical role of appropriate fencing in allowing a move into managed goats and subsequent livestock and land management.

Over the past five years, much of the change seen within the case study enterprises are a result of the high prices experienced. The flow on effects of this includes a greater focus on export markets over the once premium markets of domestic consumption and live export. This is due to the competitive prices and broader grids offered by exporters, as well as reduced demand from live export markets that began sourcing goats elsewhere. There was also a shift in enterprise balance from trading to growing.

Some producers have reduced the intensity with which their business is run. This has stemmed from a belief that goat enterprises are better aligned to a low input, extensive, commodity based production system.

As the industry continues to mature, established producers identified opportunity in their unique ability to provide both a consistent product to market and superior breeding stock to producers. However producers also expressed some concerns. While it was acknowledged that progress had been made, the need to develop a supply chain of consistent quality and quantity was raised. Those managing breeding goat herds also identified availability of quality Boer goats as a limiting factor. This influences the genetic progress of both their businesses and that of the broader rangeland goat industry.

As a whole, producers said they were glad to be a part of the goat industry and expressed confidence in it's future.



Case studies

- **Orana Station**
- **Bushley Station**
- **Gates Goats**
- **Tasman Station**
- **Tindarey Station**
- **Wallangarra Station**
- **Moonavale Station**
- **Big Ampy Rangeland Goats**



CASE STUDY

Orana Station

Producer:

- John Vagg

Property:

- Orana Station, 33 km north-west of Ivanhoe
- Huntingfield Station, 70 km north-west of Wentworth



Area:

- Orana 19,595 ha
- Huntingfield 7,335 ha

Rainfall (av/a):

- Orana 250 mm

Enterprise:

- Self replacing composite goat herd selling to abattoirs for export
- Huntingfield is running Dorpers while the property is being developed and equipped to run goats

Key messages

- Boer genetics are integral in achieving increased growth rates and carcass quality.
- The goat industry needs to transition into a more managed production system to ensure consistent supply.
- A well managed goat enterprise has the ability to improve land condition, reduce work load and increase profitability.

Looking back

John has owned and managed Orana Station since 1983. Initially running Merinos, up to 10,000 sheep were shorn annually during the 1980's. At this time John was also harvesting up to 2,000 rangeland goats each year. This continued until 1990, when a combination of the collapse of the wool market, heavy discounting of wool due to vegetable matter, and the attractive returns being made from goats convinced John to transition into a 100 per cent goat enterprise. The low cost, low input nature of goats presented an enterprise type that fitted well with John's single operator business.

From the initial decision to move into goats came the subsequent need to upgrade fencing to a hinge-joint type fence. This allowed him to capture the rangeland goats already present on Orana and retain those that were bred. John then began what is now approaching 30 years of trialing infrastructure designs, adapting animal husbandry practices and focusing on genetic selection. This has resulted in the development of a hardy, fertile, high yielding composite goat that underpins a profitable business.

John has also witnessed substantial improvements in land condition since moving entirely to goats, which he attributes to the vastly different grazing habits of goats to sheep. This has been the final factor in what John considers to be the triple bottom line of a well managed goat enterprise; reduced work load, increased profitability and improved land condition.

Property and business development

In addition to Orana, Huntingfield Station was purchased in late 2016, allowing the enterprise to expand by 7,335 ha and an anticipated 1,500 does.

This increase in scale also complemented John's plans to move closer to the major center of Mildura as he begins considering the early stages of succession. John's son Shane has also returned to the region to begin developing his own goat enterprise.

While Shane doesn't play an active role in the running of John's business, he helps out when additional labour is needed, such as doing stock work.

Due to John's reduced work load since major infrastructure developments on Orana were completed in 2013, he now has the time to begin developing an additional property.



John Vagg inspecting his newly constructed exclusion fence on Huntingfield Station boundary

With 30 years' experience running goats on Orana, John is able to implement lessons learnt from day one on Huntingfield. On Orana, the majority of fencing involves 6/70/30 hinge-joint which was often attached to existing fences. This has withstood the test of time and John feels it does a suitable job at containing goats.

Paddock sizes on Orana vary with water availability, but larger paddocks are generally around 1,600 ha. John has more recently begun using 8/90/30 hinge-joint with a barb clipped to the bottom wire and above the top wire as he believes this is most effective at controlling movement of goats and feral animals. This fence design is being used on all internal fencing at Huntingfield, while the boundary will be built to a more exclusion type standard. This is in order to minimise invasion from kangaroos and emus.

It involves 1800 mm fence height, seven metre post spacing, 2,400 mm posts used one in three, 8/90/15 hinge-joint with a barb run along the bottom wire, three barbed and three plain wires above the hinge-joint (placed from the hinge-joint up as barb, plain, barb, barb plain, plain).

Development plans on Huntingfield also involve a laneway system to allow ease of stock movement. A pipeline will supply stock water to troughs and at least two water points will be established per paddock in order to spread grazing pressure.

Back on Orana, dams have been cleaned out in recent years and stock scales were purchased. John points out that scales have been valuable in being able to load trucks without risk of being overloaded. They have also allowed him to gain a better understanding of the weight lost through curfew and carcass yield.



Exclusion fence design on Huntingfield Station boundary



Livestock

Goat numbers on Orana were standing at around 2,700 doe's in late 2017, following a reduction from 3,500 before the decline in season. These breeding numbers result in an annual turn off of 8,000 to 9,000 head, equating to an impressive annual weaning rate of around 300 per cent (previous case study indicated 170 per cent, however this figure was clarified to be per kidding, not per annum). John believes this is achieved through a combination of goats' high fertility, high fecundity, young maturity and strong survivability. Young does have been observed to have kids of their own before they reach one year old, with does able to kid three times in two years and multiple births common. It is this reproductive capacity, combined with hardiness, that John believes positions goats well in the face of increasing climate variability. Does are culled on structural soundness and productivity rather than whole age groups. Most are usually sold at around six years old.

Husbandry

Does are continuously joined as John believes they seem to be able to pick the season best in order to have a flush of kids when feed is available. Bucks are joined at approximately six per cent, however John has been slowly reducing bucks to this figure without yet seeing any impact on kidding rates. Kids are weaned in June-July and December-January at about five months old and all are drenched (oral). John has witnessed a noticeable difference following weaning between kids that have and haven't been drenched, persuading him to make this a routine practice. Worm tests are not carried out to inform drenching decisions, but John does change practices in response to season and timing of weaning. For example, if goats are being weaned in spring following a wet winter he will opt to drench, but if weaning is being carried out in late summer after a dry season, he will not drench. All males are left entire and females are tagged.

Wild dogs are not present close to Orana, but tracks have been seen on Huntingfield. If dog predation became apparent John would begin regularly baiting and seriously consider establishing a total exclusion fence on his boundary. The boundary fence being constructed on Huntingfield would only require an apron to be clipped on the bottom of the hinge-joint to create a multi-species exclusion fence.

Breeding

All goats are classed at weaning based on visual assessment methods similar to those used on cattle. These include confirmation, temperament, structure and milking ability. Bucks to be kept for the breeding herd are retained at the point of sale.

In 2003, Boer bucks were first introduced to the Orana breeding herd to increase weight gain, dressing percentage and carcass quality. There were initial difficulties with the Boer's in joining success and survivability. However John persevered with the breed and focused on joining first cross bucks with larger numbers of rangeland does rather than pure Boers. Through cross-breeding, he was able to establish a level of Boer influence across his herd. John believes the Boer influence increased weight gain, allowing animals to reach 20 kg cwt by around nine months rather than 11, and also increased dressing percentage by about five per cent. John's composite goats dress at 44 to 46 per cent, with one mob recently averaging 48 per cent.



Polled bucks bred by John Vagg

John purchased some Boer bucks last year in order to ensure their genetic influence did not decline. However he is yet to have seen a single kid that would indicate it was sired by a pure Boer. As John is achieving reasonable growth rates and carcass yield from his herd, he feels it is not worth persevering with the Boers. He believes the only way to achieve reasonable joining rates with Boers would be to keep them in a tightly enclosed area at a very high joining percentage.

The other focus in John's breeding herd is the development of a polled line of goats. This began by selecting polled goats that naturally occurred in the rangeland population and has grown to the point where polled does represent about 75 per cent of the breeding herd. By running polled and horned bucks in the same paddock and then separating them to be trucked and processed, John has been able to compare the performance of these two genetic lines. At 10 months old, John reports polled bucks to have dressed an average of 2.4 kg heavier than horned bucks. He believes this is primarily due to the reduced energy spent fighting.



Polled composite buck bred by John Vagg

Despite many producers claiming the polled trait is associated with a higher frequency of hermaphrodites, John disputes this. His observations have been that the condition exists in no more than one per cent of polled goats, which is similar to the broader population. He does however monitor their occurrence closely. If frequency was to increase John would likely reintroduce horned bucks in order to increase genetic diversity.

An MLA funded project explored the genetic make-up of Australian goats and the association between polled animals and hermaphrodites. It identified substantial genetic diversity in rangeland goats and located the polled gene on chromosome one (Kijas, 2012). The poll mutation was seen to be the dominant allele, meaning animals could be polled while still carrying a horned or 'wild type' allele. Common belief, stemming from genetic studies of European goats, is that goats will display intersexuality if they carry two of the dominant polled alleles (homozygous). Meaning goats carrying only one poll allele (heterozygous) will be single sex. However, this Australian study indicated the genetic association between polled and intersex animals was far more complex, as some heterozygous animals were hermaphrodites. This means it may be possible to de-couple these two traits, allowing polled goats to be selected without increasing the prevalence of intersex animals. More research is required to fully understand this relationship (Kijas, 2012).

Marketing

Following classing, goats are sold direct to abattoirs at nine to 10 months old and 16 to 18 kg cwt (35 to 40kg lwt) with resulting products destined for exported. This sale point is primarily determined by the need to allow room for younger stock coming on. John also sells some cross bred does privately to other producers. There are occasions when smaller goats may be sold for domestic consumption; however this is not common since the price rises seen in recent years. In the event of declining seasons, John is quick to sell stock while they are still in good condition. This ensures weight and potential value is not lost and pressure is taken off the land.

Land management

John has seen numerous improvements in land condition following the transition to goats, such as a reduction in pasture weed species and an increase in preferable pasture species. He believes this is due to the diverse browsing habits of goats, compared to the selective grazing habits of sheep. John recalls how goats have grazed ward's weed (*Carrichtera annua*) to the point where its presence has been dramatically reduced. Subsequently, grazing pressure has been taken off a number of native grass species allowing them to successfully seed and reestablish. The habits of goats to spread out more as they graze has also meant a more even grazing pressure across paddocks. This has reduced the amount of pads around water points. Despite this improvement in land condition, John has chosen not to increase stocking rates in order to promote a more healthy and resilient landscape. As seasons improve, John allows stock numbers to build gradually rather than buy in goats and place immediate pressure back on pastures. This also avoids the genetic dilution of buying in goats. While there is no specific grazing strategy in place on Orana, John is very mindful of spelling paddocks in line with visual assessments of their overall state. Paddocks will remain destocked until a rainfall event substantial enough to allow for adequate regeneration.

John does have some challenges with turpentine (*Eremophila sturtii*) and believes fire is critical in controlling young growth. He has however only used fire in small areas.



Mixed mob of goats on Orana Station

Looking forward

Current and future focus is largely centered on the development of Huntingfield into an operational goat enterprise.

John and Shane believe that as the goat industry continues to develop and more producers move towards a managed goat enterprise, there will be a growing demand for animals that are genetically superior to rangeland goats. They see this as an opportunity to sell more breeding animals from the composite line John has developed.

Industry direction

John still has concerns over the broader supply chain of the Australian goat industry, due to the limited ability to consistently supply large numbers of goats. He feels this is also a key aspect in restricting a domestic restaurant market.

Regarding domestic supply, a growing ethnic population is seen to be increasing demand, with inside country producers slowly moving into goats to address this.

Regarding export, John believes there is some opportunity for Australian goatmeat to be branded in a way that promotes the extensive production methods used.



CASE STUDY

Bushley Station

Producer:

- Greg Church

Property:

- Bushley Station, 85 km south east of Wilcannia



Area:

- 19,627 ha

Rainfall (avg/a):

- 300 mm

Enterprise:

- Self replacing composite goat herd selling to abattoirs for export
- Dorper flock
- Opportunistic cattle trading

Key messages

Sustained genetic improvement in rangeland goats through the introduction of Boers is hindered by the quality and availability of stock.

- Managed goats provide a profitable, low input alternative to traditional livestock enterprises.
- Shade is important to keep stock comfortable and easy to work with.

Looking back

Greg has owned and managed Bushley since 1993, originally running Merino sheep and cattle. However as goat prices began to rise in the later part of the decade, Greg began to more seriously consider the opportunity rangeland goats posed.

The first step taken was to muster goats already on the property into suitably fenced paddocks. Greg then began sourcing and selecting rangeland goats for conformation, structure and coat type.

