

Advancing Berkshire triticales supply for the Australian pig industry 4B-115

Final Report prepared for the
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Pork

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Executive Summary

Following the release of Berkshire triticale in Australia in 2009, it was expected that it would be prominent within the feed grain supply chain because it was relatively high yielding, agronomically suited to large parts of grain-growing regions in Australia, and contained about 0.5 MJ DE/kg more energy than the average level found in other triticale varieties. Even though wheat is a dominant crop, it is reasonable to assume that Berkshire would have a niche, as a superior triticale variety, in grain growers' rotations.

It is economically rational for pig producers to source downgraded wheat at discounted prices but when supply is short, price will increase and pig producers may have to seek alternatives. As there is a relatively inelastic demand with respect to price for grains and they are the major component of animal feeds, it might be expected that pig producers would send demand signals to grain growers so as to increase their confidence in growing dedicated, high yielding feed grain varieties. Facilitating such communication could involve establishing supply chain networks and potential contracts.

The aim of this project was to provide a guide for and assessment of triticale supply chains that could be economically and environmentally efficient for the Australian pig industry in Western Australia (WA) and South Australia (SA).

In preparing the supply chain guide, knowledge gaps were identified and outputs were prepared and distributed to address this lack of information. However, in the assessment it was found that generally, communication within the supply chain appeared to be sufficient to facilitate growing and using Berkshire within the supply chain. Even so, demand for triticale in general, and specifically Berkshire, is spasmodic, with price incentives being limited due to a seemingly adequate supply of alternative grains. Further, supply of triticale is irregular and after poor seasons is unlikely to be grown unless the grain producer has ample resources to use it as a break crop or receives a price incentive to grow it. Closed-loop supply chains were not established and this was due in part to both (a) the grain producer having a lack of incentive to participate, and (b) the grain buyer/user overestimating production risk and underestimating price risk. However and in due course when supply of grains for feed is limiting, the advantages of a closed-loop supply chain for both pork producers and grain growers is likely to become evident.

To that end, the following recommendations have been made:

1. Endorse triticale varieties as energy substitutes for wheat to encourage triticale demand at a market price;
2. Should demand increase, encourage feed buyers to communicate with agronomists and triticale growers to stimulate supply;
3. In the short term, to increase the area grown of triticale and specifically Berkshire, the focus should be the "Grower-User" market segment involving mixed pork/grain businesses;
4. Remove the PBR status from Berkshire;
5. Follow the progress of triticale as a food grain and use any positive market developments to benefit feed grains;
6. A market awareness campaign for grain bought as feed and a workshop program focusing on price risk management and grain trading be made available for producers and buyers of grains purchased as feed for the pig industry;
7. To ensure security for grain used as feed, there is merit in testing the closed-loop supply chain concept again with a mainstream commodity such as wheat or barley;
8. The Pork CRC should not be involved in plant breeding of niche varieties.

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1. Introduction

Following the release of Berkshire triticale in Australia in 2009, it was expected that it would be prominent within the feed-grain supply chain because it was relatively high yielding, agronomically suited to large parts of grain-growing regions in Australia, and according to King (2010) contained about 0.5 MJ DE/kg more energy than the average level found in other triticale varieties. Whilst Pluske and Pluske (2011) found that grain growers generally preferred wheat to triticale, because of its earlier harvesting date and higher yield and price, it was nevertheless expected that Berkshire would have a niche as a superior triticale variety.

With regard to demand, pig producers continue to source downgraded wheat at discounted prices (as previously noted by Barbetti *et al.* 2005). It may be economically rational for them to make such purchase decisions but when supply is short, price will increase and pig producers may have to seek substitute energy sources, including high-priced food manufacturing wheat. As grains are the major component of animal feeds and there is a relatively inelastic demand with respect to price for grains, it might be expected that pig producers should address this grain security issue. Part of this process should include enhancing grain growers' confidence in growing dedicated, high-yielding grain varieties for the feed market. Grainsearch (2007) noted that a quality feed-grain industry in Australia would not develop if the end users did not help drive the process by ensuring there is a continuing competitive market place and price.

To this end, Barbetti *et al.* (2005) suggested that within relevant supply chain entities there needs to be: (a) an increase in the flow of information and understanding from farmers through to end-users; (b) a focus on demand and supply imbalances by e.g., establishing supply chain networks and potential contracts; and (c) feedback to meet agronomic and plant breeding requirements of industry funding bodies and the supply chain. Grainsearch (2007) noted that implementation of feed grain supply chain groups would need consideration of their specific requirements, capacities, strengths and weaknesses and hence a customised plan for each. These recommendations continue to be relevant in light of the current situation.

