aegic

Australian Export Grains Innovation Centre

The economic value to the Western Australian economy of oat processing and oat production within the state

30th April 2024

A report to the Processed Oats Partnership (POP) Program

Ross Kingwell[1] and **Vilaphonh Xayavong**[2]

[1] Chief Economist, AEGIC

[2] Research Economist, DPIRD

Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

GRAINS AUSTRALIA

AEGIC is an initiative of the Western Australian State Government and Grains Australia

The Economic Value to the Western Australian Economy of Oat Processing and Oat Production within the State

Executive report

Ross Kingwell[1] and **Vilaphonh Xayavong**[2]

[1] Chief Economist, AEGIC
[2] Research Economist, DPIRD

Introduction

To support the growth of the oat industry in Western Australia over the next 20 years, the State Government is providing $10.1 million to the Western Australian Agricultural Authority (WAAA) to manage the industry-led Processed Oats Partnership (POP) Program. Industry partners are co-contributing cash, technical expertise, and other in-kind support.

This report is provided as a component of Output 1 of the AEGIC based POP activities within the project titled "Economic lens to capture increased market value for oats through industry innovation and better targeted industry investment". The purpose of this report is to provide the POP steering group with information on the economy-wide ramifications of an enlarged oat production and processing sector in Western Australia. It complements other work to be completed by AEGIC including information on the rates of growth in demand for oats and oat products in key and emerging markets. Collectively this knowledge will give useful market intelligence to oat marketers, oat producers, and oat processors to aid their strategic decision-making.

Executive Summary

Western Australia annually produces around 750 kt of oats and about 500 kt of oaten hay. The health properties of processed oats are seen as a springboard for greater international and local sales of oat-based foods. Of interest to industry and government, when considering investments to expand oat production and oat processing in Western Australia, is to understand the state-wide economic ramifications of those potential investments. In short, how might employment, wages and salaries growth and the value of goods and services produced in the state be affected?

This report examines the economic impact of expansion in oat processing and oat production in Western Australia via the lens of multiplier analyses that draw on an industry input-output depiction of the economy of Western Australia (WA).

Using an illustration of the annual capacity of oat processing in WA being expanded by an additional 100,000 tonnes, the output multiplier impacts of that enhanced capacity are shown to range in value to the state's economy from $111m to $222m. The range in additional employment generated by the increase in oat processing is between 175 to 349 additional jobs. Plus the lift in wages and salaries across the state's economy will range from $18m to $35m; and the additional value-added across the economy will range from $36m to $71m.

In the case of the annual capacity of oat production in WA expanding by an additional 100,000 tonnes, the output multiplier impacts of that enhanced capacity range in value to the state's economy from $42m to $80m. The range in additional employment generated by the increase in oat processing is between 71 to 133 additional jobs. Plus the lift in wages and salaries across the state's economy will range from $6m to $10m; and the additional value-added across the economy will range from $18m to $34m.

Hence, expansion in either industry (oat processing or farm-level oat production) generates a range of favourable economic consequences for the state's economy. However, due to its different nature, oat processing when subject to demand stimulus tends to generate a larger range of economic benefits, particularly in employment, wages and salaries; and value-adding.

Estimates of four types of multipliers (Table 1) are generated for oat processing and oat production:

1. Output multipliers that capture the total value of production by all sectors of the economy required to satisfy an extra million dollars' worth of demand for the output of oat processing or oat production at the farm-level.
2. Income or wages and salaries multipliers show the increase in income earned by households resulting from an extra million dollars' worth of demand for the output of oat processing or oat production at the farm-level.
3. Employment multipliers show the jobs supported by an extra million dollars' worth of demand for the output of oat processing or oat production at the farm-level.
4. Value-added multipliers show value-added generated by industry production across sectors required to satisfy an extra million dollars' worth of demand for the output of oat processing or oat production at the farm-level.

Table 1: Multipliers associated with each effect

	Type of Effect						
Multiplier Type	Initial or Direct	First Round	Industrial Support	Production Induced	Simple	Consumption Induced	**Total**
Output	1.00	0.40	0.22	0.63	1.63	0.24	1.87
Employment	1.31	0.80	0.45	1.25	2.56	0.58	3.14
Wages and Salaries	0.06	0.07	0.05	0.12	0.18	0.05	0.24
Value added	0.40	0.17	0.10	0.27	0.67	0.13	0.80

The components of each type of effect that are the ingredients of each multiplier are highlighted in Table 2 for the oat processing sector.

Table 2: Description of effects

Type of Effect	Description – Value chain segments	Production Induced Effect	Simple Effect	Total Effect
Initial or Direct	Increase in labour and production within the oat processing sector		X	X
First round (or supply chain effect)	Increase in inputs required by the oats processing sector	X	X	X
Industrial support	Increase in inputs required by the support industries	X	X	X
Consumption induced	Effect from additional economic activity of consumers			X

The economic value to the Western Australian economy of oat processing and oat production within the state

Technical report

Background

Australia's production of oats ranges from around 800 kt in drought years to close to 1600 kt in bumper years (Figure 1).