As the six year journey of goat-proof fencing began, it was clear that goats would be a core component of any future business on Bushley. By 2000, all profits from goats were being consumed supporting the wool enterprise, at which point all sheep were sold. From this point on, Greg focused on breeding a superior rangeland adapted goat for his own commercial production and sale of breeding stock to other producers.

While goats still remain a core enterprise, Greg has recently incorporated Dorper sheep into his business as means of diversification.



Property and business development

Bushley remains a single operator business, employing contractors at peak times to manage workload. While going into goats has allowed a reduction in workload from Merinos, Greg has not seen a change in work load over the past five years.

Since first making the transition to goats, Greg has tried numerous fence designs. He believes seven or eight line hinge-joint on seven to eight metre post spacing is the most effective. Barbed wire is used above and below hinge-joint on boundaries but is not considered necessary on internal fences. With recent development in energisers, Greg is interested in trialing Weston electric fencing.

Over the past five years Greg has further developed water infrastructure, piping water to troughs in areas of Bushley that were previously not well watered. Work has also been done to clean dams and drainage catches.

An autodraft has been used in the past in order to ensure under weigh goats were not sold into domestic markets. However with changes to target markets it has not been used for the last three years. These changes involve the reduction of minimum carcass weight to eight kg and cessation of selling into the domestic market, meaning weight requirements of sale stock are far more flexible.

Greg has previously placed substantial emphasis on the value of shade in keeping goats comfortable and calm while being worked. Rooves have been built over the races and core working area of stock yards for some time. Greg's belief in this has only strengthened recently, with additional roofing constructed and a shade sail on the way to ensure goats and staff are almost always shaded when in the yards.



Undercover stock yards on Bushley Station

The ability to keep stock cool and reduce dust has also been added to by installing a sprinkler system. A new loading ramp has been purchased, resulting in loading time being halved. It has solid steel sides which Greg believes has resulted in goats flowing much easier and quicker. The ability to adjust ramp height has also reduced time spent changing decks on the stock crate and the stock flow disruptions these additional ramps cause. Greg notes that he was initially skeptical about a steel floored ramp (preferring a wooden floor) however has not noticed any downsides to this.

Livestock

Greg carries around 4,000 breeding does on Bushley, selling 3,000 to 6,000 animals per annum depending on seasonal conditions.

In the past, kidding rates have ranged from 135 to 175 per cent p.a., however due to increasing irregularity in kidding times Greg has stopped trying to calculate weaning rates.

A flock of 600 Dorper sheep are run purely for the purpose of market diversification. Dorsers are managed much the same as goats, being a low cost, low input enterprise. Dorsers are able to achieve a 200 per cent p.a. weaning rate.

Greg also trades cattle as seasons allow, with the wet winter and rising markets of 2016 providing particularly good opportunities.

Husbandry

While goats are a low input enterprise by nature, over the past five years Greg has further reduced the animal husbandry activities he undertakes. In the past, all bucks were castrated in order to focus genetic selection on superior animals and reduce fighting and associated transport difficulties. Greg also ran a number of on-farm trials in which he found castrated bucks would achieve carcass weights approximately 1.5 kg greater than entire bucks at the same age (10-11 months). Greg still attests to the benefits of castration, but now only castrates bucks if they display particularly undesirable characteristics. This is due to Muslim markets' preference for entire males. Goats are joined year round, with everything mustered and sale stock drafted and sold in April and December. Kids remain with the breeding herd until they are sold, with retained does often kidding themselves before they reach one year old. With this in mind, Greg is very mindful to avoid selling heavily pregnant does due to animal welfare concerns and the obvious economic sense of allowing them to kid.

Wild dogs are a growing concern for Greg, with the first dog tracks spotted in 2014. No dog predation impacts have yet been felt but Greg and other producers in the region have become actively involved in coordinated group baiting. By baiting dogs across such a broad area and in a coordinated, regular fashion, Greg believes they have the best chance of controlling them.

When preparing sale stock, Greg musters two days before goats are due to be trucked, feeding lucerne hay over-night. As Greg has previously transported his own stock, he observed how stock that had been mustered nearer to the trucking date or not had access to hay over night were far more prone to go down on the truck. Greg feels that this keeps stock more calm and comfortable as they aren't hungry and avoids having them full of water only. He notes that some processors have also begun feeding hay while goats are being held.



New loading race at Bushley Station

Breeding

In the past, Greg spent many years working to incorporate Boer genetics into his rangeland herd by buying in bucks and crossing over his does. During this time he struggled with poor survivability of boers and low joining rates. However he was successful in developing a composite herd with improved growth rates and dressing percentage.

During this period of sustained genetic selection, Greg was achieving 49 to 51 per cent dressing. Over the last three years Greg has found it too difficult to maintain the influence of Boer goats due to an inability to source the quality and quantity of animals required. This has resulted in a reduction of two kg in average carcass weight, with dressing percentages back to 44 to 45 per cent. This decline has also been compounded by the genetic dilution caused by leaving most bucks entire. Within herd selection of well-structured animals does ensure that a quality line of animals is maintained. Priority characteristics are frame size, good feet and a sound udder.

In Greg's experience, the vast majority of boer goat breeders are located in higher rainfall areas and are primarily breeding goats to meet show ring or hobby farm requirements. This has resulted in the development of animals that are often structurally poor and have had no selection pressures placed on performance in a rangeland environment. They are often developed by hobby farmers with a limited understanding of stock breeding principals and the commercial requirements of the broader goat industry.



Marketing

As with the recent changes in management practices, Greg has also simplified his marketing of goats. This is largely a result of price increases and difficulties associated with particular markets. As Australian goats began receiving such good prices the need for producers to pursue more lucrative markets has reduced. This made it an easy decision for Greg to stop supplying goats for domestic consumption as buyers refused to raise prices in line with the broader market. Greg also ceased live exporting goats to Malaysia as the high prices pushed these buyers to other more affordable markets. Greg notes that exporters were particularly poor communicators which made doing business quite difficult.

All goats from Bushley are currently sold direct to abattoirs at eight to 10 months of age and dressing at 16 kg, with cull animals sold in addition to this. All product from Bushley is exported following processing. Greg has strong working relationships with processors and believes this is very important. As a result of the mutual trust and loyalty built with these relationships, Greg would need to see sustained proof of positive dealings before he would consider supplying a new processor. He would prefer to take a lower price in the knowledge that he would be paid quickly and the dealing was as smooth as possible.

Where Greg previously sold some breeding animals to other producers, his enthusiasm for developing a composite line of goats to supply other producers has diminished. This is a result of difficulties sourcing Boer genetics and the lack of commitment from interested buyers.

Land management

Greg uses visual assessment of the general land condition in order to make stocking and land management decisions, responding to the season as it changes. The move from Merinos to goats and Dorpers has meant that woody species such as hopbush (*Dodonaea attenuata*), which were once considered invasive, are now well controlled and an additional aspect of the pasture base that is utilised by stock. Turpentine is however still a problem and is actively managed by herbicide application. Greg believes the overall condition of the land has improved since moving in to goats.

Looking forward

Greg intends to maintain the enterprise mix he currently has and would ideally like to again put greater focus on genetic improvement. This would produce a composite goat with higher weight gains and increased carcass quality. However this relies on ability to source suitable Boer goats.

Infrastructure will continue to be developed with a focus on increasing animal comfort during handling.

Industry direction

Greg feels the skills shortage of the broader agricultural industry is slowly beginning to be addressed, but still has some way to go. He also expressed concerns over tagging requirements, citing time and operator safety considerations. An additional point Greg raised was the difficulty in achieving consistency of tagging or tagging exemptions across producers who are running semi-managed goat enterprises. He feels it is easy for a producer to argue their animals are not managed so are exempt from tagging, while other producers with slightly different management practices are required to tag.

The fact that South Australia is still maintaining a pest status on goats is something Greg feels is particularly restrictive to the further development to the industry. This is due to both perception and the way regulation impedes progress. In order to further professionalise the industry, Greg believes processors need to begin penalising producers for sending goats outside of the specifications, as producers doing the right thing have no incentive to continue doing so. This was particularly prevalent with domestic markets receiving goats outside of carcass weight specifications.

Greg has been glad to see the increased involvement of MLA in the goat industry, which is increasing the profile of goats and providing more resources for those looking to enter the industry.



CASE STUDY

Gates Goats

Producer:

- Rick and Joanne Gates

Property:

- Burndoo Station, 65 km south of Wilcannia
- Slamanon Station, 65 km south of Wilcannia
- Woolahra Station, Ivanhoe



Area:

- Burndoo 25,639 ha
- Slamanon 33,376 ha
- Woolahra 7,656 ha

Rainfall (avg/a):

- 260 to 300 mm

Enterprise:

- Rangeland goat depot and growing out enterprise selling to abattoirs for export domestically to re-stockers

Key messages

- Quick stock turnover is critical to a profitable trading enterprise.
- It is important to maintain the flexibility to adapt to markets and seasons.
- Multi-wire plain and barbed wire fences provide an effective alternative to hinge-joint.

Looking back

Rick and Joanne operate one of Australia's preminent goat enterprises. Purchasing Burndoo in 1988, the Gates' initially ran a Merino enterprise. However diminishing returns from wool and the pressures of drought during the 1990's persuaded them to consider alternative enterprise options. With rangeland goats already present on Burndoo and across the broader region, they were an obvious choice.

As the Gates began sourcing goats from other properties within the region, it became clear that opportunity existed for a business to trade goats on a quick turn-around basis, rather than necessarily becoming a breeding enterprise.

'Gates Goats' was then established as a goat depot in 1998 with the goal of having the capacity and efficiency to meet market demands while generating a consistent net income. In order to achieve this required good quality infrastructure to ensure goats could be retained and handled and good land condition maintained to provide feed for animals.

In order to further expand the business, Woolahra was purchased in 2009 and has been run in the same capacity as Burndoo. As the goat industry continued to evolve, Gates Goats has adapted by increasing capacity, supplying goats to a range of markets and more recently branching into growing out of smaller goats. Despite the success and consistent growth of Gates Goats, Rick is quick to add that there's no such thing as easy money.



Property and business development

Undergoing an additional expansion in 2012, the Gates purchased Slamanon, which neighbours Burndoo and doubles their total operating area.

During this time their son Ross has returned home and begun working in the business. Additional staff have also been put on in response to the dramatically increased capacity, with a total of three full time and four part time staff now working within the business. With increased staff and trading being reduced as a portion of the overall business, Rick feels he has more personal time than five years ago, when he recalls it being difficult to take any time away from the property. Rick does however concede that this was a necessary change as he has been the President of the Goat Industry Council Australia since 2013, a role that he has found both challenging and rewarding.

The requirement for goat depots to be registered with NSW DPI from 2016 is a change Rick has welcomed despite the increased requirement for record keeping and associated audits. This has resulted in increased professionalism of goat depots and the associated improvements in perception across the industry.

Development of appropriate infrastructure was crucial for the Gates to go into goats, particularly considering the high throughput of animals involved in running a depot. Fencing was upgraded across all properties to a 10 wire (eight plain, two barb) design with four metre post spacings. Rick believes this is just as effective at containing goats as hinge-joint, but with reduced maintenance. He also points out that this design does not have the welfare concerns associated with hinge-joint, where goats have been known to get their heads stuck between wires.



Fence design used on Burndoo is used

When considering factors above control of goat movement, Rick has begun to contemplate the option of multi-species exclusion fencing. This is due to the impending movement of wild dogs into the area. Additional control over total grazing pressure (TGP) would be a secondary benefit to this.

Well designed steel yards are critical in allowing the safe and efficient handling of goats and have been established on all properties since entering into goats. Yards also have a roof over the core working area, providing shade for both stock and staff to increase comfort and reduce stresses involved with handling. A custom designed race allows width to be altered to accommodate a range of sizes of goat. An auto-draft has also been purchased in the last five years. While Rick primarily drafts by eye as it is quicker, he does value the auto-draft when needing to identify animals that are approaching the lower end of saleable weights.

The large capacity infrastructure required to cater for the high numbers associated with a depot operation also extends to water points. Tank and trough water points are used in depot paddocks, however larger troughs are used with a higher flow rate.

Over the past five years, the Gates have also invested in solar pumps and solar panels for electricity generation. This has resulted in complete offset of their previously substantial annual electricity bill and generated some income with surplus electricity.

Incoming goats are transported with the Gates' own trucks while they use external transporters to truck goats to other markets.

Livestock

As 2017 drew to a close, Rick's belief that high prices and declining seasons were resulting in a reduction in rangeland goats in the region was confirmed. The annual aerial goat survey indicated a 33 per cent population decline (McLeod, 2017). This has resulted in a significant shift in Gates Goats from being 80 to 90 per cent trading to an even 50:50 split (by income) between trading and growing out goats. There has also been a resultant decline in total number of animals sold, from 150,000 in 2011 to 115,000 in 2016.

The increase in growing goats has primarily been facilitated by purchasing Slamanon, allowing some diversification within the industry. Rick observes that small goats gain around 0.65 kg per week, being sold at 28 to 30 kg liveweight. Due to the poor season seen across the region in 2017, Rick sold 25,000 underweight goats to other producers to grow out in order to reduce the pressure on his properties. While Gates Goats does not set out to breed goats, holding animals to be grown out does result in some reproduction. Rick does not intend to move into goat breeding.



