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## Improving Farm Gate Returns and Reducing Reliance on Exports for the Australian Pulse industry

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### Abstract

Pulse grain crops play an important role in the Australian agriculture industry. However, for producers there is a substantial risk associated with growing pulses in the form of low production and inconsistent prices. The latter is caused in part by import restrictions introduced by foreign governments, highlighting the industry's overreliance on export markets. Domestic processing and value adding provides an opportunity to alleviate this issue to capitalise on the growing ability of the Asian middle class to purchase processed and premium food products as well as satisfying the increasing presence of health conscious consumers. Small and medium enterprises will play a significant role in adding flexibility and coordination to the supply chain while increasing overall chain surplus.

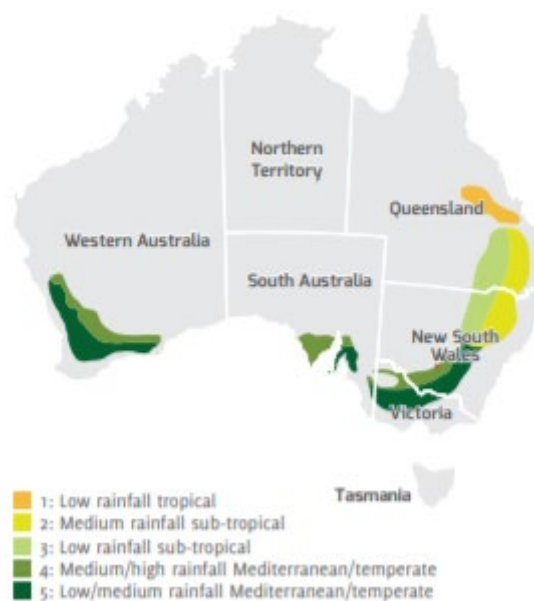
**Keywords:** Pulses, value adding, developing markets, small and medium enterprises, flexibility

### Introduction

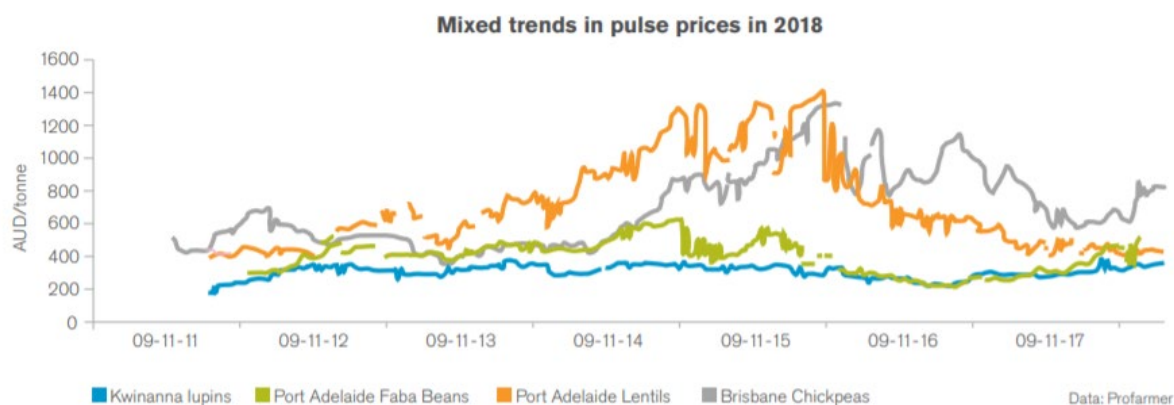
Pulses are grain legumes that can be used for human consumption but do not include peanuts and soybeans (classified as oilseeds). In Australia, there are seven major pulse crops grown which include chickpeas, faba/broad beans, lentils, lupins, field peas and mung beans with an array of smaller alternate legumes also grown (Pulse Australia, 2019). Pulses are grown in all grain growing regions of Australia occupying approximately 10 per cent of the total planted area (approximately 1.8 million hectares), however in some regions, pulses can occupy 25 per cent of planted area (Aegic, 2018). The regions in which pulses are grown are shown in Figure 1. The land potential for pulse production is estimated at 4.2 million hectares (Aegic, 2018).

Pulses contribute to sustainable farming practices as they have the benefits of fixing nitrogen, enabling weed control and providing a cereal disease break, amongst other benefits. In the winter cropping regions, pulses are sown in April-May and are harvested in late spring-early summer. In the northern production regions, production times can vary depending on the cultivar as this system utilises stored moisture or summer rainfall (Aegic, 2018).

While pulses provide many benefits to the agricultural system, the grain cash returns they provide for farming businesses are inconsistent. Recent trends can be described as boom/bust cycles for some pulses, or prices do not warrant production in others, as seen in Figure 2.

**Figure 1. Pulse production regions and their climates**

Source: Pulse Australia (2019)

**Figure 2. Australian port pulse prices from 2011-18 for lupins (Western Australia), faba beans and lentils (South Australia) and chickpeas (Queensland)**

Source: Rural Bank (2018) using data from ProFarmer

Lentil prices provide a recent example of this inconsistency in the period from 2014 until the present. The lentil price during the 2015/16 period reflected the peaks in worldwide demand and the prices received created unbelievable returns for farmers. This encouraged an increase in planting area worldwide in countries such as Canada, resulting in the market correcting during 2016. Furthermore, import restrictions were imposed in India during 2017 which resulted in further price reductions (Semmler, 2016). GRDC (2018) shows lentil prices were decile eight and above, with peaks easily being decile ten as can be seen in the figure in Appendix A. This figure also shows the 2017 price after the trade restrictions were imposed, which is only just above decile one.