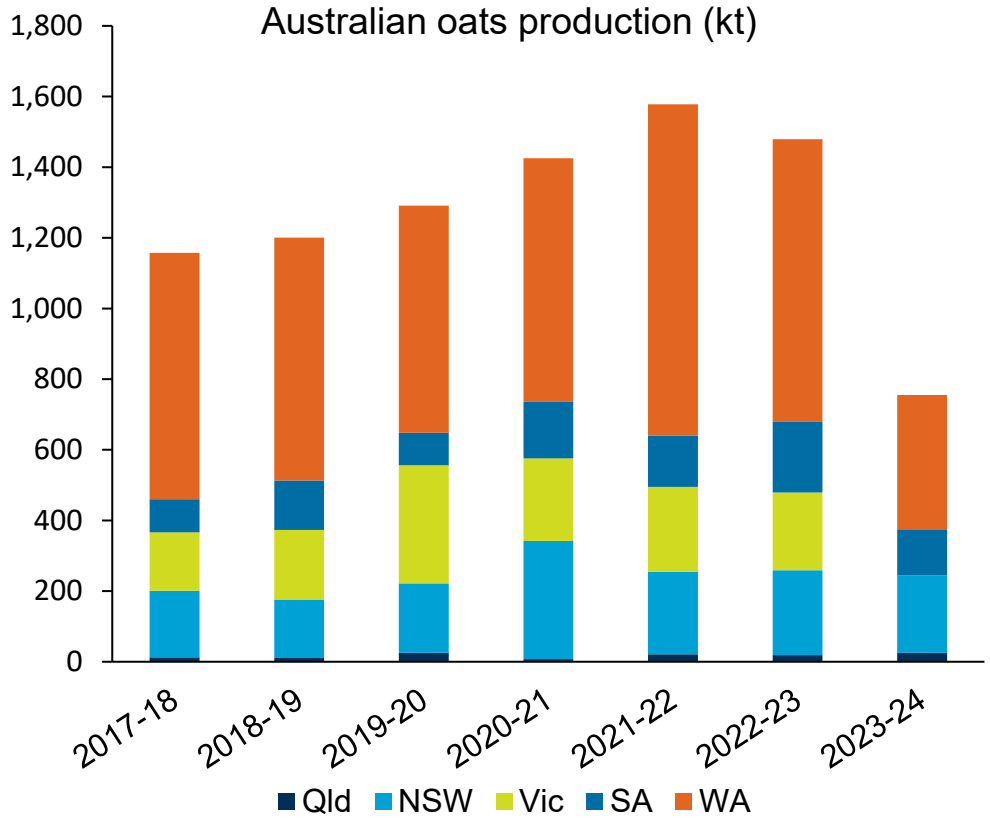

Figure 1: Oats production across years and in Australian States

Western Australia (WA) produces around 750 kt of oats and also about 500 kt of oaten hay each year. WA produces over 40% of the nation's export hay, generating over $120 million in export earnings to the state in recent years (DPIRD 2023). Typically, 25 per cent of the WA oat crop is retained on-farm as animal feed, and oat hulls and downgraded oats (when sufficiently cheap) are used in the domestic feed trade in compound feed rations (DPIRD 2023).

Since 2017, and depending on production volumes and seasonal conditions, about 250 kt to 300 kt of oats is used for on-farm and domestic feed uses. Exports of raw oats account for another 100 kt to 500 kt; and a further 150 kt to 250 kt tonnes are processed and mostly exported. In very recent years, supporting greater food use of oats, are increased investments in oat processing in WA that brought the oat processing capacity in WA in 2022 to about 250 kt (Milnes Feeds, 2022) and further capacity is being constructed during 2024.

There are three main oat processors in WA; Pepsico, Unigrain and CBH. Pepsico owns Quaker Oats and the capacity of its Perth plant has been increased. Unigrain is also upgrading its plant in Wagin and CBH operates its new Metro Grain oats processing plant at Forrestfield. Avena Mills is a smaller plant based in Wandering.

Unigrain's Wagin oat processing facility received $3 million as an Industry Attraction Fund grant for its expansion project that will cost around $10 million. Expansion commenced in late 2023 with a completion date in late 2024. The milling capacity at Wagin will increase from 75,000 tonnes annually to about 175,000 tonnes (Dupe and Rooney, 2023). The plant receives oats from growers, then cleans and dehulls them. The expanded plant will produce oat flour to be predominantly exported to Asia. Once complete, the Wagin site will be the single biggest oat flour production site in the Asia-Pacific region. The plant also steams and dries the dehulled oats before sending them to its Bibra Lake facility to be processed into breakfast cereal.

CBH's oat processing facility at Forrestfield has an annual throughput of 60,000 tonnes. CBH also wholly owns Blue Lake Milling who operate oat processing plants in South Australia (Bordertown) and Victoria (Dimboola), with the head office in Bordertown. Blue Lake Milling process 60,000 tonnes of oats annually to international markets, mainly China. CBH thus has a national capacity to process 120,000 tonnes of oats, perhaps up to 140,000 of oats.

A new entrant to oat processing is Wide Open Agriculture. It has raised $20 million in capital funding to build WA's first oat milk manufacturing plant, including a $5 million Industry Attraction Fund grant. The new processing plant is proposed to be located strategically adjacent to the Buntine Protein pilot plant and will produce a range of oat milks in 1 litre formats, featuring the company's lupin-based Buntine Protein as an ingredient.

The increased investments in oat processing in WA will be supported partially, to a limited degree, by local population growth. WA's population in 2024 is almost 2.9 million; yet is forecast to grow to almost 3.4 million by 2040. Current per capita annual consumption of oats in Australia is approximately 10 kg. Hence, an additional 0.5 million people in WA will likely annually consume a further 5,000 tonnes of oats; equivalent to a very modest almost 1% increase in local oat grain production. In addition, the national population increase by 2040 is projected to be an additional 7.9 million people whose per capita oat consumption translates into a requirement for an additional 79 kt of milling oats, posing a further source of potential demand for WA oats, particularly whenever eastern Australia experiences severe drought.

However, the main source of future demand for WA oats is exports; raw oats are currently sent in bulk, mostly to China and to a lesser extent India, Japan and Malaysia; and then processed oats – mostly rolled and flaked – are exported via containerisation. Local processing of oats is a form of decommodification. For WA oat farmers, through their membership of CBH, growers participate in an off-farm downstream value-adding investment.