Prattley® scale and auto-draft unit, with custom made adjustable race

Marketing

Within the trading operation, goats purchased that are greater than 22 kg are traded immediately, with anything less than 22 kg moved to the grow-out herd. Trading goats is reliant on being able to put together a load to meet a specific market as quick as possible. Due to the low input, high turnover nature of this business, no animal husbandry activities are undertaken.

The markets Rick targets fluctuate with demand and as such have seen some changes over the past five years. In 2011, the market breakdown of sales from Gates Goats was 65 per cent to abattoirs for export, 15 per cent live export, 15 per cent domestic consumption and five per cent domestic re-stockers.

More recently, this has been 65 per cent to abattoirs for export, 20 per cent to domestic re-stockers, 10 per cent to domestic consumption and five per cent to live export. This has largely been a function of high prices reducing the demand for live export goats and reducing the competitiveness of domestic meat trade buyers, and declining seasons requiring underweight goats to be sold before making saleable weights.

Despite the pressures drought puts on any agricultural business, trading allows for some income to be achieved even during dry times. In contrast however, the rising prices of goats over the past five years have tightened supply and profit margins for the trading enterprise, while growing out small goats increased in profitability. This clearly displays the benefits of a business model that is able to adapt to variable climatic and market environments.

Land management

Maintaining groundcover is a priority for Rick to maintain soil stability and increase water infiltration when rain occurs. Stocking rates are roughly guided by one goat to 10 acres (four ha), however this is primarily determined by pasture condition. Rick begins reducing stock numbers at the point when there is no longer any green left in pasture species and will not re-introduce stock until grass butts have new growth a few inches high.

As Rick outlines that the condition of Burndoo and Slamanon is similar to that of 2002, he states that they will soon completely destock and revert solely to trading. In doing so, waters are controlled to reduce kangaroo access; a grazing pressure that Rick estimates has reduced his production capacity by 20-25 per cent in recent years. Despite the dry conditions, Rick prefers to sell stock rather than feed them. He will provide hay for trade goats being held short term, but will completely destock animals being grown out.

As a general trend, Rick believes there has been an improvement in land condition over the 20+ years he has run a goat enterprise on Burndoo. He cites an increase in grass diversity and abundance, and reduction in invasive native scrub (INS). Rick puts this down to the more even, dispersed grazing patterns of goats, where Merinos would graze into the prevailing southerly wind and water in large mobs. Goats also browse, shifting some grazing pressure from pasture species targeted by sheep onto shrubs and more woody species. Since introducing goats there has been an 80 per cent reduction of INS on Burndoo. Goats have eaten hopbush, only leaving behind turpentine which is being treated through chemical means.



Plant matter covering soil. Despite the dry season, Rick ensures groundcover is maintained

Looking forward

A big consideration for Gates Goats going forward is the potential impact of wild dogs and avenues available to address this. Dogs had not previously been present in the area, with the first tracks seen in 2016. While no noticeable impacts of dogs have yet been felt, Rick is acutely aware of the risk they pose. The destruction caused to sheep and goat industries in Western Australia and Queensland are evidence of this.

Rick considers multi-species exclusion fencing to be a viable option in preventing entry of dogs before they become widespread in the area. This does however pose a substantial investment, both initially and ongoing, so is not a decision that is being taken lightly. The Gates are also members of a newly formed coordinated dog baiting group that will run regular, multi-property baiting programs.

While Rick is by no means intending to step away from the business in the near future, succession and an eventual retirement of sorts is also something he intends to begin working towards.

Industry direction

When discussing industry direction, Rick refers to the Goatmeat and Livestock Industry Strategic Plan 2020. This is a document well worth reading when considering the priorities and future of the Australian goat industry.

Speaking more casually Rick discusses the clean, green image that 'Rangeland Goat' branding may promote. While product has been marketed under this title in the US for some time, this may have potential elsewhere. DEXA technology (Dual Energy X-ray Absorptiometry) is being supported by the industry with work being done to assess viability. This is consistent with the sheep and beef industries.

Rick is hopeful this may provide some opportunity for Boer goat producers to realise a premium return for a premium carcass. This would subsequently promote broader improvement in product quality across the industry.



CASE STUDY

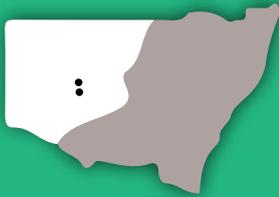
Tasman Station

Producer:

- Bryan Milne (Proprietor)
- Randall Graham (Manager)

Property:

- Tasman Station, 65 km north east of Ivanhoe
- Corinya Station, 65 km north east of Ivanhoe



Area:

- Tasman 43,357 ha
- Corinya 29,100 ha

Rainfall (avg/a):

- 304 mm

Enterprise:

- Self replacing composite goats sold to abattoirs for export and Dorper sheep

Key messages

- Current goat markets are largely commodity based which suits a low input rangeland production systems.
- Constant introduction of Boers is critical to maintain production benefits achieved using their genetics.
- Wild dogs pose a serious threat to the goat industry.

Looking back

Bryan purchased Tasman in 1995, adding the adjoining Corinya in 2001. At this time Randall was also employed as manager, a position he has remained in since.

In pursuit of organic marketing opportunities, damara sheep were introduced in 1999 and carried for almost a decade. As the live export trade began to diminish and damara carcass composition was not well suited to the domestic lamb market, it was decided to move into Dorsers.

In 2008 Dorsers were gaining popularity in the region for being hardy and productive animals. Rangeland goats had been mustered off the properties throughout this period, with Bryan developing fencing to contain and manage wild caught goats. With this success it was decided that a managed goat enterprise would be developed using rangeland goats and Boer goats as the genetic basis.

After experimenting with breeding pure Boers, Randall quickly discovered that they required very intensive management and displayed very poor reproductive performance and survivability; achieving only 40 per cent marking from the first year. Randall then began joining Boer bucks to rangeland does and witnessed a dramatic improvement of survivability of kids. However he also noted that Boer bucks are very poor at competing with rangeland bucks to join does. From this time, Randall has undertaken a continuous breeding program of crossing Boers with rangeland goats to establish a composite line of goats that exhibit strong survivability and reproductive rates, with improved weight gains and carcass composition.

The move into goats also resulted in substantial infrastructure development of primarily hinge-joint fencing. Tasman and Corinya have also held Australian and US organic accreditation, with endeavors being made to market product through these avenues.

After a number of years pursuing the development of a premium animal to meet a premium market, Randall is now of the opinion that the business is better suited to producing a commodity product as efficiently as possible. This changed focus has resulted in alterations to business goals and re-direction of past priorities.



Property and business development

In the past five years, Tasman and Corrinya have continued to be managed in much the same way when considered on a broader business scale. The majority of changes have involved enterprise make up, breeding strategies and marketing.

An additional staff member has been employed on a part-time basis and contractors are used to assist with stock work. Despite not increasing enterprise size, labor requirements have increased largely in response to the emergence of wild dogs in the region. Prior to 2012, dogs had never been seen in the region. In the five years since, Randall has killed 17 dogs across the two properties. This has been a big challenge for Randall and something he has dedicated much time to.

In the fight against dogs, Randall uses remote cameras which he has found very valuable. One camera is able to send regular photos to his phone via text. This is used to monitor a set trap in order for Randall to be able to respond if it is set off without needing to physically check it. The other cameras store pictures on a memory card which is physically collected and downloaded. This allows general monitoring of dog activity to better direct control strategies. Coordinated baiting programs have also occurred for the last two years in the region.

Both properties have had boundaries completely enclosed for 15 years, with the earlier fence designs using eight-line hinge-joint. Newer fences have been constructed using 7/90/30 hinge-joint with a plain at the top of the post and no additional wires. Randall does however believe that his goats have become far easier to contain as they have become more domesticated. He believes barbed wires below the hinge-joint do little to deter pest animals trying to push under. Fencing across the two properties has been completed to a standard capable of retaining goats for some time, with a total of 350 km of hinge-joint currently standing.



Steel stock yards with covered working area and Prattley® stock handler

This level of investment into hinge-joint fencing is a clear indicator of the value it is seen to offer and its ability to maintain integrity over time.

A Prattley® handler has been purchased to make tagging goats easier. An auto draft was also purchased some time ago, however has not been used recently as they ceased supplying goats for the domestic market. This is due to the reduced need to achieve specific weight ranges on sale animals.

Windmills are gradually being replaced by solar pumps and dams are cleaned out when the need and opportunity arises. In 2012, Randall also indicated his desire to investigate remote water monitoring systems. In the five years since, resources have not allowed this to occur, however telemetry is something Randall still sees great value in and would like to implement.

Livestock

Randall is currently running 4,000 breeding goats with a capacity of 7,000-9,000 goats in good seasons. While data is not collected to calculate kidding rates, anecdotal evidence indicates that there has been some decline. An indicator of this is a large paddock that in the past Randall would stock with 2,000 goats and muster 5,000 in a year's time. More recently he will not muster more than 4,000. This is thought to be a result of predation via increasing dog pressure and declining seasons and associated hard culling.

Calculation of reproductive rates is also made difficult by the inconsistency of selling times. Goats are sold primarily in response to feed availability rather than number of stock or time of year. As seasons improve and there is ample feed available, numbers are allowed to build, whereas numbers are drastically reduced as conditions deteriorate. Over the past five years, annual sale numbers have ranged from 12,300 to 3,600.

About 2,500 Dorpers are also run in order to give some market diversification to the business. Dorpers provide an alternate end product to goats while still complementing the low input system being run.

Randall notes that Dorpers have very similar grazing habits to goats so they are not complementary in the context of feed utilization. However they are able to be managed in very similar ways allowing simplification across the business. He also warns against running Dorpers and goats in the same paddock as they tend to learn to avoid being mustered as a result of experiencing musters targeted at the other species. Randall is intending to re-balance his enterprise mix to a 50:50 split.

Husbandry

Goats are weaned once annually or twice in drier years, with all saleable bucks sold and all does and smalls bucks retained. At all mustering events, any goats with strong rangeland characteristics are culled.

Breeding

It is estimated that 70 per cent of the total goat herd would be cross breeds, an increase of five per cent over the past five years. Previous goals had been set to reach 100 per cent of goats being Boer composites, however as Randall realigned his focus to developing a low cost, commodity based enterprise, the importance placed on this has been reduced. A primary factor in this has been the resources required to achieve reasonable survival of Boers. Since a reasonable portion of Boer cross does have been established, the effort and investment associated with cross breeding is no longer warranted. Randall also believes there has been an increased influence of rangeland goats as he has begun running crossbred goats in two large paddocks on the boundary where incursions are more common.

Goats that have strong rangeland characteristics such as long coats and unruly horns are culled. However there has been a substantial reduction of intensity from times when any pure rangeland bucks seen in the paddock would be caught and removed from composite herds.

Bucks are joined year round, primarily due to the risk of rangeland bucks joining cycling does if bucks are not present within the managed herd at the time. The primary focus of all culling and selection is carcass weight. The influence of Boer genetics has increased both weight gain and dressing percentage of carcasses, however Randall expects that these traits would be on the decline with reduced Boer influence.



Goats displaying heavy Boer influence



Eight-line hinge-joint fence on Tasman Station

Marketing

In the past, goats have been sold into a number of markets in order to capitalise on any available premium. This included domestically killed goats for export, domestic trade goats and small consignments of live export breeding stock. Additional to this, both properties were ACO (Australian Certified Organic) and USDA (United States Department of Agriculture) organically certified.

While this was originally in place for their Damara enterprise, efforts were made to market goats as organic, with little success greater than individuals wanting to purchase a single carcass.

Eventually the decision was made to surrender their organic status due to the ongoing costs of accreditation and the need to use the otherwise prohibited 1080 poison to control wild dogs.

In hindsight, Randall feels that consumers purchasing goat and consumers purchasing organic certified products rarely overlap, meaning they were aiming at a very limited target market.

As an extensive goat enterprise, he needs to produce a bulk product in order to offset overheads and reduce transport costs. In order to do so, goats produced in western NSW largely become a commodity product rather than something with a niche, targeted market. Randall doesn't see a time in the foreseeable future where there will be a domestic organic goat market of sufficient scale for involvement of rangeland producers.

Despite this evolution in the strategic direction of the business, the greatest factor causing change in the markets being sold to is the high prices being received for goats. As Australian goat prices increased, live export buyers began sourcing animals from elsewhere, while in Australia the premiums received for providing domestic trade goats did not increase at the same rate as the general market. This resulted in producers opting to sell more animals to the less picky export meat processors. As a result, 100 per cent of goats have been sold directly to abattoirs for export for the past three years.

Land management

Stocking rates are managed by Randall in response to visual assessment of feed on offer and stock condition. When it is decided that stock numbers need to be reduced they are generally halved. Paddocks are rotated between grazed and rested, as well as between stock type (goats, sheep), with a number of paddocks having currently been rested for three years. In this time there has been a regeneration of both pasture and browse species.