As noted above, the Indian Government have imposed tariffs and/or quotas on different pulses which have been in place in different forms since the beginning of 2017. The current restrictions on a range of pulses are as follows (Wells, 2019):

“In summary, restrictions applying on April 1, 2019 for the year ahead are as follows:

- Desi-type chickpea, not restricted by quota, 60pc tariff

- Kabuli-type chickpea, not restricted by quota, 40pc tariff
- Lentil, not restricted by quota, 33pc tariff
- Peas (*pisum sativum*), 150,000t quota, 50pc tariff
- Mung bean, 150,000t quota, 10pc tariff
- Pigeon pea, 200,000t quota, 33pc tariff"

On top of these restrictions, the Indian Government have also placed strict preconditions that importers must comply with in order to import these grains into the country (Wells, 2019). These decisions appear to have been driven by political circumstances with half of the Indian population working in agriculture meaning that policies positively impacting these people will result in votes at the election ballot (Bettles, 2018).

Pulses have three main markets. The first is the export market, where the majority of Australian pulses are destined. Figure 3 shows the major export markets. Export is either completed by companies processing the grain in Australia or the commodity is bagged and/or containerised for direct export (Aegic, 2018).

**Figure 3. The major export destinations for pulses for the calendar year average until 2016**



Source: Aegic (2018) using data from ABARES

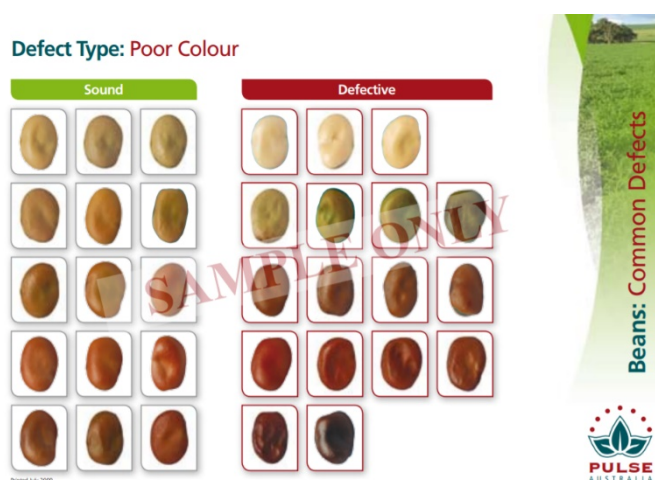
When processed, “common outputs include canning, split, noodles, snack foods, fermented foods, flour and used in soups, curried casseroles and salads” (Aegic, 2018). This showcases the wide range of uses of pulses for human consumption with the nutritional benefits of being high in protein, vitamins and fibre as well as the attractive natural flavours of many pulse crops (Aegic, 2018).

Northern Africa and the Middle East are large consumers of pulses. This is mainly in the form of whole faba or broad beans used in traditional dishes such as fuul. Furthermore, pulses are heavily consumed during the Islamic religious period of Ramadan, which occurs during the ninth month of the Islamic calendar year and has a starting date that changes every year (Sears, 2013, p.28). Returns on faba beans have elevated during the 2018/19 period as a result of tight world demand due to drought in many areas of Europe and Australia.

The Indian subcontinent which includes India, Pakistan, Bangladesh and Sri Lanka amongst other countries consumes large volumes of chickpeas, lentils and peas. This is the largest market for the Australian pulse export industry as can be seen in Figure 3. Consumers in this region use pulses in a variety of forms since pulses are a staple food in their diet. Consumers are sensitive to price in this region and will substitute as necessary (Sears, 2013, p.29).

Quality is an issue with the delivery and sale of pulses. Classification is completed through visual checks as can be seen in Figure 4 as well as size requirements. Pulses are classified on characteristics including variety, purity, moisture, defective seeds, colour, foreign and unmillable material such as soil, insects such as snails and foreign seeds, amongst others. These classifications vary for different types of pulses as well as for different end uses of these pulses. These standards are set by Pulse Australia and can be found on their website.

**Figure 4. Example of a visual classification guide for pulse quality**



Source: Pulse Australia

Some domestic buyers require higher standards when purchasing pulse products, especially when used in premium food items. An example of this is Pangkarra Foods, a premium gourmet food producer based in South Australia. In the production of retorted chickpeas, small stones the same colour and size as the chickpea grain were not cleaned out which caused quality assurance issues. This required the cleaner, AGT Foods and Ingredients, to implement manual sorting of chickpeas for the Pangkarra products (Jennings, 2016).

Another use of pulses is for livestock supplementary feed. In the past, pulses have accounted for between 10 and 20 per cent of the diet of Australian intensively produced livestock (Hawthorne, 2006). Furthermore, stock and mixed farmers in grain production regions utilise pulses as a supplementary feed source and view pulse stubbles after harvest as a valuable source of stock nutrition. Another example of the use of pulses for fodder is lupins being utilised as a protein rich feed source in the aquaculture industry. This popularity is due to pulses being protein, amino acid and energy rich with individual types of pulses having their own unique characteristics that an end-user will find attractive (Hawthorne, 2006). The by-products of cleaning and processing of pulses are utilised as stock feed, minimising and value adding to wastage from these processes.