As additional oat processing occurs in WA, an economic question arises: What is the magnitude of wider economic benefits generated by oat processing? The magnitude of those benefits is the outcome of the types of processing and product mix created via oat processing. This is outlined in the next sub-section.

Physical flows of oats in processing options

As shown in Figure 1, oat processing entails several activities, with a range of potential products able to be produced.

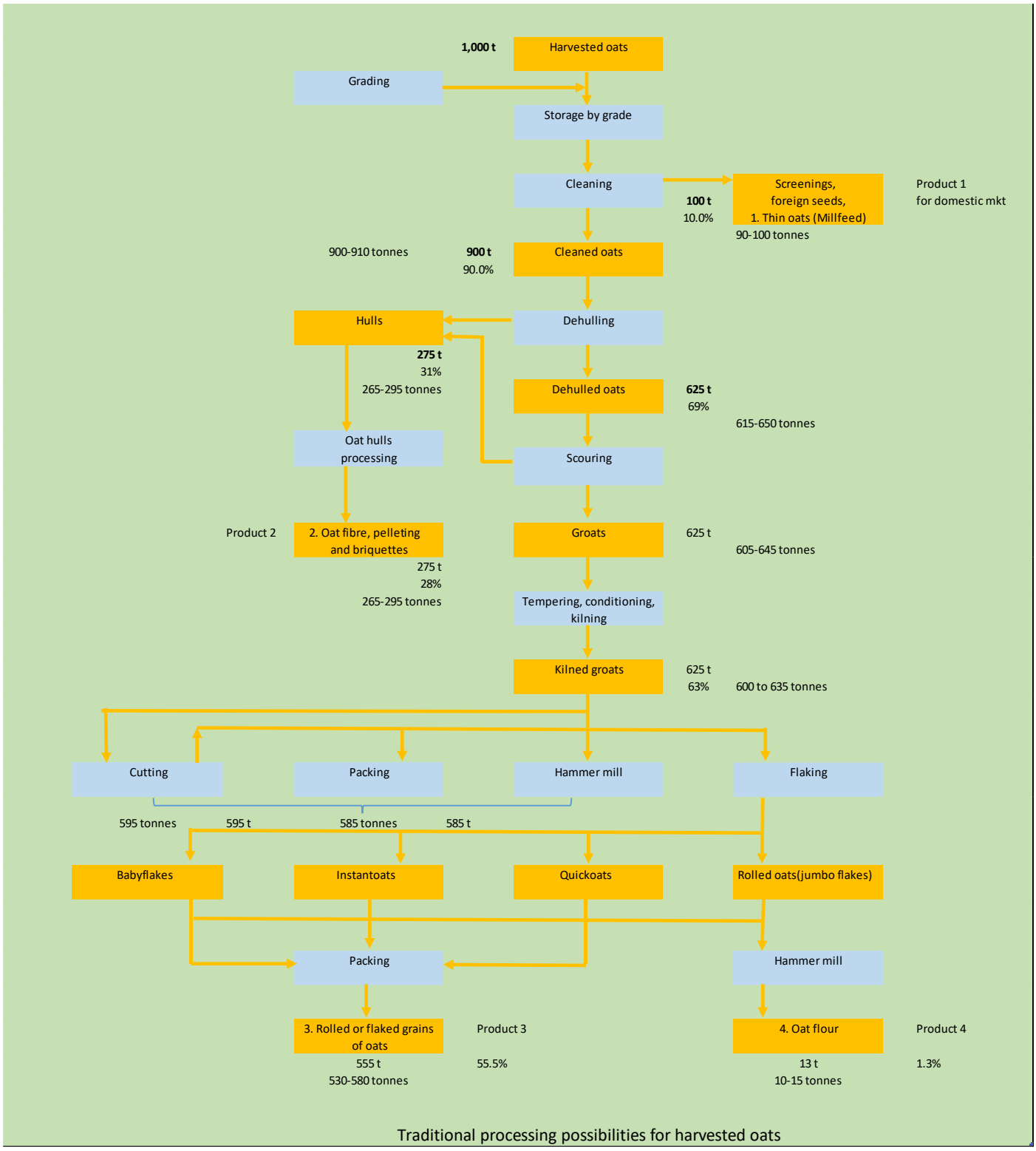

Figure 1: Processing options in traditional oat processing.

Note: These are indicative flows and should not be construed as representing flows in any actual oat processing facility in WA.

Raw oats need to be graded, cleaned, dehulled, scoured, tempered, kilned and then are subject to a further set of processing options including cutting, hammer-milling, flaking and packing; or are subject to further milling to produce oat flour that is exported or used in producing oat milk. Although oat processing is capital intensive, it is not labour-intensive. Increasingly, oat processing plants and equipment are designed to operate with low levels of labour. Hence, the main costs are typically – (i) the equipment depreciation and its energy use, (ii) the cost of oats as the plant's feedstock, and to a lesser extent (iii) the annual labour cost to operate and maintain the plant's equipment and oversee product flow.

Unfortunately, due to commercial sensitivities there are no public domain datasets on the features and related construction and operating costs of various types of oat processing plants. Private discussions with some operators have revealed the increased cost-efficiency and technical capability of new plant options; but much information remains commercial-in-confidence. Accordingly, to estimate the impacts of additional oat processing in WA we have relied on value chain analyses and industry modelling at the state level.

The estimation of the economic impacts of additional farm-level oat production and additional processing of oats is sensitive to the value of oats. An examination of milling oats prices ex-Kwinana reveals their volatility (Figure 2).