While both goats and Dorpers will graze browse species, they don't eat turpentine, resulting in it getting overly thick in places. Randall does not treat turpentine on a paddock scale but will poison plants around infrastructure and holding paddocks.

Looking forward

Future plans for Randall largely involve continuing along the same trajectory he is on. Continual improvement of efficiencies is always a priority. One particular avenue he intends to pursue is increasing dressing percentage. Installation of telemetry systems would also allow for increased labor efficiencies through time saved checking waters.

Industry direction

Randall is very positive about goats as a managed enterprise and the global need for protein providing market opportunity. Some concern is expressed over the sustainability of the industry and its ability to meet demand while it is based primarily on opportunistic harvesting. With abattoirs continuing to lower minimum carcass weights (now eight kg) Randall feels there is a risk of breeding does being over-harvested.

Randall feels continued movement into managed goats is positive for the quality of animals being produced and necessary for the industry to increase sustainability and consistency of supply. However he also notes the huge genetic resource rangeland populations provide. This is of great value to the industry. The question of how this resource is best utilised and preserved as the industry develops is not something Randall feels he has the answer to. However the value of the rangeland goats in the continued evolution of his cross bred goats is well acknowledged.

Attention is also drawn to the risk over-regulation has on a low cost commodity based industry. The possibility of changes to NLIS tagging requirements is something that he feels would particularly threaten the profitability of producers.



CASE STUDY

Tindarey Station

Producer:

- Keith and Robin Francisco

Property:

- Tindarey Station , 50 km north of Cobar
- Darling Downs Station, 50 km north of Cobar



Area:

- Tindarey 15,891 ha
- Darling Downs 14,789 ha

Rainfall (avg/a):

- 300 mm

Enterprise:

- Self replacing rangeland goats and growing out underweight goats sold to local depots.

Key messages

- Investment in good quality infrastructure such as fencing and yards gives long term benefits.
- Worms can cause production losses outside of wet years.
- High weight gains can be achieved with young goats, particularly on improved pastures.

Looking back

Keith has owned and managed Tindarey since 1962, originally running a successful Merino enterprise while also working off farm. However in 1985, a portion of the property was burnt out by a large bushfire, which persuaded Keith to trial a different enterprise.

As rangeland goats were present on Tindarey, and mohair was a profitable industry at the time, Keith re-fenced with hinge-joint and began trapping goats to be joined to Angora bucks. Soon after, the mohair market collapsed and Keith decided to focus on meat goats and developing the rest of his property for this purpose.

During these early years Keith also traded as a depot, trucking goats to the Bourke abattoirs. When the abattoirs shut in the late 1980's, Keith returned to a solely breeding and growing enterprise.

In the years following Keith's conversion into goats, he has fenced Tindarey to a standard capable of controlling goats, and developed some of the more arable areas with forage crops (400 ha).

A growing emphasis has also been placed on regeneration and improvement of the country through the resting of paddocks and thinning of invasive native scrub (INS). With the majority of infrastructure on Tindarey completed to a desired standard for some time, Keith's business has grown into a productive, low input enterprise.



Property and business development

In late 2016 Keith purchased the neighboring property, Darling Downs Station. This resulted in an almost doubling of his operating area, allowing substantial expansion.

The opportunity to up-scale was realised as Tindarey was developed to a point that allowed ease of management and minimal future infrastructure investment. The successful attainment of a carbon farming project also provided additional capital. In recent years, one of Keith's sons has also returned home, providing another labour unit to the growing business.

Infrastructure on Tindarey has largely been completed for some time. Fencing consists of 7/90/30 hinge-joint with electric offsets. These are particularly valuable in stemming the flow of pigs and kangaroos. While Keith acknowledges that this was a very expensive fence option to pursue, he believes it has proved most cost effective in the long term, both in longevity of materials and effectiveness of fence design.

All waters on Tindarey are trapped to reduce the need for mustering and restrict access when paddocks are being rested.



Goat shed on Tindary Station

Tindarey also boasts a purpose built 'goat shed'. In the same context that a shearing shed is used, Keith's goat shed houses a set of yards that allow stock handling to be done in-doors. It provides a dust free environment where work can be done in the shade or under lights in the cool of the evening.

Keith believes this has been of great value in order to reduce the toll of stock work on both people and animals. This is particularly important as much of his handling is done in summer. When receiving comments from people who have assumed that a new shed means he is going back into sheep, Keith remarks that his shed is used more frequently than a shearing shed so was a logical decision.

On Darling Downs, Keith has already cleaned out all dams and expanded drainage lines to ensure sufficient water storage. Troughs have also been installed off some dams. While much of the fencing on the property has previously been upgraded or replaced with hinge-joint, further fencing will also be done following the same design as that on Tindarey.



Hinge-joint fence with electric offset

Livestock

Stock numbers on Tindarey are split roughly 50:50 between breeding does and underweight animals that have been purchased to grow out.

Keith is currently running 3,000 does. The inclusion of both breeding and growing enterprises gives Keith the flexibility to respond to seasonal conditions without regularly needing to impact his breeding herd. He is able to buy and sell grow-out stock as feed availability allows. In this sense, he also finds goats far better suited to a variable climate than sheep as their higher reproductive rate allows for quick recovery of numbers following rain.

Keith currently sells approximately 3,000 to 4,000 head each year, achieving 140 to 150 per cent weaning rates annually from his breeding herd. Goats are sold at around 40 kg liveweight or at a minimum of 30 kg if they need to reduce stock numbers quickly.

There is also a small portion of Tindarey located on the eastern side of the Kidman Way which Keith continues to use purely to trap rangeland goats. The few hundred trapped each year are then sold on or added to his grow-out herd, pending weight. All animals over 25 kg are sold immediately and others are grown out.

Darling Downs is currently stocked with 1,000 Dorper ewes, however will transition into goats in the near future, as developments allow. Keith hopes to produce 15,000 to 20,000 goats annually following the expansion in scale and planned forage crop production.



A mixed mob of recently captured rangeland goats

Husbandry

Goats are joined year round to station bred bucks, with the majority of kidding occurring from August to October. Most stock work is carried out over late summer which complements kidding time and hot weather, allowing trapping. Young goats are weaned at this time and bucks castrated.

Occasionally Keith grows forage crops of silk sorghum, in which case he will wean all wethers onto the sorghum to maximise growth rates before sale. Otherwise, all weaners are returned with does. When placed on sorghum, Keith has achieved weight gains averaging just over one kg per week for mixed sex mobs.

All stock are trapped on water, with salt and oats used as an additional attractant. Goats are trapped over two days with all animals trucked to the yards in order to reduce the labor requirements and stock stresses of mustering and walking. Keith believes trapping effectively captures 95 per cent of goats, requiring two weeks to get everything. Traps located on waters that can be accessed from two neighbouring paddocks are also used to move stock from one paddock to another.

All goats brought on to the property to be grown out are back-lined with a product registered for deer, under approval and direction from a veterinarian. Goats bred on the property are not treated for worms unless there is a need. This hasn't been required since 2011 when barber's pole worm and black scour worm were confirmed through faecal egg count testing. Keith maintains that there is substantial benefit in treating goats for worms, referring to a trial he conducted in the past where goats that had been wormed averaged an additional one kg of weight gained in the 12 weeks following treatment.

Over the past five years Keith has also experienced an increase in the pressure from wild dogs and foxes. As a result he has begun undertaking regular baiting. However he expresses frustration that there aren't more neighbouring properties involved in baiting programs. This is due to surrounding landholders being either hobby farmers with little acknowledgement of predation risks, or absentee landholders whose priority land use is recreation and hunting.



Breeding

During weaning, Keith castrates the majority of bucks in order to focus genetic selection away from rangeland characteristics such as long coats. Keith feels the only substantial genetic gains he has made are as a result of introducing Red Boer bucks to his herd approximately five years ago. He believes this influence resulted in a 10-15 per cent increase in weight gain, allowing eight month old goats to be sold at 35 to 40 kg liveweight.

Keith did however experience poor survivability in introduced Boer bucks, except for those sourced from the Even Better Red Boer stud located at Ivanhoe.

Keith believes that having these Boers bred in the region resulted in a hardy animal that was able to survive and reproduce in the rangelands. Keith has recently purchased another 45 Red Boer bucks from Even Better Red's to continue increasing their genetic influence.

Marketing

Keith grows out both bred and bought goats to 35 to 40 kg, with cull animals and trapped rangeland goats weighing above this.

The majority of animals produced on Tindarey are sold to depot operations in the Cobar district. The odd load is sold directly to abattoirs to be processed for export. This is a change from Keith's past marketing focus of producing animals that fit the higher quality domestic market. He believes that selling to local depots generally results in a similar price received when sold to the abattoirs once the costs of transport are considered. Keith would make decisions on selling to the new Bourke abattoirs based on price received after freight.

With more of the larger meat processors having entered the goat industry, Keith believes increased competition has benefited producers. As prices increased over the past few years, Keith's business became increasingly profitable as inputs were maintained at low levels.

Land management

Keith uses a combination of grazing management and mechanical interventions to work towards creating a more productive landscape. He believes substantial improvements have been seen in the condition of Tindarey since going into goats.

Drastic increases in pasture species diversity and prevalence of mulga mitchell grass, box grass and copper burr in particular have been identified. In outlining this point, Keith stated that he felt the carrying capacity of Tindarey would have increased by 200 per cent.

Grazing pressure is managed via appropriate fencing throughout and the rotation of stock between paddocks in response to visual assessment of available feed. Goats are moved between two neighboring paddocks by use of trap yards on adjoining waters. Rest periods can be up to multiple years if seasons do not allow sufficient recovery. If feed availability across the property is declining, numbers are reduced before stock start losing condition. This is done in order to prevent the financial impact of reduced weights and the impact of overgrazing on pastures.



Mulga Mitchell grass regenerating in country that had been burnt a number of years earlier



Tractor used to sow sorghum, which will also be used to pull the new disc plow

Keith is also an avid user of machinery, having some areas of cultivation that are opportunistically used to produce forage crops. While no crops have been planted for some time, 400 ha of silk sorghum was sown in late 2017, an increase from 140 ha of cultivation in 2011.

Apart from providing a high value feed source, Keith sees his cropping program as a means of improving country that was once dense INS. Keith currently undertakes this program by chaining (depending on vegetation type), deep ripping to 11 inches and then seeding. He is currently getting a heavy duty disk plow made up that he hopes will reduce the need for ripping and allow areas of regrowth to be effectively sown. There is also 800 ha of historical cultivation on Darling Downs that Keith will plant to silk sorghum.

Going forward, his intention is to have upwards of 2,000 ha sown to silk sorghum and a mix of sorghum, premier digit grass and various clovers within the next five years. In the long term, native grasses will begin to reappear and supersede sown species, with sorghum lasting no longer than seven years. This integrates with Keith's goat enterprise by providing high quality feed on which goats can be finished quicker. It also provides clean pastures to wean young goats onto in order to break worm cycles.

Forage cropping allows land to become transformed from being dominated by woody vegetation to a productive, diverse pasture.

In somewhat of a contrast to Keith's plans for the rest of the property, in 2016 he successfully established a Carbon Farming project on 60 per cent of Tindarey. This allows continued grazing but prohibits clearing and burning. While reducing the area Keith is able to undertake management of woody vegetation, this project has allowed both the expansion of his business and the ability to focus more resources on improving other areas. Keith intends to run Darling Downs under the same management principals as Tindarey. It will however be operated as a separate business.

Looking forward

Keith's plans for the future are largely centered on the development of Darling Downs and subsequent expansion of his goat enterprise. Land management is also a priority in order to regenerate areas of dense and re-growing INS to create a more productive property. Regarding the management and marketing of goats, Keith is content to continue as is.

Industry direction

In terms of the broader industry, Keith still feels there could be improvement in communication from industry bodies, specifically with reference to the use of levies.



CASE STUDY

Wallangarra Station

Producer:

- Tony and Heather McGinty

Property:

- Wallangarra Station, 50 km north east of Ivanhoe.

Area:



- 30,348 ha

Rainfall (avg/a):

- 300 mm

Enterprise:

- Self replacing Red Boer composite goats and Dorper sheep

Key messages

- Red Boer goats provide an alternative to traditional white-bodied Boers.
- Goats are a hardy, highly adaptable animal but they must be allowed the freedom to express those traits.
- By introducing purchased bucks at a young age increases their ability to adapt and survive in the new environment.

Looking back

The year 2019 will mark 100 years of McGinty family ownership and management of Wallangarra Station. Tony has been on the property his entire life.

In keeping with the greater pastoral zone of NSW, Wallangarra initially supported a Merino enterprise. It was not until 1985 that Tony made the decision to move away from wool, during the period in which the market collapsed under the reserve price scheme. With rangeland goats already on Wallangarra, Tony witnessed how well they were adapted to the environment and believed there was a profitable future in the goat industry. At this early point in his transition out of wool, Tony introduced cashmere goats. After persisting for eight years, he then decided he was better off focusing on meat goats. This was due to the difficulties posed by vegetable matter, the small fibre cut achieved and the inability to run cashmere goats as a dual purpose breed.