Thus, pulses have a wide range of uses for human consumption and livestock feed, however the volatility in price and production provide barriers to consistent returns for farmers. In this paper we

analyse the Australian pulse industry value chain and investigate opportunities to increase farmgate returns for pulse production, increase value chain surplus and reduce the reliance on export markets.

### The Pulse Value Chain

As noted above, the majority of pulse production is exported. Table 1 and Figure 5 quantify the total production and the amount exported. There has been steady growth throughout the past decade with evidence of the boom and bust cycle showing, especially in Figure 5. The 2017 figures show a large boom in the production and export of pulses. As seen earlier in Figure 2, this rise shows a significant correlation to the inflated prices of lentils and chickpeas at that time, with production assisted by high seasonal rainfall in many of the cropping regions. In 2017/18, the forecast had been reduced when compared to the production of the previous season, as the Indian trade restrictions were imposed, reducing the financial incentive to plant these crops together with poorer seasonal conditions.

Figure 6 shows the gross value of production and export value of the same pulses. This further reinforces the economic significance of export markets to the pulse industry. Figure 7 shows the breakdown of costs involved with exporting pulse grains to the point of arriving at the foreign market to give an appreciation of the costs in this supply chain.

Assigning values to the domestic value chain of pulses is a more difficult process. After an extensive search there is little information available detailing the costs associated throughout the domestic supply chain for human consumption. This may be a result of the smaller domestic usage as well as private enterprise confidentiality surrounding their operations. This led to a decision to analyse how much value was created through the sale of whole and partially processed pulses as well as pulses with extensive modification and value added.

Table 2 and Figures 8, 9 and 10 give an indication of the amount of value added by cleaning and selling the pulse products as a whole food. Also shown is the value created from conducting further processing to create a premium niche product, as is the case with Pangkarra Foods. Whilst there are obviously costs and risks associated to bring these value-added products to market, it is interesting to see how much value is created.

The breakdown of costs displayed in Figure 7 could also be utilised in the domestic supply chain to cover the costs associated up until the point of cleaning and further processing of the pulse as well as delivery for livestock use. The point of the figure where this could occur is between 'at the farm gate' and 'on the truck/train ex silo point' as seen on the y axis. This would depend on the facilities that each enterprise is able to access.

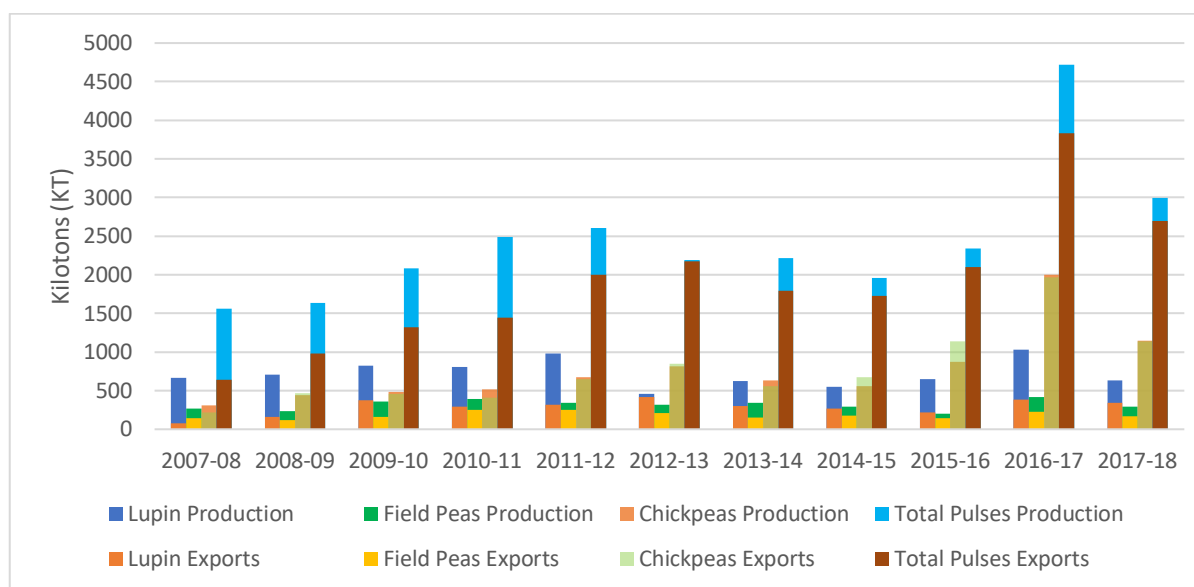
A stylised map of the Australian pulse value chain is shown in Figure 11. The details above the value chain highlight the enabling environment – the external issues considered by each of the component stages of the Australian pulse value chain. The details below the value chain highlight the specifics of what occurs within each stage and minor details of the actors involved. This map was created using information from Cloutman (2018), Vuong (2018), IBISWorld (2019), Thomson (2019), Aegic (2018), Economic Development Board (2015) and AGT Foods and Ingredients Inc (2018).