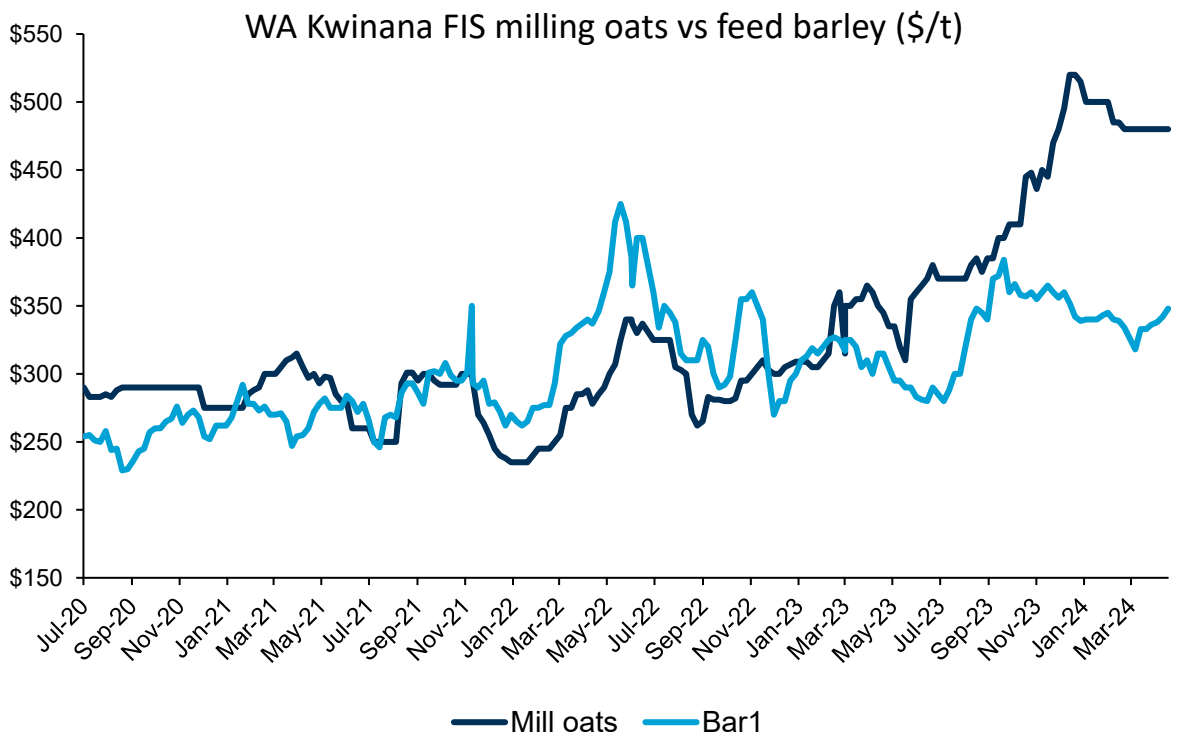

Figure 2: Milling oats and malting barley prices (Kwinana FIS $/t): July 2020 to April 2024

Farmers' plantings of oats plantings vary according to seasonal outlooks and relativities of prices of crop alternatives. Australian oats prices can vary within and across seasons. By illustration in season 2023 when WA harvested its smallest crop in more than a decade, Kwinana FIS prices for milling oats increased jumped more than $150/t from planting to post harvest. Substantial quality downgrading following a wet 2023 harvest in Victoria also contributed to these higher prices.

Over a handful of years, and often within a season, oats prices are lognormally distributed (Figure 3). The practical interpretation of this distribution is that often oat prices remain

around the lower end of the spread of prices. Hence, in many seasons farmers' experience is their receipt of modest prices for the oats they produce (assuming the Profarmer FIS series is a reliable view of likely prices actually paid to most farmers).

The FIS prices mostly range from $265/t to $365/t with the distribution's median price being $309/t. We know from the AEGIC supply chain cost studies that the volatility in FIS prices is not caused by marked changes in supply chain cost components. Rather price volatility is mostly the outcome of production volatility and changes in international and local prices for food and feed grains.