From the early 1990's onwards, Tony has focused on breeding a superior meat goat using the well adapted rangeland goat and the carcass traits of Boer goats. This resulted in a focus on Red Boers and registration of the 'Even Better Reds' stud in 2003.

The direction of Tony's business has continued along these lines, with more subtle changes to breeding objectives and target markets adapted along the way. After many years of breeding, Tony is well known for producing quality Red Boer goats that are well adapted to the rangelands.

Property and business development

Wallangarra is managed as a single property, with Tony being the primary labour unit. Tony's grandson Conrad also works in the business. In the past Conrad worked on Wallangarra on a full time basis however he now shares his time evenly between work at Wallangarra and Hay.

In moving into goats, Tony considers adequate fencing as critical. It ensures stock are held on the property and allows them to be moved effectively. Six line hinge-joint is the most commonly used fence type on Wallangarra, with much of it fitted to existing plain wire fences. Over 10 years, Tony re-fenced the whole property with approximately 200 km of hinge-joint fencing. This was completed in around 2005. Tony feels the six wire hinge-joint has been sufficient and continues to do the job. By being a bit shorter it also allows kangaroos to jump over it easily rather than getting caught and wrecking the fence. He does however acknowledge that once goats are bred behind wire they are far easier to control.



Six-line hinge-joint fence with barb



Stock yards built throughout property for ease of access

While his managed goats are easily retained by current fencing, incursions from rangeland goats are common.

In the past Tony has also trialed electric fencing which he says can effectively control goats as long as they have first been educated in respecting them. Kangaroos also caused problems by either physically wrecking the fence or causing it to short out.

The majority of stock water on Wallangarra is supplied by ground tanks with some pipelines feeding troughs.

Over the past five years, the only major infrastructure changes have been the establishment of more stock yards. Tony has gone from three sets of steel yards to nine, giving all paddocks close access to yards. This reduces the need for walking stock and also facilitates the easy removal of rangeland goats from paddocks.

Scales are also located in the main yards which allows smaller animals to be weighed prior to sale to ensure they meet requirements.

Livestock

In an average season, Tony runs approximately 5,000 does and 2,000 Dorper ewes. He sells around 3,500 in an average year and up to 6,000 goats in a good year, but notes that he doesn't keep great records on numbers. Goats are sold at four to five months of age, often coming straight off their mother. Tony points out that goats need to be sold as young as possible in order to allow room for young kids. At this age, goats weigh up to 33 kg liveweight and yield around 49 per cent.

Over the last five years, Tony has not seen a great change in the level of production achieved on Wallangarra outside of seasonal effects.



Husbandry

Does are joined year round at a rate of about five per cent bucks. Tony believes that a two per cent joining rate would be sufficient but by increasing that to five per cent provides insurance against does being joined by rangeland bucks. Having bucks in year round not only minimises risk of does being joined by rangeland bucks, but also allows does to reproduce in a way that best matches the season. This notion of 'letting goats be goats' is something Tony sees as very important.

All goats are tagged which allows a good understanding of productive lifespan of does to be gained. Tony believes most of his does will reproduce until around nine years of age, but has had some reach 12 years. Young goats are not weaned or treated in any way due to being sold at a young age.

The presence of rangeland goats is a constant challenge for Tony. He outlines that a rangeland buck joining a doe turns a potentially \$50 kid into one worth only \$15. Tony does not report any predation from wild dogs, sighting eagles as a far greater source of loss.



Horned composite does

Breeding

When Tony first began focusing on meat goats during the mid 1990's, he identified the carcass attributes of Boer goats as something of value. In the early years he trialed both white and red bodied Boers. It was when a mixed mob of goats was bought from Condobolin that Tony first began to realise the benefits of the red bodied goats over the traditional white bodied, red headed Boers. In the first litter of kids from this mixed mob it was clear that those born to reds displayed higher survivability and performed better in his environment. Traditional Boer bucks also failed to breed successfully with rangeland does. Additional to differences in adaptation, Tony has observed that white bodied Boers tend to produce a fatter carcass than the reds. This is something he sees as undesirable.

In the earlier years of Tony's move into goats he regularly entered goats in shows where they were judged on their physical characteristics. However he ceased doing so as his focus on Red Boers grew. This was due to the opinion that the characteristics being judged did not align well with those that are commercially important. Tony feels this has played a role in white bodied Boers displaying poor survivability in a commercial, rangeland setting. This is a result of being largely bred for show ring success, with a lack of commercial focus in selection decisions.

From 2000 onwards, Tony focused his breeding on Red Boer goats. He sourced bucks from the Armidale district over a three year period and even implemented an Artificial Insemination (AI) program in 2003. Despite the substantial change in environment, bucks from Armidale adapted well to the rangelands. Tony recommends introducing purchased bucks as young as possible, as they appear to adapt far better. While the AI program allowed genetic gain to be fast tracked it is not something Tony would do again. This is due to the intensive nature of the work.

Within herd selection at Wallangarra focusses on weight gain and carcass yield. Tony explains that these are the traits you get paid for. When considering the ability to sell goats at a young age to create room for the next flush of kids, weight gain is increasingly important. Other characteristics that Tony selects for are length, height, structure, short red coat and good temperament.

By using Red Boer's, Tony believes he has raised average carcass yield from around 40 per cent in rangeland goats to almost 50 per cent.



Red Boer bucks bred by Tony, approximately five months old



Polled composite does

Additional to increased yield, goats have a far higher growth rate. Tony estimates that the live weights of his Boer goats would be around double that of rangeland goats at five months of age. He notes that rangeland goats can get just as big on a live-weight basis, they just take longer to get there.

One particular change over the past five years in Tony's herd is the presence of polled animals. This was not a trait he had previously had much interest in pursuing until he began noticing a growing demand from people sourcing composite breeding animals. Tony now estimates that up to 50 per cent of his herd would be polled. Tony has not witnessed any increased frequency of hermaphrodites since selecting for poll animals. Apart from the obvious phenotypic outcomes, he hasn't noticed any additional production benefits.

A particular challenge Tony has identified going forward is sourcing new Red Boer genetics to introduce to his herd. He recently bought 12 Red Boer bucks from Armidale in a dispersal sale. This is the first time new genetics have been introduced in many years.

Marketing

Most goats from Wallangarra are sold at around 5 months old direct to abattoirs for export. Tony aims to achieve carcass weights of 13-14 kg. To achieve this, Tony caps live-weights at 33 kg as he finds that animals over this tend to dress too heavy. In the past, these goats were sold into the domestic market. As the price of export goatmeat rose, the previously attractive premiums of the domestic market began reducing. This eventually resulted in Tony opting to sell into export markets from around 2015 onwards. At this point the export market was offering up to \$1/kg cwt above domestic buyers.

Tony has found that by providing a high quality product he has been able to build good relationships with buyers.

A number of breeding animals are also sold to other producers. In the 15 months preceding 2018 he sold 500 bucks to producers primarily located in western NSW. Breeding stock have been sold domestically for some time, with buyers located across eastern Australia and Tasmania. Interest from Angora breeders wanting to breed horns out of their herd has also been expressed more recently. Breeding bucks are sold at between five and 12 months of age at a set price across age groups. No advertising is done for the sale of breeding bucks as Tony has not seen the need.

Land management

Both sheep and goats are set stocked on Wallangarra. Stock numbers are managed to reflect seasonal condition and feed availability. When discussing the de-stocking program occurring at the time of writing, Tony refers to the country getting 'redder'. This is used as a means of assessing groundcover and the subsequent availability of feed.

Over the years, Tony has witnessed a reduction in the presence of ward's weed (*Carrichtera annua*), noogoora burr (*Xanthium occidentale*) and Bathurst burr (*Xanthium spinosum*), to the point where little is found on the property. He believes this is due to the weed species being grazed by goats where they were not readily eaten by Merinos. Tony refers to areas of the property boundary where clear fence line effects can be seen. All three listed weed species are far more prevalent in neighbouring paddocks that are grazed by Merinos. With regard to woody weed species, Tony identifies turpentine (*Eremophila sturtii*) as the biggest weed problem on Wallangarra.

In reflecting on the landscape changes seen since moving into goats, Tony notes that it responds quicker after rain than it used to. He puts this down to the habit of goats to browse a variety of vegetation which removes some pressure from pasture species. This has in-turn allowed for greater maintenance of groundcover, and increased seed set and recruitment of pasture species.



Mixed mob of polled and horned goats

Looking forward

When asked about the future plans for his business, Tony refers back to the difficulties faced in sourcing Red Boer genetics. It may be the case that he will look to the USA to source bucks. This would be done on a live export basis rather than AI.

The primary challenge Tony faces without a potential solution at hand is the continued encroachment of turpentine.

Industry direction

In order to achieve greater price stability Tony believes that rangeland populations need to be better controlled. This will even out the largely seasonal supply curve that is heavily influenced by summer trapping. He feels the greater competition between processors has been good for producers in achieving higher prices.

Tony would like to see greater reflection of carcass quality in prices received by producers. As it currently stands, he sees breeders losing motivation to continue developing a better animal.

At an on-farm level, Tony gives some advice around the need for producers to balance breeding objectives in order to produce a productive, efficient and well adapted animal. While he owes much to the introduction of Red Boer genetics, he is very much of the belief that they can't be too intensively managed. Tony explains this by outlining the differences between red and white Boers, the later which he refers to having had 'the goat bred out of them'.

Overall, Tony is happy to be in goats and feels positive about the broader industry direction.



CASE STUDY

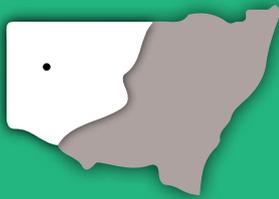
Moonavale Station

Producer:

- Rick and Floss Howard

Property:

- Moonavale Station, 50 km north west of Wilcannia



Area:

- 40,937 ha

Rainfall (avg/a):

- 212 mm

Enterprise:

- Wild harvested and semi-managed rangeland goats, Merino sheep and cattle

Key messages

- Rangeland goats provide good enterprise diversification while being a stock species that complements the grazing habits of Merino's and cattle.
- Reduction in price volatility of Australian goatmeat promotes greater commitment from producers to establish goat enterprises.
- There is a need to an increase managed and semi-managed goat herds in order to maintain supply volumes and consistency.

Looking back

Rick and Floss took over management of Moonavale in 1996. This is the family property that Floss grew up on, while Rick's family owned Goonalga Station east of Wilcannia. Both Rick and Floss recall mustering goats on their respective properties as young kids, at which time goats were mustered and sold opportunistically. During these times, the Howard's explain that goats were not often seen outside of hills and ranges. However over time goats have greatly expanded their range to almost all environment types within the region. They see this as a result of population expansion and the resultant resource limitations within their preferred habitats.

At the time Rick and Floss took over full-time management of Moonavale, it was primarily a Merino enterprise. As had occurred in the past, they continued opportunistically harvesting goats and selling them for whatever small return was available. This was largely undertaken as a means of reducing the competition for pasture that goats were placing against domestic stock. From this point, the Howard's have gradually transitioned into a semi-managed goat enterprise that accounts for a sizeable portion of their overall business.

As their business continues to evolve alongside the Australian goatmeat industry, the Howard's now intend for goats to become their core enterprise in the coming years.



Property and business development

Over the last 20 years, most changes occurring on Moonavale have involved infrastructure development and enterprise mix. During the 1990's Moonavale was run at 80 per cent Merino's and 20 per cent hereford cattle, with harvested goats making up a negligible portion of total income. From this base, goats have slowly grown to the point where they now represent approximately one third of the total business, with sheep and cattle also in even thirds. The increase in goats has been due to the combined effects of increased numbers, increased value and pursuit of diversification. Going forward, Rick and Floss intend to increase goats to somewhere in the vicinity of 75 per cent of their overall business, with sheep and cattle making up the remaining quarter.

Labour requirements are met within the family unit, something Rick keeps at the front of mind when planning infrastructure developments. As labour can prove to be not only costly, but often hard to source, Rick is mindful of using infrastructure to reduce labour requirements where practical.

Infrastructure developments on Moonavale have largely been in the form of fencing and water point establishment. Rick refers to large areas of the property that had never been utilised outside of exceptionally wet years due to the limited access to water. These areas are now being opened up by the establishment of new bores and associated pipelines. Following water has come fencing, with larger paddocks split into smaller areas that allow for easier management. Regarding paddock design, Rick prefers a long and narrow layout as they are able to be mustered by fewer people.



Existing plain wire fence upgraded with hinge-joint and barbs.

New fencing has varied between plain and barbed wire sheep fences and hinge-joint goat fencing. The first 'goat paddock' was established on Moonavale in 2005, enclosing 2,800 ha (7,000 acres). The fence design used on this paddock and employed since is 6/70/30 hinge-joint with steel posts spaced at seven metres and barb wires run above and below the hinge-joint. Rick points out that the bottom barb is one hole below the hinge-joint to act as a 'sacrifice wire' that can easily be replaced if it rusts out in the future. This design was settled on after trialing a number of options on water points. There is now a total of approximately 25 km of hinge-joint fencing on Moonavale, being installed gradually since 2005 to enclose a second paddock of 200 ha in 2018.