**Table 1. Production and exports (KT) for the 10 years to the 2017/18 season, with the 2017/18 data season being an ABARES estimate**

		2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
<b>Lupin</b>	Production (KT)	662	708	823	808	982	459	626	549	652	1031	631
	Exports (KT)	76	157	373	289	316	416	298	270	220	380	343
<b>Field Peas</b>	Production (KT)	268	238	356	395	342	320	342	290	205	415	289
	Exports (KT)	142	118	163	254	248	208	155	179	143	225	170
<b>Chickpeas</b>	Production (KT)	313	443	487	513	673	813	629	555	875	2004	1148
	Exports (KT)	218	466	459	409	653	852	562	674	1140	1970	1135
<b>Total Pulses</b>	Production (KT)	1564	1633	2083	2491	2604	2195	2217	1959	2342	4720	2996
	Exports (KT)	644	985	1321	1444	2002	2177	1796	1729	2098	3833	2694

Source: ABARES. Note: total pulses include lupins, field peas, chickpeas, faba beans, mung beans, navy beans and lentils and some other minor pulses

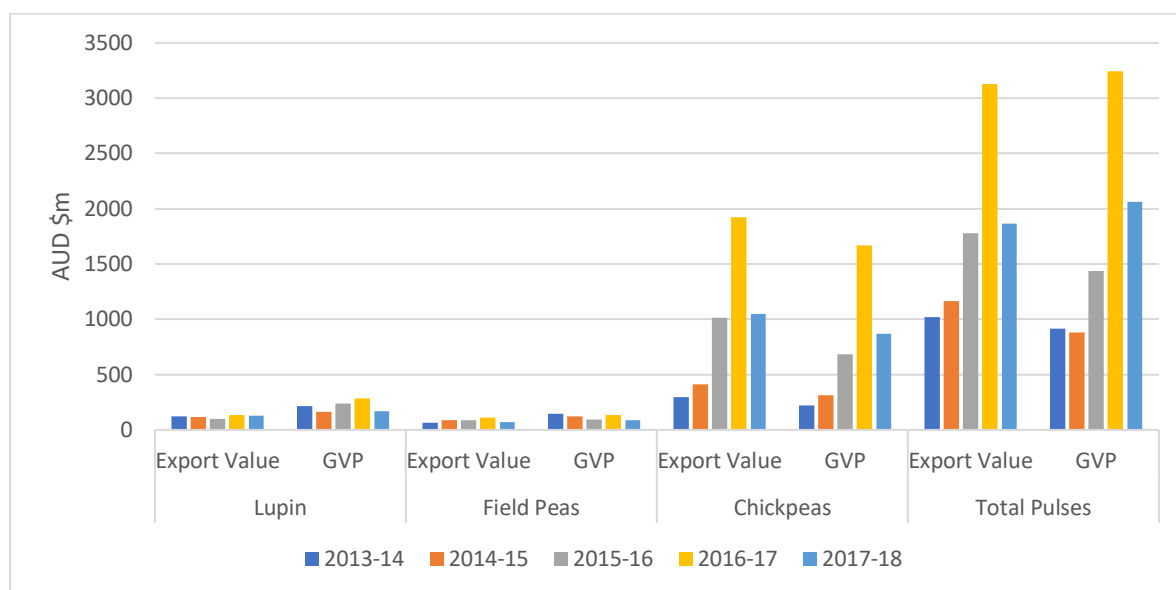
**Figure 5. Production and exports (KT) for the 10 years to the 2017/18 season, with the 2017/18 season being an ABARES estimate**



Source: ABARES. Note: total pulses include lupins, field peas, chickpeas, faba beans, mung beans, navy beans and lentils and some other minor pulses