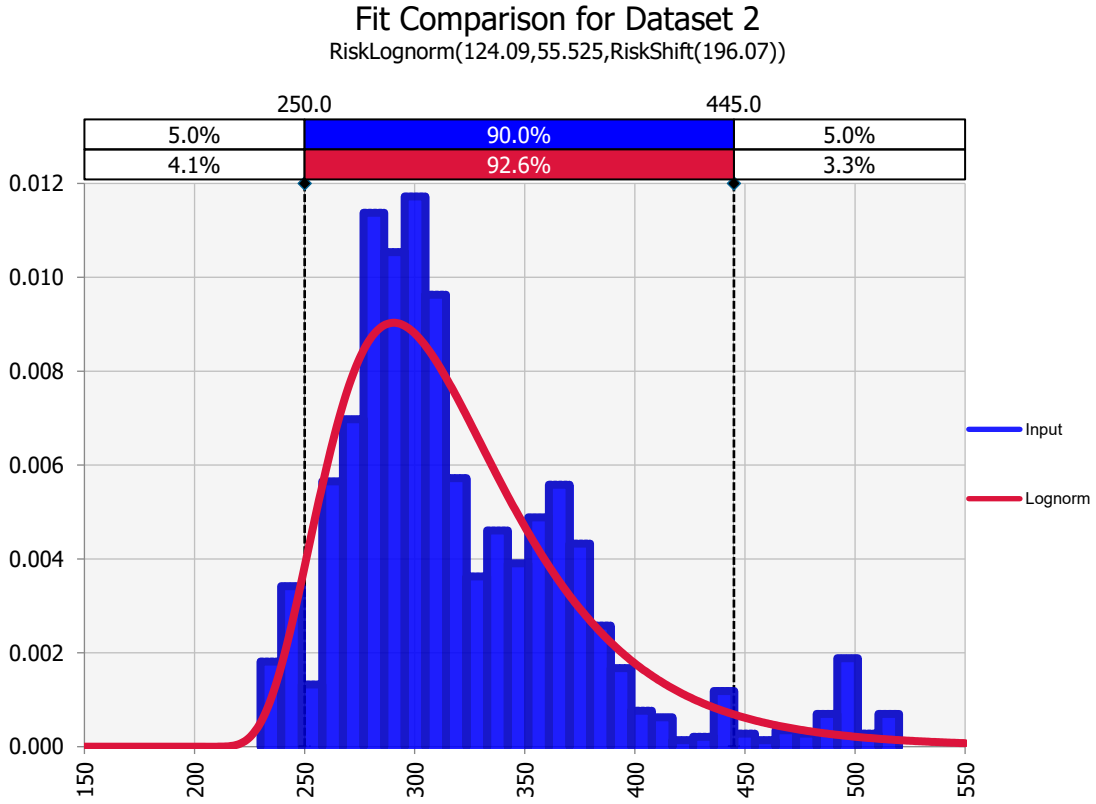

Figure 3: Best-fit lognormal distribution of manufacturing grade oat prices (FIS, Kwinana) and the underlying price dataset: Jan 2020 to Apr 2024

Infrequent spikes in oat prices are observed where FIS prices can exceed $450/t. The skewed nature of the price distribution (Figure 3) causes the mean price to be $320/t, exceeding the median price of $309/t. This suggests that in some seasons, especially in low volume years and where international grain prices are high, a marked upward shift in oat prices can occur.

The volatility in milling oat prices causes volatility in the economic impacts of additional farm-level oat production and additional processing of oats. Accordingly, in the following section a range in the magnitude of impacts is presented.

Economic impacts of additional oat processing in WA

A common measure of economy-wide impacts involves use of multipliers calculated from Input-Output tables of a state economy. Generally, the more connected an industry is within a state economy, the larger the multiplier effects of any growth in that industry.

Types of multipliers

- Output multipliers capture the total value of production by all sectors of the economy required to satisfy an extra million dollars' worth of demand for an industry's output.
- Income or wages and salaries multipliers show the increase in income earned by households resulting from an extra million dollars' worth of demand for an industry's output.
- Employment multipliers show the jobs supported by an extra million dollars' worth of demand for an industry's output.
- Value-added multipliers show value-added generated by industry production across sectors required to satisfy an extra million dollars' worth of demand for an industry's output.

Each multiplier has various components.

The direct effect: this is the initial required production and employment associated with an extra million dollars' worth of the particular industry's output, where in this case the output is that for oat processing.

The first-round effect is the demand for intermediate goods and services by all industries along the oat processing supply chain in response to the initial increase in oat processing output.

The industrial support effect: this is where each industry supplying goods and services to the oat processing industry increases their own input demands in response to the increase in their production in the first-round effect, which in turn induces extra output. The combination of the direct effect plus supply chain effects measures the economic impacts on all industries involved in the oat processing supply chain, result in what are called simple multipliers. The combined effects of the first-round effect plus the industrial-support effect are called the production-induced effect.

The consumption-induced effect: the increased economic activity leads to increased employment across the economy, which in turn leads to increased household consumption expenditure driving further increases in production. The combined effects of simple multipliers plus the consumption-induced effect are called total multipliers.

Measuring economic impacts can be decomposed into two stages: (i) a production-induced effect and (ii) a consumption-induced effect. The production-induced effect is sometimes also called the "type 1 effect" with the simple effect hence being called the "type 1 multiplier". Likewise, the consumption-induced effect is sometimes called the "type 2 effect" with the total effect being named as the "type 2 multiplier". Mathematically, the simple effect = Direct effect + Supply chain effect. The production-induced or supply chain effect = Industrial support effect + First round effect. The Total effect = Simple effect + Consumption-induced effect.

To estimate the various multipliers associated with enlargement of oat processing in WA involved creating a disaggregated industry Input Output table for the WA economy. This task of describing all the economic linkages between industries across the economy of WA is a huge endeavour; involving several months of work. It required access to a range of national,

state and industry datasets, including value chain mapping. This report does not explore or explain all the steps and datasets involved in creating the industry Input Output table for the WA economy. However, the list of the 121 industries described by the table is outlined in Appendix One. The list includes the oat industry and a separate grain milling and cereal product manufacturing industry.

Further detail of how WA industry multipliers are generated is outlined in Xayavong et al. (2023).

Multiplier impacts in WA for oat processing

Output multipliers in WA

Each million dollar increase in demand for the output of the oat processing industry results in the output multipliers listed in Table 3.

Table 3: Output multipliers for WA oat processing

	Type of Effect						
Output Multipliers	Initial or Direct	First Round	Industrial Support	Production Induced	Simple	Consumption Induced	Total
Oat processing[a]	1.00	0.54	0.32	0.86	1.86	0.36	2.22

[a] Strictly, this is the grain milling and cereal product manufacturing industry.

Each million dollar increase in demand for the output of the oat processing industry generates additional output across a range of industries involved in supporting or benefiting from oat processing. The aggregate value of the additional output across the WA economy is worth $1.86 million, including the supply chain effect of $0.86m. In other words, the output simple effect is $1.86m. The output increase at this production-induced stage would typically be associated with some small changes and increases in jobs in the industries involved in supporting or benefiting from oat processing. The increase in employment at this stage would be associated with any increase in the expenditure on wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure is captured in the local economy. The consumption-induced effect under this scenario is estimated at $0.36m. In sum, the total output effect, including all direct, supply-chain and consumption effects is estimated to be worth $2.2m per million dollar increase in demand for the output of the oat processing industry.

To more practically illustrate the magnitude of these multiplier effects, suppose the annual capacity of oat processing in WA is expanded by an additional 100,000 tonnes and the output of the oat processing is conservatively valued at an equivalent price of $800 per tonne. The output multiplier impacts of that enhanced capacity would be $80m * 2.22= $178m (where $80m= 100,000t*800$/t). However, as previously noted, wide variation in oat prices is feasible. Hence, it is possible that the output multiplier impacts could range from $111m ($50m * 2.22) to $222m ($100m * 2.22).