Eight trap yards have been established across Moonavale to allow water to be closed down and reduce grazing pressure when domestic stock are removed. They also facilitate the trapping of rangeland goats. Three of these sites also involve multi-species stock yards that allow sheep, cattle or goats to be handled. Trap yards are built using a figure eight design, with one yard directly around the water where animals enter, and a second yard the animals exit through. This ensures that when the water is being trapped that animals don't block up the water, resulting in others not entering the trap yard. When discussing trap yard design, Rick refers back to his earlier trap yards designed using hinge-joint. These yards only lasted a few years, having been replaced with weld mesh which has since proved sufficient to stand up to the high pressure of trapped rangeland goats. Reflecting on this, Rick states that by investing in better quality materials and design first up would have saved time and money in the long run.

Looking to the future, continued investment in water points and fencing is planned in order to better utilise poorly watered areas of Moonavale. Fencing will also be critical in expanding their goat enterprise, with intentions to have a total of 12,000 ha enclosed with hinge-joint fencing. This will require an additional 40 km of hinge-joint fencing to be established.



Recently installed solar bore

Another area Rick is seriously considering investment in is remote water monitoring technology. He sees this as having great potential to reduce the time and maintenance costs associated with regularly checking waters. At this point, a system has not yet been found that 'ticks all the boxes' for Rick. He wants something that sends visual footage, is reliable and is scalable. With the development of species recognition technology, Rick also sees huge potential in using remote cameras to potentially exclude non-domestic stock from water. In his opinion, this would provide an alternative to the costly and high maintenance exclusion fencing being installed by producers as a means of controlling predatory pests and total grazing pressure.

Livestock

In the late 1990's when goats only made up one or two per cent of total income from Moonavale, they were being opportunistically mustered primarily as a means of reducing grazing pressure.

During this time the goat industry as a whole was largely reliant on opportunistic trapping and mustering of rangeland populations. This resulted in substantial price swings, with lows over summer when successful trapping resulted in a large supply, and highs over winter when supply was limited.

The establishment of a goat paddock in 2005 allowed goat sales to be timed to market peaks, as goats could be held following capture. This system continued effectively for some years, but with the growing value of goats a second paddock was established to increase capacity. At this time the seasonal price differences of goats was also declining as the industry continued to mature. Goat paddocks are now used to hold semi-managed herds and allow captured goats to be aggregated before trucking. This ensures freight efficiencies are maximised.

In recent years, goat sales from Moonavale generally sit around 2,500 head p.a. This figure is made up from goats bred within semi-managed paddocks as well as those trapped across the property.

The break up between these sources is approximately 20 per cent and 80 per cent respectively. Depending on season and rangeland goat movement, annual sale figures can increase to around 6,000. These additional numbers are primarily a result of mustering an extension block at the northern end of Moonavale. Due to its location, geography and natural waters, it can attract substantial numbers of goats.

As the Howard's work to increase the portion of their business made up by goats, they hope to ultimately be turning off up to 3,500 goats each year. Under this system, they anticipate a far greater proportion of goats will be bred behind wire rather than being mustered or trapped from the wild.



Rangeland goats leaving water



Husbandry

Under current production methods, no husbandry practices are carried out on goats. Once trapped or mustered, rangeland goats are trucked straight off the property if there are sufficient numbers and feed is limiting. Otherwise, they are released in hinge-joint paddocks to be sold at a later time. At this point, little consideration is given to selection of breeding animals to be kept. By having multiple yards and traps located around the property allows goats to be trucked to paddocks in order to minimise the stress placed on the animals by walking them.

Rick believes that goats reproduce and gain weight more efficiently in a wild state than they do behind wire. For this reason he times trapping and mustering events around flushes of kids having already reached a reasonable weight. Goat paddocks are also kept relatively large in order to not have semi-managed goats feeling too restricted. Being an animal that has evolved in the wild, Rick doesn't feel they respond well to management.

One factor that has become a serious concern for the Howard's over the last four years is the growing predation risk from wild dogs. They have recently joined a coordinated baiting group which baits for dogs twice a year, while also trapping and shooting at all times. When considering control methods going forward, Rick expresses his preference for collective approaches such as broad-scale coordinated baiting and the maintenance of the border fence. While he can see the reasoning behind people's decisions to pursue property or cluster scale exclusion fencing, he feels broader scale options should be prioritised from a region and industry perspective.



Trap yards with holding yards, working yard and loading race

Breeding

When Rick and Floss first began considering goats as a stand-alone enterprise, they had some ideas about breeding a more 'domestic' goat from rangeland animals. They felt that selecting for a short haired, white goat that was polled and exhibited superior reproductive and weight gain traits would create a desirable line of animals. However as there was no premium being paid for superior animals, they felt they were better off continuing along the path of harvesting and semi-managing rangeland goats. While breeding does occur within their goat paddocks, this is not at all managed. Goats are sold and retained based purely on weight with no priority given to developing a dedicated breeding herd.

Going forward however, the Howard's imagine that as their semi-managed goat herd increases they will begin placing more emphasis on breeding and selection. This would not involve managed joinings but selection of both bucks and does that exhibit superior phenotypic and production traits. The move from a goat enterprise mostly reliant on harvesting, to one reliant on breeding, is seen by Floss and Rick as a necessity to ensure supply. As the price of goats has risen there has been increasing pressure on wild populations which they expect will continue. They feel that reductions in minimum carcass weights have also resulted in a greater portion of breeding animals being removed from the rangeland population. This has further reduced population resilience to over-harvesting.

Marketing

Goats from Moonavale are sold through two avenues. Approximately 80 per cent are sold to the nearby depot Gates Goats and 20 per cent are sold over the hooks to an abattoir in Victoria. The key factors influencing sale decisions are price and animal welfare.

Sale animals and times are dictated by animal weight, numbers and seasonal conditions. Over-the-hook sales are generally targeted to the winter months to capture any seasonal upswing in prices. It also ensures cooler conditions for the longer distance journey. Animals sold direct to abattoirs have an average dressing percentage of around 47 per cent. When comparing prices available from depots and processors, Rick has found that a live weight price approximately one third of a carcass weight price is generally pretty even on a per head basis. He is also mindful of the welfare and weight retention benefits of trucking stock a smaller distance to a depot, where they are then held in a paddock environment.

Recalling the long term relationship held with Gates Goats, Rick speaks passionately about supporting local business. He has high regard for those who, at their own risk, have been pioneers in the goat industry. In this sense, Rick is very positive about the soon to open Bourke abattoirs. With such a substantial share of the national goat kill originating in western NSW, he sees this new facility as not only a logical step for the industry, but a sign of confidence in the future. It has the potential to reduce transport costs borne by producers and increase overall supply chain efficiencies. By reducing the distance stock are required to travel also benefits animal welfare.

Land management

Livestock on Moonavale are run separately, with fencing infrastructure dictating that goats are only able to be run in two designated paddocks. Paddocks are generally stocked year round, with numbers varied to match feed on offer. Such decisions are made by visual assessments of groundcover and stock condition. Some areas are rested for extended periods when the need and opportunity arises. For example during the wet seasons beginning in 2010, one area of the property was spelled for three years as there was ample feed elsewhere for stock.

While goat paddocks are only stocked with goats, cattle and sheep are occasionally rotated. Rick points to the different grazing habits of the three livestock species as being somewhat complementary. As they largely target different aspects of the vegetation community, Rick has observed that he is able to maintain stock numbers for longer when the total DSE is spread across the three species rather than being entirely made up of Merinos.

Vegetation type is also something the Howard's consider when making stocking decisions. Areas of bluebush (*Maireana spp.*) country are generally lightly stocked as it is considered to be 'survival paddocks', providing feed in drier times.

As Rick likes to allow rangeland goats to breed outside of captivity, he is conscious of keeping the country in good condition. This ensures rangeland goats on Moonavale stay until they are captured, rather than moving on in search of better feed.

When establishing their first goat paddock, Rick and Floss chose a site that not only had topography that suited a hinge-joint fence, but was also thick with INS. They hoped by stocking it with goats they may be able to reduce the prevalence of woody species and return it to a pasture species dominant paddock. When first asked about the changes in vegetation and condition of the goat paddocks, both Rick and Floss reported minimal changes. However on further consideration they felt there had been some regeneration of grass species and increase in groundcover due to goats browsing habits. They have come to the conclusion that to have a substantial impact on INS, it needs to be the only thing left to eat and goats need to be present at a very high density.



Bluebush country considered as survival paddocks with substantial stands of Leopardwood trees are present



Rangeland goat production in Western NSW: Where are they now?

Pushing the country and animals to this point is not something they have felt comfortable pursuing. They also acknowledge that the size of their goat paddocks makes achieving higher animal densities quite difficult.

Rick describes his approach to grazing and landscape management as having been learnt from experience. As there are a number of influencing factors, which can vary greatly across space and time, you cannot take a prescriptive approach. This observational approach to learning and land management has led to an appreciation for a number of holistic management principals. An example of this is his belief in the importance of animal impact on landscape function. When discussing this, Rick describes the paddock which was rested over the 2010-11 good seasons. After growing a mind blowing amount of feed during that first season, he has been somewhat underwhelmed by its condition and performance since. This is despite being rested from domestic stock for a number of consecutive years. Rick puts this down to nutrients from that first season of big plant growth not being effectively cycled back into the soil due to the absence of stock.

An additional factor that cannot be ignored when discussing land condition is the impact of kangaroos. Such high kangaroo populations over the last few years have had a substantial impact on feed availability, making it very difficult to conserve feed by reducing domestic stock numbers.



Multi-species stock yards used for goats, sheep and cattle

Looking forward

Going forward, Rick and Floss intend to continue on the same trajectory that they have been on over the past 20 years. Water and fencing infrastructure will be gradually developed as they continue to expand their goat enterprise. As this occurs, they will also shift from a harvesting and semi-managed goat herd to a breeding herd.

Wild dogs are considered the number one risk to their business and the broader small stock industries across western NSW. They intend to keep working in this area to employ whatever tools are available to reduce dog numbers.

Industry direction

From an industry perspective, Rick has been pleasantly surprised with the rate at which the industry has developed. He doesn't feel it could grow at a much faster rate without the risk of overcommitting our supply capacity.

With the volatility of goat prices reducing, Rick and Floss feel that more producers will consider goats as a genuine enterprise option. Stigma around the perceived risk and opportunistic nature of a goat enterprise is being overcome.

As Australian goatmeat sustains relatively high prices, the Howard's expect harvest pressure on rangeland populations to also be maintained. This will result in a greater reliance on managed herds to meet supply demands as wild populations are reduced. In order to increase managed herds in western NSW, other stock types will inevitably be displaced. Individual producers will be making these decisions based primarily on long term profitability of an enterprise, so price consistency is very important.

CASE STUDY

Big Ampí Rangeland Goats

Producer:

- Big Ampí Pty Ltd

Property:

- Big Ampí Station, 50 km south-east of Menindee
- Mt Hope Station, 20 km north of Hillston



Area:

- Big Ampí 54,434 ha
- Mt Hope 25,003 ha

Rainfall (avg/ a):

- Big Ampí 260 mm
- Mt Hope 380 mm

Enterprise:

- Composite rangeland goats for domestic and export markets, Merino sheep and beef cattle

Key messages

- A premium product is required in the domestic market and this needs to be reflected in prices received by producers.
- Composite bred goats may respond differently to more intensive management than rangeland goats.
- Objective measurement combined with practical experience provides a strong base on which sound management decisions can be made.

Looking back

Big Ampí Station was purchased by its current owners in 2005. At this point it was being run as a primarily Merino enterprise. As was the case across much of western NSW, rangeland goats were present on the property and considered to be largely a pest species. Goats were harvested and sold for a small return in order to reduce competition for available feed. During this time when contractors were used to conduct broad scale goat musters, all non-saleable animals were taken by contractors for a negligible payment. At this point, a single 'goat paddock' was established in order to allow under-weight goats to be grown out and sold. With an established paddock allowing for closer observation, experimentation began by selecting and breeding superior rangeland harvested goats. While it was long acknowledged that goats were well adapted to the rangeland environment of Big Ampí, they now felt that opportunity existed to develop a genetically superior animal.

At this point, the key limiting factor in the expansion of Big Ampí into managed goats was fence infrastructure. For such substantial investment to be made into fencing required confidence that sufficient profit margins existed within the goat industry. This point was reached as goatmeat prices broke \$5/kg cwt. Subsequently, Big Ampí undertook a substantial capital expenditure program in order to equip the property to produce goats. While still in the development stage, it is now a business that boasts a substantial goat enterprise.

As Big Ampí Rangeland Goats continues to expand, it is assessing and utilising all available technologies, research and information to create a highly productive enterprise. This development and management strategy is described as being guided by modern science laid over contemporary wisdom.