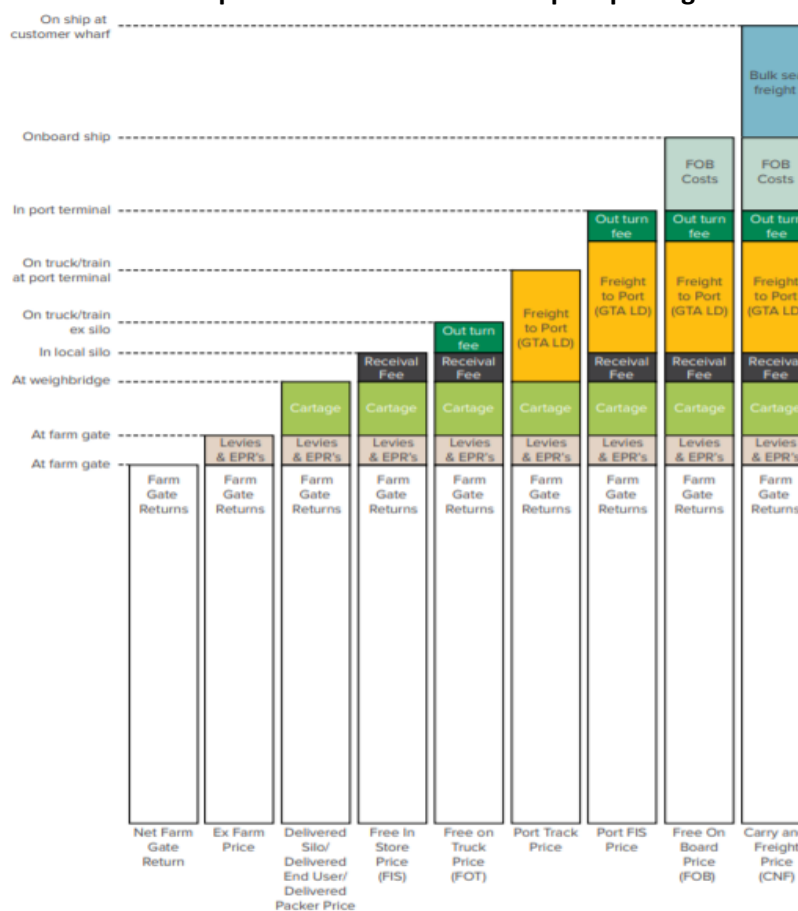


**Figure 6. Gross value of production (GVP) and the export values for a range of pulses from the years 2013/14 to the 2017/18 year (2017/18 was the ABARES estimate at the time of production)**



Source: ABARES Note: total pulses include lupins, field peas, chickpeas, faba beans, mung beans, navy beans and lentils and some other minor pulses

**Figure 7. The breakdown of costs and pricing points through the lentil export supply chain, which can be extrapolated across the other export pulse grains**



Source: GRDC (2018)

**Table 2. Price and quantities of different products offered by Mt Zero Olives (whole grains/partial processing) and Pangkarra Foods (processed and enhanced)**

Mt Zeros Olives	Price	Quantity (kg)	Pangkarra Foods	Price	Quantity (grams)
Split faba beans	\$12.00	2	Chickpea puffs	\$4.85	90
Organic chickpeas	\$ 6.50	0.5	Roasted Chickpea and/or Bean mix	\$5.95	200
Non-organic chickpeas	\$18.00	2	Retorted Chickpeas	\$ 6.00	450
Lentils	\$ 5.50	0.5			

Source: Mount Zero Olives (2019) and Pangkarra Foods (2019)

**Figure 8, 9 and 10. The bulk commodity price per tonne of lentils, chickpeas and faba beans (left), the per tonne price of Mt Zero Olives wholefood products (centre), and the per tonne price of Pangkarra’s processed and enhanced pulse products (right), 2019**



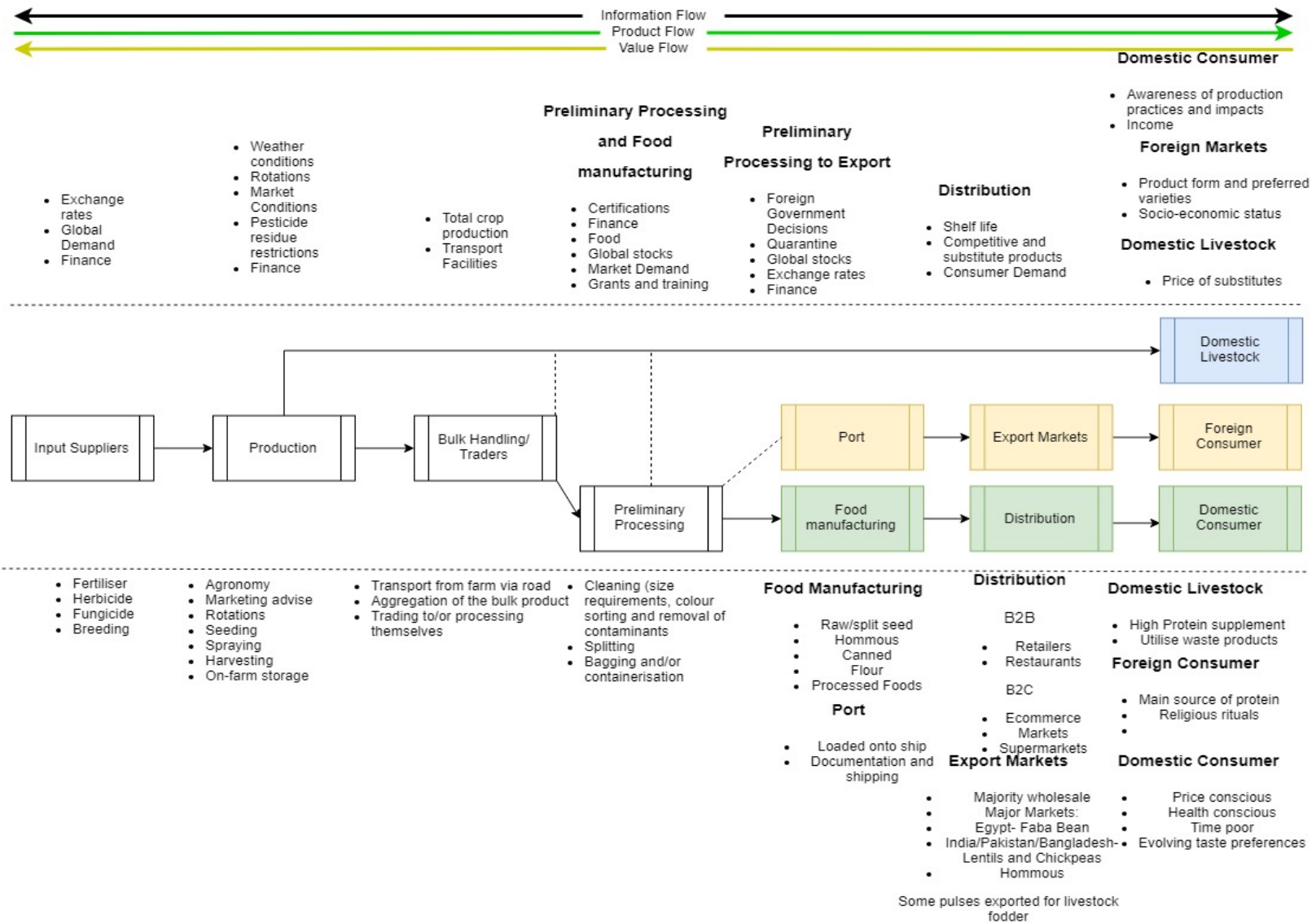
Source: GrainPro (2019), Mt Zero Olives (2019) and Pangkarra Foods (2019)