Oats are a minor crop grown in WA and as is often typical of minor crops, wide variation in prices is possible due to the impacts of climate and changed patterns of plantings that can affect WA and interstate oats production. Output increases in response to an increased demand for processed oats in turn generate simple and total effects on economy-wide output, employment, income and value-added activity.

Impact on employment in WA

Each million dollar increase in demand for the output of the WA oat processing sector generates support for only an extra 0.85 full-time equivalent positions (Table 4). However, from this initial or direct effect within the oat processing industry are generated subsequent flow-on supply-chain effects in terms of local purchases of goods and services that further support 2.63 jobs. This reflects the employment simple-multiplier effect.

Table 4: Employment multipliers for WA oat processing

	Type of Effect						
Employment Multipliers	Initial or Direct	First Round	Industrial Support	Production Induced	Simple	Consumption Induced	Total
Oat processing	0.85	1.14	0.65	1.78	2.63	0.86	3.49

Similar to the effect of any increase in output, the increase in jobs in the economy results in an increase in the wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure is captured in the local economy. The consumption effects under this scenario are estimated to further support employment by 0.86 jobs.

In sum, the employment associated with each million dollar increase in demand for the output of the WA oat processing, including all direct, supply-chain and consumption effects is an additional 3.49 jobs. Again, to place these estimates within a realistic setting: suppose the annual capacity of oat processing in WA is expanded by an additional 100,000 tonnes and the output of the oat processing is conservatively valued at an equivalent price of $800 per tonne. The employment multiplier impacts of that enhanced capacity would be $80m * 3.49 = 279 additional jobs across the WA economy; but in reality, the actual range could extend from 175 to 349.

Noting that the oat processing plant of Unigrain is located in Wagin then some of the additional employment generated by the lift in oat processing capacity will occur at that location and will stimulate other additional regional employment. The milling capacity at Wagin is poised to increase from 75,000 tonnes annually to about 175,000 tonnes (Dupe and Rooney, 2023).

Impact on wages & salaries in WA

Each million dollar increase in demand for the output of the WA oat processing sector generates impacts on wages and salaries. The direct or initial impact within the oat processing industry would be a very modest increase in wages and salaries of $0.12m (Table 5). As explained above, the flow-on supply-chain effects would further create additional jobs, which in turn would further increase wages and salaries by $0.15m.

Table 5: Wages and salaries multipliers for WA oat processing

	Type of Effect						
Wages and Salaries Multipliers	Initial or Direct	First Round	Industrial Support	Production Induced	Simple	Consumption Induced	Total
Oat processing	0.12	0.08	0.07	0.15	0.27	0.08	0.35

Following the effects on jobs in production and consumption-induced stages, as explained above, jobs associated with each stage would further increase wages and salaries by $0.27m. This reflects the wages & salaries-simple-multiplier effect.

Total wages and salaries, including all direct, supply-chain and consumption effects is estimated to increase by $0.35m.

Illustrating these estimates more practically: suppose the annual capacity of oat processing in WA is expanded by an additional 100,000 tonnes and the output of the oat processing is conservatively valued at an equivalent price of $800 per tonne. The wages and salaries multiplier impacts of that enhanced capacity would be a $80m * 0.35 = $28m lift in wages and salaries across the WA economy. In practice, the lift in wages and salaries across the WA economy could range from $17.5m to $35m.

Impact on value-adding in WA

Value-added multipliers show the additional value added, generated by industry production across sectors required to satisfy an extra million dollars' worth of demand for the output of the oat processing industry (Table 6). The initial or direct value-added effect within the oat processing industry is fairly small, only $0.16m. Subsequent supply chain impacts lead to additional value-adding occurring equating to $0.52m (the simple multiplier effect).

Table 6: Value-added multipliers for WA oat processing

	Type of Effect						
Value-added Multipliers	Initial or Direct	First Round	Industrial Support	Production Induced	Simple	Consumption Induced	Total
Oat processing	0.16	0.22	0.14	0.36	0.52	0.19	0.71

The total effect generated from the extra million dollars' worth of demand for the output of the oat processing industry is worth $0.71m in additional value-adding.

Applying the usual illustration of the annual capacity of oat processing in WA being expanded by an additional 100,000 tonnes (with the output of the oat processing being conservatively valued at an equivalent price of $800 per tonne) then the additional value-added across the WA economy would be worth $80m * 0.71 = $56.8m. In practice, the additional value-added across the WA economy could range from $35.5m to $71m.

Economic impacts of an enlarged oat producing farm sector in WA

Potentially associated with additional oat processing in WA is the prospect of growth in oat production at the farm level. If there is enhanced demand, locally and overseas, for oat grain, oaten hay and processed oats, then what are the economic multiplier consequences of enlarged farm production of oats? The findings are outlined in the next sub-section.

Multiplier impacts in WA for farm-level oat production

Output multipliers in WA

Each million dollar increase in demand for the output of the oat producing industry (i.e. farm production of oats) generates the output multipliers listed in Table 7.

Table 7: Output multipliers for WA oat production

	Type of Effect						
Output Multipliers	Initial or Direct	First Round	Industrial Support	Production Induced	Simple	Consumption Induced	Total
Oat production	1.00	0.40	0.22	0.62	1.63	0.24	1.87

Each million dollar increase in demand for the output of the oat producing industry generates additional output across a range of industries involved in supporting or benefiting from farm-level oat production. The aggregate value of the additional output across the WA economy is worth $1.63 million, including the supply chain effect of $0.63m. In other words, the output simple effect is $1.63m. The output increase at this production-induced stage would typically be associated with some small changes and increases in jobs in the industries involved in supporting or benefiting from oat production. The increase in employment at this stage would be associated with any increase in the expenditure on wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure is captured in the local economy. The consumption-induced effect under this scenario is estimated at $0.24m. In sum, the total output effect, including all direct, supply-chain and consumption effects is estimated to be worth $1.87m.