Property and business development

Since the decision was made to establish Big Amp Rangeland Goats, a second property was purchased in early 2017. Mt Hope Station boasted a 4,000 strong composite goat herd that was transferred with the property. Being run as a goat enterprise, it was already equipped with much of the required fencing infrastructure. It also has frontage to the Kidman Way, allowing for all weather truck access. This is strategically important in the context of developing a business that could provide a consistent supply of goats to domestic markets.

With expansion into managed goats and the subsequent capital expenditure program, comes some risk. Big Amp are confident in the research they have done to inform their decisions and feel that sufficient opportunities exist to utilise the infrastructure being invested in, even if they were to move away from goats.

Big Amp Rangeland Goats has permanent managers living on both properties. They are valued greatly for their experience in managing pastoral properties, particularly in goat and meat sheep industries.



Composite bucks, six to seven months of age

An additional labour unit is also located on each property on a full time basis. Managing partners are located off farm, but play an active role in all aspects of the business.

Fencing on Big Amp station was initially plain and barbed wire designs, sufficient for containing cattle and Merino sheep. Since expanding into managed goats, fences are being constructed using 7/90/30 hinge-joint with three supporting plain wires, barbed wires top and bottom and posts spaced at seven metres. Hinge-joint fencing now encloses approximately 24,000 ha on Big Amp, with 30,000 ha yet to be fenced. Mt Hope station is entirely fenced with hinge-joint.

It is thought that by raising the fence height from 1.1 m to 1.2 m may have a substantial impact on the movement of kangaroos over hinge-joint fences. On farm observation has indicated that a far smaller portion of the kangaroo population is willing to try and jump a fence with this extra height. As additional height and wires act primarily as a visual deterrent, Big Amp are exploring the accessibility of a low cost, flexible post extender. Fence lines are kept graded for better station access and to reduce impact damage from animals that don't sight the fence in time.

Water infrastructure across the two properties is a mix of ground tanks and troughs, with no paddock relying solely on surface water. This provides some surety of stock water while also spreading grazing pressure between water points. An additional aspect to water management is the ability to shut down waters (by turning off a trough, or closing a yard around ground tanks) when stock are not present in a paddock. This allows for better control over non-domestic grazers in order to properly rest pastures.

An area which Big Amp are beginning to explore is the use of radio frequency identification (RFID) tags. This technology allows individual animals be identified and production data captured and stored. Currently, breeding animals are being tagged but other tools and data collection has not yet been implemented. Key intended outcomes from the use of this technology include; capture of reproductive performance data, incorporating an autodraft unit allowing saleable animals to be accurately drafted, and for animal selection decisions to be better informed.



Hinge-joint fence design



Doe and kids during September 2017 kidding

Livestock

In the long term, Big Ampí intend for managed goats to be the primary enterprise. However this will not be achieved until capital works are completed, allowing goats to be effectively held and managed.

Goats are joined every eight months with the aim to achieve 130 per cent kidding rates across all seasons. This results in an annual kidding rate of 195 per cent. Production goals at Big Ampí are to have goats reaching a live weight of 35 kg by eight months of age. Goats are sold at this point, achieving a 15 kg carcass (43 per cent dressing). In order to achieve a consistent supply of goats across the year, joinings are staggered. Unmanaged rangeland goats continue to be mustered and trapped across the two properties. They are sold directly to abattoirs in a first instance, or held to be grown out if underweight or if greater numbers are required for a load.

Due to the fencing program and sensible paddock selection there have not been any problems with unmanaged bucks joining the station bred composites. In the future unmanaged goats will continue to be a resource to harvest, albeit for a different market.

Husbandry

When coordinating joinings, the priority for Big Ampí is to achieve condensed kidding periods. For this reason, bucks are joined at the relatively high rate of four per cent for the first four weeks, with an additional two per cent added for the remaining two weeks of the six week joining period. While time is given for does to be joined over two full estrus cycles, higher buck numbers aim to achieve majority of joinings at the first cycle. Ideally, they would love to be able to synchronise oestrus cycles across doe herds in order to further condense kiddings. However at this point there are no effective means of doing so on an extensive scale.

Does are scanned in early pregnancy to identify those that are pregnant and empty. Empty does are given one chance to be re-joined before being culled. Going forward, Big Ampí intends to scan for singles and twins, and have this data compiled against the RFID tag of that specific doe. In doing this, they would also consider running single and twin bearing does separately to better target their nutritional requirements.

Kids are weaned at three months of age, weighing around 15 kg. Maintaining a strict weaning time is important to make sure does are able to be re-joined within eight months. This ensures does meet the targeted three kiddings over two years.

At the time of weaning, kids are vaccinated with a six-in-one product to protect against clostridial diseases and cheesy gland, with a booster given in the weeks following. While not a common practice in extensive livestock enterprises, this was picked up from the manager of Mt Hope station who had previously implemented vaccination as a standard practice. Goats are not drenched routinely but will be drenched if required. This is assessed based on seasonal conditions and faecal egg counts. All bucks are left entire as castration is not considered necessary due to the young age of stock at slaughter. However they would implement this if benefits or requirements became apparent.

Due to the prevailing dry conditions across the region, Big Ampí goats are currently being supplementary fed. Feed rations have been developed to match the requirements of each stock class using barley, lupins, faba beans, corn and hay. Stock are fed using paddock feeders to reduce wastage and animal health risks. While some industry work indicates that rangeland goats do not utilise such feed types well, observations from Big Ampí indicate it is not so clear. They suggest that a composite goat may utilise this higher quality feed better than a pure rangeland goat. At present, goats are only supplementary fed due to limited availability of quality pasture. In the future however, it may be considered as a means of supplying optimum nutrition to breeding does at critical times.

Wild dogs are a growing risk to Big Ampí. While noticeable losses have not yet been experienced they are well aware of the threat posed. In response to this they take part in regular coordinated baiting programs.



Does and young kids



Breeding

Genetics and breeding is a big part of Big Ampí Rangeland Goats, however they are quick to clarify that they are not a stud and are not concerned by any particular breed alliance. Their priority is producing meat.

The first bred goats to be purchased by Big Ampí were sourced from a producer in Ivanhoe who had developed a composite goat from rangeland animals, Red Kalahari and Boer's over many years. This transaction occurred in 2013 and involved 450 young breeding does. On the purchase of Mt Hope station, a well established herd of Cashmere-Boer cross goats was also acquired. These animals originated as a Cashmere stud that transitioned into a meat goat enterprise by crossing with Boers. They have been observed to be very productive animals and have since had an influence over the broader Big Ampí herd. The Big Ampí Rangeland Goat is made up of Kalahari Red, Cashmere, Boer and the Australian rangeland goat. While all breeds provide certain traits, the overall high level of hybrid vigor is valued. The resulting composite is aimed to exhibit high fertility, high fecundity, high feed conversion efficiency, is able to raise kids, is resistant to predators and is able to do well in an extensive rangeland setting. Despite much focus being given to breeding a superior composite goat, rangeland animals are valued for the hardiness and level of adaptation to the region. In this same sense, it was also noted that pure bred Boer goats are not necessarily the best commercial fit in the Western Division.

When selecting both does and bucks to be retained for breeding, visual assessments are primarily used. As sufficient data on animal performance is captured, it will play an increasingly important role in animal selection. Bucks are also sourced externally from the Ivanhoe and Condobolin regions.



Composite buck displaying Boer influence at 18 months

When discussing breeding and genetics, concern is raised regarding the availability of stud stock suitable for a rangeland environment. Big Ampí often find that stud bucks don't have the structural characteristics such as long legs and good feet, which are required in an extensive system. As a result, consideration is being given to developing an in-house breeding program.

As unmanaged rangeland goats are still captured and grown out for sale, it is easy to compare performance to the composite animals. It is estimated that rangeland goats take up to 20 per cent longer to finish, reaching 11 months of age before achieving a 15 kg carcass.



Consistent line of Big Ampí Rangeland Goat carcasses

Marketing

Big Ampí Rangeland Goats aim to provide a high quality, consistent product fit for the domestic market. They believe this to be best achieved with a 15 kg carcass from an eight month old goat.

Within the domestic market, a few hundred goats are supplied to two different buyers every two to three weeks. A small number of goats are also live exported, while the vast majority are consigned to abattoirs to be exported as a frozen carcass.

Across these sale destinations, only a small premium is received in some domestic markets. This is a point of concern for Big Ampí as they consistently produce a product suitable for higher end, primal cut type markets.

Going forward, they intend to address this via a number of avenues. Initially, is to create the scale that allows them to be a year-round supplier of domestic quality goatmeat. This will both provide the business with a supply advantage, and also contribute to ensuring the broader domestic market is met by the quality of product consumers' desire. Big Ampí also intend to further explore the possibilities of direct marketing. This would allow a premium product to be promoted in order to attract a premium price. They feel that their business is well positioned to market itself within the 'clean-green', 'free range' type arena. This is underpinned by the extensive, native pasture based system on which they operate.

At present, Big Ampí retain most of their breeding stock in order to build numbers as developments are completed. However they are open to selling surplus breeding stock to other producers where the opportunity exists.

Land management

When the decision was made to transition into goats, a literature review was undertaken to establish a dry sheep equivalent (DSE) rating for all stock classes. This was then matched to the historical stocking capacity of the property to identify a benchmark goat stocking rate. In light of this, it is now believed that due to the high browse content of a goat's diet, they place less pressure on pasture species than an equivalent Merino stocking rate.

Stock are rotated between paddocks in response to visually assessed feed availability and stock condition. Spatial data is also used to assess ground cover across the two properties over time. Spatial data does indicate an increase in groundcover in some of the earliest paddocks fenced to hinge-joint and stocked with goats. However it is acknowledged that it is too soon to identify long term impacts on the landscape. Feed samples and photo points are currently taken seasonally which will also provide valuable insight into changes in landscape and vegetation health over time.

It is hoped that goats will play a positive role in controlling Invasive Native Scrub (INS). Hopbush (*Dodonea spp.*) on Big Ampí is slowly being eaten and knocked down by goats. This requires large rangeland bucks to be most effective. On Mt Hope, White Cypress Pine (*Callitris spp.*) and other INS species are being mechanically controlled under a Property Vegetation Plan (PVP) with hopes that goats will control regrowth. Affected country is pulled and then stick raked. Spatial data comparing before and after treatment shows an increase in useable biomass and ground cover.

In the context of land management, grazing pressure from kangaroos is also raised as a major challenge. Big Ampí estimate that 30 per cent of their production potential is lost to kangaroos on country that is not tightly fenced and with control of the waters. This led them to investigate employing a full time commercial kangaroo harvester. However it was deemed not possible to break even at prices below 95c/kg. While damage mitigation permits provide an avenue for kangaroo control, it is not felt that they are sufficient to deal with the scale of problem at hand. Big Ampí are trialing a range of non-lethal control methods such as fencing and water point control. They also feel there is merit in some form of sensory deterrent being identified which could be laid on fence lines to prevent digging.



Big Ampí composite goat carcass on left, rangeland wild harvested goat carcass on right



Looking forward

Going forward, Big Ampí Rangeland Goats intend to continue along their current trajectory of developing their properties to run managed goats. Ultimately, goats will become their primary enterprise. In achieving this there are a number of areas where opportunities are being explored.

A key priority for Big Ampí is to access markets that value their product and production system as superior to a wild harvested rangeland goat.

Industry direction

On an industry scale, Big Ampí would like to see greater development of the domestic market. They see this as an area where a premium product is demanded and subsequent opportunity exists for a price premium to be received.

The avenues through which greater domestic demand may be created are the 'normalisation' of goatmeat as a protein source and the promotion of nutritional benefits of goatmeat. There are also a number of areas where they see the need for greater research. These include nutrition and feed conversion efficiency, intensification of joining programs and kangaroo management.

Big Ampí are taking a leading role in conducting their own on-farm trials to better inform their decisions and management.

Big Ampí Rangeland Goats are well engaged with industry bodies and believe they are motivated to further develop the industry.

SWOT matrix

An analysis of strengths, weaknesses, opportunities and threats was done by compiling information and comments provided by producers.

Strengths

- Easy care: low input, low cost production system possible.
- Marketability: rangeland based industry aligns with 'free range' and 'clean-green' type production methods.
- Adaptability: rangeland goats are hardy, well adapted animals with high reproductive rates.
- Depot registration: quality assurance of depot operations.
- Growing prominence: Increasing awareness and regard for industry as it matures.

Weaknesses

- Supply chain inconsistency: reliance on harvesting creates variability in product supply and quality.
- Industry image: inconsistency between perceptions of goats as a resource vs pest.
- Skills shortage: limited skilled labour and expertise within goat industry.
- State inconsistencies: South Australia maintains legislation that is inhibitory to industry development.
- Research gaps: Available literature is limited but growing.

Opportunities

- Domestic market: potential increase in domestic goat consumption.
- Increase management: industry shift towards managed/semi-managed production systems.
- Landscape tool: goats can be used to positively influence land condition eg. by eating weeds, reduce padding.
- Carcass quality: market recognition of superior carcass quality.
- Adoption: collaboration between government, industry, and private businesses to promote best practice management.
- Benchmarking: ability to assess and compare business performance and target improvement.