### Strategic Fit and Drivers of Profit

The export markets for pulses have shown consistent demand, especially in the regions where these products are a staple in consumer’s diets. The result of this can be seen by the expansion of the Australian pulse industry which has been enabled by exporting the majority of the pulses grown but is then at the mercy of protectionist policies, as is the case with India. Some markets can be price sensitive due to consumer income which drives them to utilise cheaper supplements as required, which again is the case in India (Seears, 2013, p.28). Egypt has an increasing reliance on imports according to Faysal and Shelaby (2017) which combined with rising demand, has created positive conditions for the faba bean industry. Egyptian consumers have a preference for faba beans which gives some level of demand certainty. Furthermore, government decisions impact the supply side with India imposing tariffs and quotas to protect the domestic industry. This causes an artificial reduction in the prices offered to Australian exporters which flows through the value chain. Exchange rates can have a large impact on the demand for Australia’s pulses with an appreciating dollar causing a rise in price for foreign buyers, which may highlight price elasticity (IBISWorld, 2019).



Figure 11. The Australian pulse value chain



Domestic demand for human consumption is not consistent at present when compared to the export market. With an increase in awareness of where food comes from and the impact it has on the environment, the pulse value chain has an opportunity to create an expanded domestic market. Business efforts are currently attempting to exploit this demand (Wilson, 2016). Evans Agribusiness Trading Group have announced the construction of a plant in the Wimmera region which will initially create 2,500 tons of protein powder per annum with plans to expand this (Darling, 2019). Pangkarra Foods, a family owned business, is also value adding through conducting cooking processes to whole grains targeting the premium niche snack food market (Pangkarra Foods, 2019).

Completing processes such as this while adding flavours to the product assists to increase the flexibility of the domestic industry, while also creating awareness and acceptance of pulse products. Livestock supplementary feed provides an alternate domestic demand with users being price sensitive due to the presence of many substitutes in the market.

The supply of pulses in Australia is impacted by many factors. The first of these is inputs such as fertiliser and fuel which can be influenced by exchange rates. Seasonal conditions affect the volume and quantity of supply alongside of other soil and performance constraints. The price outlook of competitive crops within the farming system can impact a farmer's decision to plant pulses. The ability to store pulses for long periods of time can assist to even out supply volatility, however this can come at a cost.

The pulse value chain is unable to respond effectively in a short period of time. This is due to production cycles as what influences decisions at planting may completely change come harvest. This can be impacted by different production cycles across the globe with changing dates of religious events such as Ramadan potentially causing marketing issues. Furthermore, the vast distances to export destinations requires a need to forecast demand and can result in conflicts if a change in the value of the dollar occurs over the transportation period (Seears, 2013, p.25). The storability of grain as explained above can also help the value chain to respond to changes in the marketplace.

The export value chain can be described as a low-cost value chain. This also means that currently it is a relatively unresponsive value chain. The production and export value chain are striving to reduce costs as much as possible. Now, in the face of uncertainty in production and demand, there is a requirement for the value chain to become more responsive. The domestic value chain is leading this through some small and medium enterprises entering the marketplace to add value as seen with the examples mentioned above. This area of the value chain has the potential to become increasingly responsive in order to meet consumers evolving needs through constantly innovating products. The combination of these arguments means that the pulse value chain can be described as a somewhat efficient value chain according to Chopra and Mendel (2016, p. 27).

### **Major Constraints and Possible Improvements**

The overreliance on delivering raw products to export markets is the major constraint facing the Australian pulse industry. It has resulted in many other issues which can be related back to this overreliance. The exposure to the impact of government decisions as explained above as well as intense competition with other large producers of pulses such as the United Kingdom and Canada has resulted in poor prices for pulses and reduced transparency and price discovery. An example of the latter occurred recently with chickpeas, when the Indian trade restrictions were put in place. Furthermore, the constant threat of government intervention means that forecasting demand is an increasingly difficult process. The Australian government and industry are lobbying the Indian government to have these restrictions removed, but while production can remain stable in these

regions and a large percentage of the population relies on agriculture as a source of income, there will always be the threat of protectionist policies.