To illustrate the magnitude of these multiplier effects more practically, suppose the oat production expands by 100,000 tonnes and the output of the oat production is conservatively valued at an equivalent price of $250 per tonne. The output multiplier impacts of that enhanced capacity would be $25m * 1.87= $46.8m (where $25m= 100,000t * 250$/t). However, as previously noted regarding the volatility and skewness of milling oat prices, the ramifications are that output multiplier impacts of that enhanced capacity could range from $42.1m ($22.5m * 1.87) to $79.5m ($42.5 * 1.87).

These output increases in turn generate simple and total effects on economy-wide output, employment, income and value-added activity.

Impact on employment in WA

Each million dollar increase in demand for the output of the WA oat producing industry generates support for only an extra 1.31 full-time equivalent positions (Table 8). However, from this initial or direct effect within the oat producing industry are generated subsequent

flow-on supply chain effects in terms of local purchases of goods and services that further support 2.56 jobs. This reflects the employment simple multiplier effect.

Table 8: Employment multipliers for WA oat production

	Type of Effect						
Employment Multipliers	Initial or Direct	First Round	Industrial Support	Production Induced	Simple	Consumption Induced	Total
Oat production	1.31	0.80	0.45	1.25	2.56	0.58	3.14

Similar to the effect of any increase in output, the increase in jobs in the economy results in an increase in the wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure is captured in the local economy. The consumption effects under this scenario are estimated to further support employment by 0.58 jobs.

In sum, the employment associated with each million dollar increase in demand for the output of the WA oat producing industry, including all direct, supply-chain and consumption effects is an additional 3.14. Again, to place these estimates within a realistic setting: suppose the annual oat production in WA expands by an additional 100,000 tonnes and the output of the oat producing industry is conservatively valued at an equivalent price of $250 per tonne. The employment multiplier impacts of that enhanced capacity would be $25m * 3.14 = 78 additional jobs across the WA economy. The likely range of the employment multiplier impacts are 71 to 133 additional jobs.

Impact on wages & salaries in WA

Each million dollar increase in demand for the output of the WA oat producing industry generates impacts on wages and salaries. The direct or initial impact within the oat producing industry would be a very modest increase in wages and salaries of $0.06m (Table 9). As explained above, the flow-on supply chain effects would further create additional jobs, which in turn would further increase wages and salaries by $0.12m.

Table 9: Wages and salaries multipliers for WA oat production

	Type of Effect						
Wages and Salaries Multipliers	Initial or Direct	First Round	Industrial Support	Production Induced	Simple	Consumption Induced	Total
Oat production	0.06	0.07	0.05	0.12	0.18	0.05	0.24

Following the effects on jobs in production and consumption-induced stages, as explained above, jobs associated with each stage would further increase wages and salaries by $0.18m. This reflects the wages & salaries simple multiplier effect.

Total wages and salaries, including all direct, supply chain and consumption effects is estimated to increase by $0.24m.

Illustrating these estimates more practically: suppose the annual oat production in WA expands by 100,000 tonnes and the output of the oat producing industry is conservatively

valued at an equivalent price of $250 per tonne. The wages and salaries multiplier impacts of that enhanced capacity would be a $25m * 0.24 = $6m lift in wages and salaries across the WA economy. The likely range in wages and salaries multiplier impacts are $5.5m to $10.2m.

Impact on value-adding in WA

Value-added multipliers show the extra value-added, as generated by industry production across sectors required to satisfy an extra million dollars' worth of demand for the output of the oat producing industry (Table 10). The initial or direct value-added effect within the oat producing industry is fairly small, only $0.16m. Subsequent supply chain impacts lead to additional value-adding occurring equating to $0.52m (the simple multiplier effect).

Table 10: Value-added multipliers for WA oat production

	Type of Effect						
Value-added Multipliers	Initial or Direct	First Round	Industrial Support	Production Induced	Simple	Consumption Induced	Total
Oat production	0.40	0.17	0.10	0.27	0.67	0.13	0.80

The total effect generated from the extra million dollars' worth of demand for the output of the oat producing industry is worth $0.8m in additional value-adding.

Applying the usual illustration of the annual production of oats increasing by 100,000 tonnes (with oats being conservatively valued at an equivalent price of $250 per tonne) then the additional value-added across the WA economy would be worth $25m * 0.8 = $20m. The likely range in the additional value-added across the WA economy is $18m to $34m.

Concluding Remarks

Whenever an industry expands in response to a greater demand for its products or services, it needs to draw upon additional resources to accomplish that expansion. That industry's use of more inputs to achieve enhanced production, and the flow of its additional production to other businesses within its supply or value chains, in turn generates a range of further economic flow-on effects.

These effects, in the language of economics, are typically called multiplier effects and their magnitude can differ between industries. For governments and investors who support business expansion, knowing the magnitudes of multiplier effect can facilitate decisions about what investments to undertake.

In the case of expansion in oat processing in WA, expanding its annual capacity by an additional 100,000 tonnes generates output multiplier impacts that range in worth to the state's economy from $111m to $222m and are expected to be $178m on average. An additional 279 jobs would be generated, although the range of possible employment increases could be from 175 to 349 additional jobs. Plus a $28m lift in wages and salaries across the state's economy is possible ranging from $17.5m to $35m; and the additional value-added across the economy would be worth $57m on average but ranging from $36m to $71m.