Threats

- Predation: wild dog pressure is increasing.
- Over-harvest of breeders: reduced minimum carcass weight requirements risks over harvesting breeding animals.
- Genetic loss: reducing wild population risks loss of genetic resource.
- Tagging: possibility of NLIS tagging requirements being increased. Time, cost and WHS risks.
- Land degradation: overgrazing and the threat of pest plant and animal incursions. This includes INS.
- Exotic disease outbreak: substantial transient populations make biosecurity management and response difficult.



Recommendations

Recommendations have been made in response to points outlined in the SWOT analysis, along with observations made as the report was compiled. Six recommendations are made, in no order, with brief context given.

1. Uptake of benchmarking across the industry.

Benchmarking allows business performance to be assessed and opportunities for improvement to be identified. The need for industry to begin benchmarking business performance is identified in the Goatmeat and Livestock Industry Strategic Plan 2020 and was also recommended in the 2012 case study report. The development of a cost of production calculator tool is a positive development in this area. It was however of some concern to identify a reduced number of producers collecting information on kidding and weaning rates. As a solely meat producing enterprise, reproductive performance is a key profit driver. Therefore, it is important that it is understood. Difficulties in accurately assessing kidding and weaning rates in a continuously joined herd are acknowledged.

2. Registration of a pour-on anthelmintic for goats.

This was raised as a priority for a number of producers in the 2012 case study report. This was largely a response to excessively wet summers that had occurred in the years prior. Landholder observations over the last 5 years indicate that worms can still impact growth rates of goats in less extreme seasons. Valuable work has been done in registering new anthelmintics for goats, however, all are oral products. Pour-on products allow a greater ease of application and avoids potential under-dosing if goats are reluctant to receive oral drenches.

3. Development of rangeland adapted Boer goats.

Producers have displayed benefits in weight gain and carcass yield achieved through the influence of Boer genetics on rangeland goats. However there has also been substantial difficulty faced with poor survivability, poor joining rates and overall poor stock quality in Boer bucks. Some research has been done in this field but more is needed. It would also be useful for rangeland producers and Boer goat breeders to increase communication and collaboration. This may be beneficial for the development of an animal that is better suited to rangeland production systems. Opportunity may also exist in the greater utilisation of Red Boers opposed to the traditional whited bodied Boers.

4. Industry promotion and extension of best practice management.

Semi-managed and managed goat enterprises provide a viable alternative to traditional livestock and goat harvesting enterprises. A move in this direction has many potential benefits to individual producers as well as the broader goat industry. This needs to be better promoted and displayed. Extension and adoption of best practice management techniques should be included in this to ensure goat enterprises are achieving optimal production, economic and land management outcomes. This requires collaboration between industry and government bodies.

5. Prepare for and respond to the risks posed by wild dogs.

The emerging and/or increasing presence of wild dogs in western NSW is a common theme in these case studies. It is critical that producers are proactive in response to predation threats. This involves establishment of coordinated baiting groups, constant monitoring of dog activity and investigation of additional control/prevention measures. Collaboration is required between all government agencies, industry bodies and land managers within and outside of the goat industry.

6. Ensure industry wide NLIS compliance.

A common concern raised by producers throughout these case studies was the possibility of having their NLIS responsibilities increased. This was also a consistent theme throughout the 2012 case study report. Currently operating under the mob based system, with exemptions in place for wild caught animals, producers feel any increase in their requirements would be detrimental. Reasons include WHS risks in handling non-domestic animals and the time and costs associated with tagging in a low input enterprise. By ensuring a high level of compliance to current NLIS requirements, a strong case will be made for the effectiveness of the current system. This will reduce the validity of any case for change.

7. Further explore and promote control options for INS.

Most producers cited some benefit of goats in eating weed species present on their property to the point where they were controlled. An exception to this is Turpentine (*Eremophila sturtii*), a native shrub species listed as Invasive Native Scrub (INS). Turpentine encroachment was commonly raised as a concerning trend and something many were actively treating through a range of chemical means. Development and extension of information around Turpentine management would be beneficial.



References

- Adams, P., (2017, November 18). Big Bucks: Feral goats are being recognized as a serious asset. Landline episode. Retrieved from <http://www.abc.net.au/news/2017-11-18/big-bucks-feral-goats-are-being-recognised-as-a/9165384>
- Agripath (2016). Benefits of mixed grazing with goats. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/research-and-development/search-rd-reports/final-report-details/Extension-On-Farm/Benefits-of-mixed-grazing-with-goats/3273>
- Alemseged, Y., Atkinson, T., (2015). Trial design development to determine expected growth rates of young goats. Meat and Livestock Australia. ISBN: 9781741919219.
- Atkinson, T., (2018, May). Goat forecasting project. Personal communications.
- Atkinson, T., Curran, G., Church, G., (2007). Bushely Boer goat trial. Department of Primary Industries. Unpublished report.
- CIE (2016). Impact assessment of MLA Expenditure 2010-11 to 2014-15. Report prepared by the Centre for International Economics, AgStrat Associates and ISJ Investments for Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/globalassets/mla-corporate/generic/about-mla/mla-impact-assessment-final-report-2010-11-to-2014-15.pdf>
- Crothers, A., (2017, 17 March). Meat and Livestock using aerial mapping to forecast Australian goat supply and market trends. ABC Rural. Retrieved from <http://www.abc.net.au/news/rural/2017-03-10/mla-uses-aerialmapping-to-forecast-australian-goat-supply/8343288>
- DPI (2018). Feral goat biology and distribution. NSW Department of Primary Industries. Retrieved from <https://www.dpi.nsw.gov.au/biosecurity/vertebrate-pests/pest-animals-in-nsw/feral-goats/feral-goat-biology>
- DPI (2018, May). NLIS: feral and rangeland goats, Primefact 1265. NSW Department of Primary Industries. Retrieved from https://www.dpi.nsw.gov.au/data/assets/pdf_file/0019/732313/nlis-feral-and-rangeland-goats.pdf
- DPI (2018). Young Farmer Business Program. NSW Department of Primary Industries. Retrieved from <https://www.dpi.nsw.gov.au/about-us/rural-support/yfbbp>
- DPI (2018, March). General position paper - Development of the goat industry in NSW, NSW Department of Primary Industries. Retrieved from https://www.dpi.nsw.gov.au/data/assets/pdf_file/0011/804449/General-position-paper-development-of-the-goat-industry-in-nsw.pdf
- DPI (2006). Goat gross margins – July 2006. NSW Department of Primary Industries. Retrieved from <https://www.dpi.nsw.gov.au/agriculture/budgets/livestock>
- Francis, J., (2014). Development of web-based cost of production tools for the goat industry. Meat and Livestock Australia. ISBN: 9871825045796.
- GICA (2018). National Livestock Identification System. Goat Industry Council Australia. Retrieved from <http://www.gica.com.au/industry-programs/national-livestock-identification-system>
- Hutchinson, P., (2014). Assessment of the extent and capacity of goatmeat industry supply chains. Meat and Livestock Australia. ISBN 9781740362238.
- Jenkins, D., (2017). Value adding goatmeat for domestic consumers. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/research-and-development/search-rd-reports/final-report-details/Productivity-On-Farm/VRMH0065-Value-adding-goatmeat-for-Australian-consumers/3693>
- Jones, A., (2012). Rangeland goat production in western NSW, NSW Department of Primary Industries. Retrieved from https://www.dpi.nsw.gov.au/data/assets/pdf_file/0007/449323/Rangeland-goat-production-in-western-NSW.pdf
- Jolly, S., (2013). Goat nutrition in Australia – Literature review. Meat and Livestock Australia. ISBN: 9781741919974.
- Kahn, L., (2016). Expansion of WormBoss to include goats. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/research-and-development/search-rd-reports/final-report-details/Extension-On-Farm/Expansion-of-WormBoss-website-to-include-goats/3377>
- Keenan, R., (2018, February 27). The U.S can't get enough of Australian goats. Bloomberg markets. Retrieved from <https://www.bloomberg.com/news/articles/2018-02-26/no-kidding-u-s-goat-imports-are-rising-and-australia-s-winning>
- Knox, M., Hunt, P., (2014). Evaluation of anthelmintic efficacy and dosing practices on goats. Meat and Livestock Australia. ISBN: 9781740362276.
- Kijas, J., (2012). Evaluation of the genetic basis of polledness in Australian goats. Meat and Livestock Australia. ISBN: 9781741919660.
- Lu, C.D., (1988). Grazing behavior and diet selection of goats. Small ruminant research, vol 1, issue 3, 205-216. Retrieved from <https://www.sciencedirect.com/science/article/pii/0921448888900491>
- McLeod, S., (2017). 2017 Analysis of NSW fixed-wing aerial survey: Goats. NSW Department of Primary Industries. Unpublished data.

- MLA (2018). Market reports and prices, Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/prices-markets/market-reports-prices/>
- MLA (2018). About your levy: Goats. Meat and livestock Australia. Retrieved from <https://www.mla.com.au/about-mla/about-your-levy/goats/>
- MLA (2018). Going into Goats. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/extension-training-and-tools/going-into-goats/>
- MLA (2018). Going into Goats. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/extension-training-and-tools/going-into-goats/>
- MLA (2018). Profitable grazing systems. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/extension-training-and-tools/profitable-grazing-systems/>
- MLA (2018, March). Global summary market snapshot: Goatmeat. Meat and Livestock Australia Industry Insights. Retrieved from https://www.mla.com.au/globalassets/mla-corporate/prices--markets/documents/os-markets/red-meat-market-snapshots/2018-mla-ms_global-goatmeat.pdf
- MLA (2017, March). Global summary market snapshot: Goatmeat. Meat and Livestock Australia Industry Insights. Retrieved from <https://www.mla.com.au/globalassets/mla-corporate/prices--markets/documents/os-markets/red-meat-market-snapshots/mla-global-snapshot-goat-2017.pdf>
- MLA (2018, March 28). Australian goatmeat finds sustained global demand. Meat and Livestock Australia. Retrieved from https://www.mla.com.au/prices-markets/market-news/australian-goatmeat-finds-sustained-global-demand/?utm_source=TN_MLA-MLW&utm_medium=Email&utm_campaign=FINAL+Prices+per+cent26+Markets++28032018
- MLA (2017, July 7). The development of a registered Abamectin Anthelmintic for goats. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/research-and-development/search-rd-reports/final-report-details/Animal-Health-and-Biosecurity/The-development-of-a-registered-Abamectin-Anthelmintic-for-Goats/1635>
- MLA (2017, September). Annual report 2016-17. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/globalassets/mla-corporate/about-mla/documents/planning--reporting/mla-ar-lr.pdf>
- MLA (2017, September 28). Growth in goats. Meat and Livestock Australia. Retrieved from https://www.mla.com.au/prices-markets/market-news/growth-in-goats/?utm_source=TN_MLA-MLW&utm_medium=Email&utm_campaign=MLW_-_20170928
- MLA (2017, November 16). Where are the goats coming from and processed?. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/news-and-events/industry-news/where-are-the-goats-coming-from-and-processed/>
- MLA (2016). Top ten Australian goat export destinations based on 2016 volumes (tonnes swt). Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/prices-markets/overseas-markets/>
- MLA (2016, February 17). NLIS tagging exemptions depend on you!. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/news-and-events/industry-news/nlis-tagging-exemptions-depend-on-you/>
- MLA (2006). Going into Goats, Module 11. Meat and Livestock Australia. Retrieved from <https://www.mla.com.au/globalassets/mla-corporate/generic/extension-training-and-tools/gig-goat-depot.pdf>
- O'Connor, J., (2016). Australian goat industry summary 2016, Meat and Livestock Australia. Retrieved from https://www.mla.com.au/globalassets/mla_australian-goat-industry-summary-20162.pdf
- Osoro, K., Ferreira, L., Garcia, U., Jauregui, B., Martinez, A., Rossa Carcia, R., Celaya, R., (2013). Diet selection and performance of sheep and goats grazing on different heathland vegetation types. Small ruminant research, vol 109, issues 2-3, 119-127. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0921448812002696>
- Petty, J., (2018, April 16). RD&A project update. Meat and Livestock Australia. Report prepared for Goat Industry Council Australia and Goat Industry Development Group. Unpublished report.
- Pitt, J., (2014). Improving the profitable and sustainable management of rangeland goats in South Australia. Meat and Livestock Australia. ISBN: 9781740362290.
- Pulford, J., (2018, May 9). Securing Mildura jobs for our meat supply chain. Minister for Agriculture, Minister for Regional Development, media release. Retrieved from <https://www.premier.vic.gov.au/securing-mildura-jobs-for-our-meat-supply-chain/>
- Puxty, D., Schuster, P., (2014). Operational Upgrade of KIDPLAN materials. Meat and Livestock Australia. ISBN: 9781740362283.
- Uchida, R., (2018). Goat exports 2017. Presentation. NSW Department of Primary Industries, International Engagement.



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