The major obvious intervention is the continued development of Australian businesses that process pulses in order to add value for the Australian domestic and export market. This will likely rely on a mix of primary processing (conversion of raw materials to commodities) and secondary processing which is combining a variety of ingredients to create a food product (Wilson, 2016). Conducting these processes will create large amounts of value and will enable access and create demand in different markets. The production and marketing of these products would take advantage of the natural qualities of pulses both for the environment and for the consumer. Some of the benefits of pulses can be seen in Figure 12.

Wilson (2016) alludes to there being two major markets these processing efforts would target. The first of these are traditional markets which are driven by population size and a rapidly growing middle class, with the growth dominated by Asian countries. Currently this segment is receiving some attention from processors such as Barilla in pasta products (Avery, 2016). The newer markets target a consumer that is health conscious and desires a snack with numerous nutritional benefits whilst being non-GMO and having low allergenicity, creating a competitive advantage against the nut market. Both of these consumer markets have a huge amount of scope for delivering positive results for the pulse value chain.

### **Entrepreneurial efforts in domestic food processing and retail**

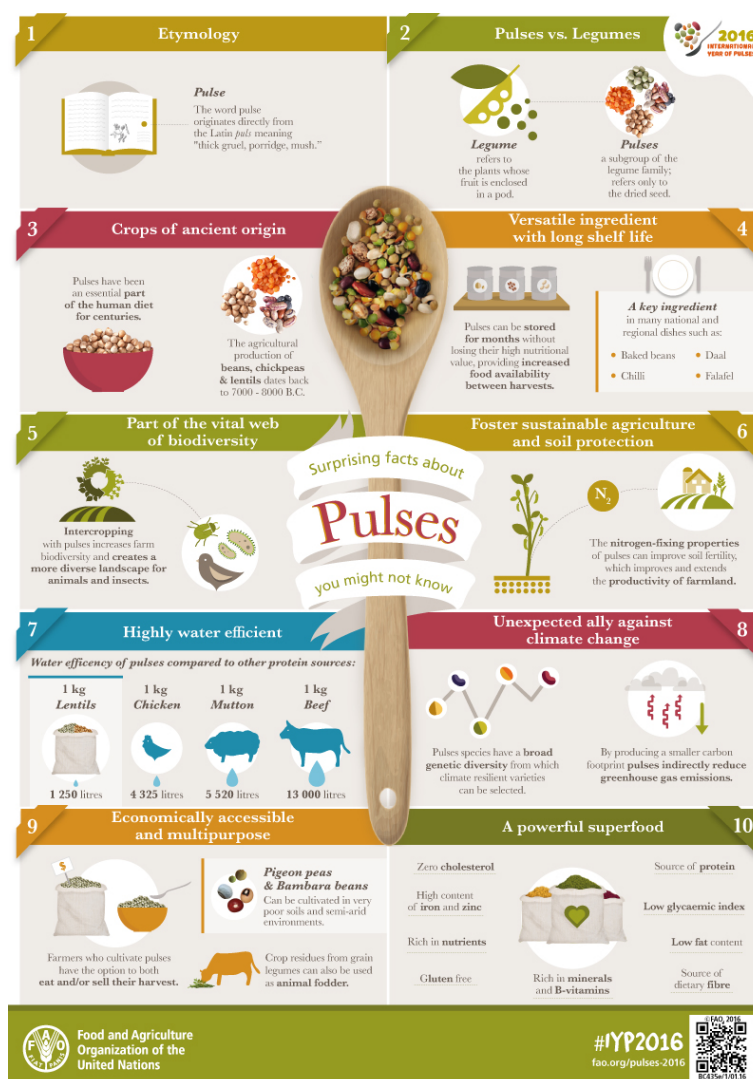
An interesting set of statistics sourced from the United States surrounds the creation of new food brands. These brands have been absorbing large amounts of growth in the markets they have disrupted. They only account for 2 per cent of total market share in 45 categories but accounted for 25 per cent of the growth of these categories between 2012 and 2016 (McRoskey, 2018). Differentiation was a constant amongst these companies utilising higher quality or desirable attributes and have taken advantage of “brand memorability, shopper visibility and range productivity” (McRoskey, 2018). These efforts could even be expanded to the animal food market as highlighted in Avery (2016) and Sears (2013, pp. 30-31).

To take advantage of growth markets utilising the benefits of pulses, increased levels of flexibility need to be added to the value chain to deal with the uncertainty of creating new products. Australian small and medium sized enterprises according to CSIRO (2017) have the qualities of being “fast and agile with high innovation potential” which shows that there may be potential to satisfy changing consumer preferences.

According to Farahnaky et al. (2018), innovation relating to pulses in the marketplace is low especially when it comes to product line diversity in Australia compared to countries such as India, the United States and Canada. These marketing activities can be targeted at a wide range of demographics who have similar health aspirations and expectations of their food. Millennials and younger demographics are currently creating opportunities through disrupting the way marketers and entrepreneurs think about food and nutrition. This sets the scene for entrepreneurial activities to improve value chain outcomes.

Firstly, as a business wanting to enter the value chain, there needs to be a case to improve chain surplus to improve the chance of success. The first way this can be done is to increase the coordination within the value chain. Chopra and Mendel (2016, p.256) outline the managerial actions that can be utilised to increase surplus in the value chain. Goal and incentive alignments could involve the creation of a regional brand, much like what occurs in the wine industry.