This analysis indicates a wide range of economic benefits are associated with additional oat processing in WA. However, care must be taken to not mindlessly extrapolate these findings

to all other crops or farm commodities. Many years ago the cautionary conclusions of Cashin (1988) are worth re-stating: “Neither high-value agricultural commodities nor value-added processing of agricultural commodities are innately desirable merely because they may raise export earnings and employment. Such activities should be assessed on a commodity-by-commodity basis and only be undertaken where Australia can do so at a lower opportunity cost than other countries, otherwise the economic welfare of Australians will be reduced.” (p. 32).

References

Cashin, P. (1988) Australian agriculture: Is there any value in ‘high value’ commodities? Journal of Applied Economics and Policy 7(2):21 – 32.

Dupe, C. and Rooney, D. (2023) *Unigrain on a roll with $10 million Wagin oat processing expansion thanks to $3 million State grant*, Countryman, 17 August, 2023.

DPIRD (2023) Western Australian oat industry. Available at: https://www.agric.wa.gov.au/hay-production/western-australian-oat-industry; updated 10 October, 2023 [accessed March 25, 2024]

Milne Feeds (2022) *The Oat Seesaw*, November 29, 2022. Available at: https://www.milne.com.au/news/the-oat-seesaw [accessed February 10, 2024]

Xayavong, V., Abadi, A., Mattingley, P., Kingwell, R. and d’Abbadie, C. (2023) Multipliers and their interpretation for WA’s agricultural economy. Department of Primary Industries and Regional Development Western Australia.

Appendix One: WA industries in a WA Input-Output table

Below is a list of industries that feature in a specially constructed Input-Output table of the WA economy. Those industries that specifically entail production and use of oats are highlighted in blue font.

Sheep
Wheat
Barley
Canola
Oats
Crop Legumes
Beef cattle
Dairy cattle
Poultry & Other Livestock
Other Agriculture
Aquaculture
Forestry & Logging
Fishing, Hunting & Trapping
Agriculture, Forestry & Fishing Support Services
Coal Mining
Oil & Gas Extraction
Iron Ore Mining
Non-Ferrous Metal Ore Mining
Non-Metallic Mineral Mining
Exploration & Mining Support Services
Meat & Meat Product Manufacturing
Processed Seafood Manufacturing
Dairy Product Manufacturing
Fruit & Vegetable Product Manufacturing
Oils & Fats Manufacturing
Grain Mill & Cereal Product Manufacturing
Bakery Product Manufacturing
Sugar & Confectionery Manufacturing
Other Food Product Manufacturing
Soft Drinks, Cordials & Syrup Manufacturing
Beer Manufacturing
Wine, Spirits & Tobacco
Textile Manufacturing
Tanned Leather, Dressed Fur & Leather Prod. Manu.
Textile Product Manufacturing
Knitted Product Manufacturing
Clothing Manufacturing
Footwear Manufacturing
Sawmill Product Manufacturing
Other Wood Product Manufacturing
Pulp, Paper & Paperboard Manufacturing
Paper Product Manufacturing
Printing (including reproduction of recorded media)
Petroleum & Coal Product Manufacturing
Human Pharmaceutical Product Manufacturing

Veterinary Pharmaceutical Product Manufacturing
Basic Chemical Manufacturing
Cleaning Compounds & Toiletry Preparation Manu.
Polymer Product Manufacturing
Natural Rubber Product Manufacturing
Glass & Glass Product Manufacturing
Ceramic Product Manufacturing
Cement, Lime & Ready-Mixed Concrete Manufacturing
Plaster & Concrete Product Manufacturing
Other Non-Metallic Mineral Product Manufacturing
Iron & Steel Manufacturing
Basic Non-Ferrous Metal Manufacturing
Forged Iron & Steel Product Manufacturing
Structural Metal Product Manufacturing
Metal Containers & Other Sheet Metal Product Manufacturing
Other Fabricated Metal Product Manufacturing
Motor Vehicles & Parts; Other Transport Equipment Manufacturing
Ships & Boat Manufacturing
Railway Rolling Stock Manufacturing
Aircraft Manufacturing
Prof, Scientific, Computer & Electronic Equipment Manufacturing
Electrical Equipment Manufacturing
Domestic Appliance Manufacturing
Specialised & Other Machinery & Equipment Manufacturing
Furniture Manufacturing
Other Manufactured Products
Electricity Generation
Electricity Distribution
Gas Supply
Water Supply, Sewerage & Drainage Services
Waste Collection, Treatment & Disposal Services
Residential Building Construction
Non-Residential Building Construction
Heavy & Civil Engineering Construction
Construction Services
Wholesale Trade
Retail Trade
Accommodation
Food & Beverage Services
Road Transport
Rail Transport
Water, Pipeline & Other Transport
Air & Space Transport
Postal, Courier Pick-up & Delivery Service
Transport Support Services & Storage
Publishing (except Internet & Music Publishing)
Motion Picture & Sound Recording
Broadcasting (except internet)
Internet Publishing, Broadcast, Web search & Data Services
Telecommunication Services
Library & Other Information Services

Finance
Insurance & Superannuation Funds
Auxiliary Finance & Insurance Services
Rental & Hiring Services (except real estate)
Ownership of Dwellings
Non-Residential Property Operators & Real Estate Serv.
Professional, Scientific & Technical Services
Computer Systems Design & Related Services
Employment, Travel Agency and Other Administrative Services
Building Cleaning, Pest Control and Other Support Services
Public Administration & Regulatory Services
Defence
Public Order & Safety
Pre-School, Primary, Secondary & Special Education
Technical, Vocational & Tertiary Education (undergrad & postgrad)
Arts, Sports, Adult, Community & Other Education
Health Care Services
Residential Care & Social Assistance Services
Heritage, Creative & Performing Arts
Sports & Recreation
Gambling
Automotive Repair & Maintenance
Other Repair & Maintenance
Personal Services
Other Services