Figure 12. The benefits of pulses



Source: FAO (2016)

This would occur through a cooperative arrangement between farmers and businesses throughout the value chain to produce, process and market the product as sourced from a single region and utilise this to create appeal with consumers through seeing the product movement from paddock to plate. This process could utilise the benefits of tailored sourcing from certain reliable regions to enable the creation of this regional brand. Furthermore, this would allow confidence amongst producers that sacrifices in alternate production methods and certifications will have a realistic chance at achieving returns for them. Initially due to likely demand uncertainty and low levels of capital, the product manufacturers could utilise revenue sharing to give some of the returns, when/if they occur, back to producers who have borne the initial risk in supplying the pulses, if done so at a lower value. Using strategies such as these would allow businesses entering this market to improve the coordination of the pulse value chain, which will desirably lead to long term viability and increased chain surplus.

Once customer demand has been created and growth is occurring, collaborative forecasting and planning could be implemented to enable coordination between producers and other actors in the value chain. At this point, offering stabilised prices that may be above the market's long term average would enable trust to be created amongst producers and value chain actors and ensure long term commitment. These tactics can also be utilised with primary processors, with a potential example being AGT Food and Ingredients as well as secondary processors to enable smaller, customisable lots

to be processed to the requirements of the individual business. In the longer term, with some luck and success, these strategic partnerships will have high levels of trust between actors in the value chain which will result in profitability and increased surplus amongst members when volumes increase (Chopra and Mendel, 2016).

Grading would be another key focus for these businesses which creates risks for both the producer and the later stages in the value chain. Foods that require good physical characteristics may have an issue when it comes to grading in the form of rejection, which could harm relationships and trust within the value chain over perceived unfairness. This is an important consideration for businesses creating these food products, and if it is deemed there is a high risk of incidences such as this occurring then it could be reduced, for example by having a diversified product line that does not require such high standards.

As mentioned above, outsourcing would likely be a required task of these businesses. For the primary and even secondary processing, the main benefits of this process would be improved production quality and reduced costs through using specialised businesses (Chopra and Mendel, 2016, p. 57). This would allow the business managers to focus on the creation of products and the subsequent marketing.

Information technology is another key enabler for these types of efforts. Due to the low cost and availability of technology and platforms to advertise and sell products, businesses can gain access to markets without needing to go through traditional routes. Customer relationship management will occur through the business's individual websites which will enable control over the sales and order management. Social media platforms will be a cornerstone of the marketing and feedback channels of these businesses through allowing desired customers to be selected and targeted while allowing consumers to communicate with the business at any time (Patel, 2017). The use of information technology has also opened international markets to these food producers. As mentioned above, the expansion of Asia's middle class is creating opportunities for these products to be sold overseas through online platforms.

It is not only small and medium sized businesses which could enter this market. There is also potential for large mature businesses to expand their product mix offered as a method to capitalise on the benefits of consuming pulses. Similar principles to what have been discussed above will need to be followed, with many of the supply chain strategies and cross functional drivers being well aligned and highly efficient already. With established brands and experience developing and marketing new products, these businesses have and will continue to experiment with different combinations, perhaps without the speed and creativity of entrepreneurial enterprises. Another school of thought which has been touched on above is to utilise pulses to create variations of foods already being produced which is an example of expanding the depth of a product mix. Many of these businesses have access to large levels of finance and/or capital which can pay for these expansions.

## **Conclusion**

This analysis has given an insight into how the Australian food industry can leverage the various strengths of pulse grains in order to improve economic returns and chain surplus. A major benefit of this is in reducing the reliance of this industry on the export market. The protein rich nature of pulses combined with the other benefits they provide consumers whilst being the most environmentally friendly source of protein are strong attributes in favour of the products. The main focus has been on fast moving and innovative small businesses capitalising on consumer trends in Australia and beyond its borders through improving coordination and other facets of the value chain while utilising



information technology. This will make the pulse value chain increasingly responsive to deal with uncertain and changing consumer demand.

Australia has a strong reputation for producing high quality pulses which has the potential to translate to a strong agribusiness industry that adds value to these products for consumers. With Australian farmers facing a wide range of issues from reducing terms of trade to poor climatic conditions, the benefits of a strong pulse industry delivering returns will ensure pulse production is a viable enterprise into the future.

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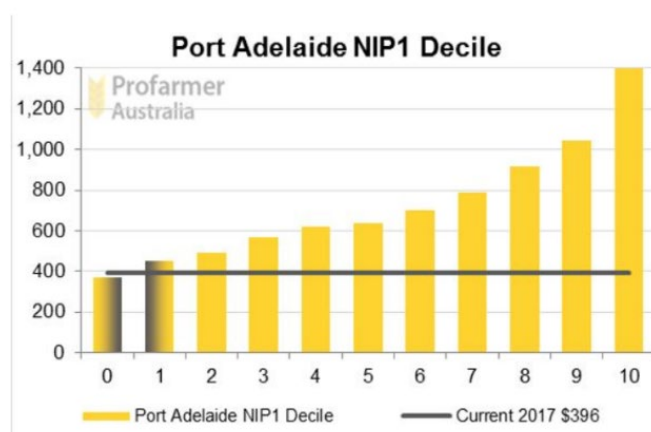
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#### Appendix A. Port Adelaide NIP1 lentil decile prices per tonne



Source: GRDC (2018)