The aim of this project was to provide a guide for triticale supply chains that could be economically and environmentally efficient for the Australian pig industry in Western Australia (WA) and South Australia (SA). In addition, an assessment of these chains was to be completed to determine the likelihood of their success.

2. Methodology

In South Australia, consultants from Rural Directions who have expertise in grain agronomy and marketing developed a short supply chain initiative. In addition a pig liaison consultant, Graeme Pope, assisted this team with identifying potential workshop participants from the grain and pig industries. The overarching objective of the workshops was for producers from both industries to engage in the project and agree to contracts for supply and purchase of Berkshire. An announcement for expression of interests in the project was released in September 2012 (Appendix 1). Following this announcement, workshops were held for both grain growers and pig producers.

A longer supply chain system was devised for Western Australia involving grain growers, agronomists, grain marketers, feed buyers and pig producers, with the emphasis being on working within the existing supply chain. The first step was to

liaise with grain marketers to set up a plan for a Berkshire receival system that was economically and environmentally effective for the grain producer and feed manufacturer and to organize for the collection of end-point royalties. During the next phase involving liaison with agronomists it was recognized that there was not enough technical information available for them to make informed recommendations for Berkshire. Hence supplementary data concerning Berkshire, collected from Pork CRC Project 4B-103 1112, was used to write relevant information reports (Appendices 2 and 3). Included also in these reports were example gross margin analyses for comparisons between e.g., growing Berkshire and wheat. To supplement the WA report a fact sheet was written (Appendix 1). A press release was also written and released to coincide with producer meetings (Appendix 1). Meetings were had with feed and pig producers and due to the lack of nutritional information regarding Berkshire, grain analyses were completed (Appendix 4) and nutritionist, Daniel Goussac, completed three feed formulation scenarios with the aim of estimating a 'value' for Berkshire (Appendix 5). Due to the lack of transparency in the supply chain, a model was developed by Jo Pluske to estimate the quantity of Berkshire that may be available for feed buyers (Appendix 5).

Whilst structures were put in place to achieve the desired outcomes for this project, the methodology was flexible to account for variations that could arise due to the different outcome from various stages of the project. In SA there was initial willingness to engage in supply chains based on an average pricing model and a contract-farming model. However, the focus shifted to just one case study for each structure. Based on the procedure put in place and findings from these case studies an assessment of the Berkshire supply chain in SA was then completed (Appendix 6). In WA, the supply chain management model proposed was a committed marketing system whereby information regarding quantity of grain demanded and a price range are known to potential suppliers, with grain sold on the spot market. However, at the request of pig producers, a closed-loop structure was also put in place. Findings from this research were then incorporated in an assessment of the Berkshire supply chain in WA (Appendix 7).

3. Outcomes

This project was not able to validate production of up to 10,000 tonnes of Berkshire in each of SA and WA. However, the project contributed to raising the awareness of triticale across the supply chain and enabled a detailed assessment of the supply chains. The following draws on information from the Appendices and specifically from Appendices 6 and 7.

3.1. An assessment of the Berkshire supply chain

Agronomic evidence reviewed for this project indicated that it might be advantageous to grow Berkshire in a cropping rotation. However, there is a lack of trial data, specifically for WA, and in particular data showing for example a comparison of wheat and Berkshire on acidic soils. Findings also suggested that there were some reservations about what triticale variety to grow because none are specifically recommended for WA and, in other States, the messages are mixed, with for example Hart Bros recommending Fusion as their "pick" for a high yielding grain triticale¹. Further, wheat was perceived by grain producers as being less risky to grow and the expected gross margin was higher for wheat than for triticale. Hence it is likely that Berkshire will struggle to find a place in the rotation for most grain growers, unless the price paid for it is such that it is able

¹ See: <http://www.hartbrosseeds.com.au/all-products/fusion-triticale.aspx>

to compete with alternative crops, and there is some continuity of market demand.

WA pork producers were receptive to the idea of increasing the level of Berkshire in their pig diets and were keen to work with others in the supply chain. However, they were not able to be specific with regard to quantity and price. The general outcome was that Berkshire was viewed as a feed grain and so should be priced accordingly within that range. Most grain for feed in WA is bought on the spot market but producers were keen to develop a "Hectare-Based Berkshire" contract. Hence a WA company, Grain Link, released a contract for grain producers whereby price was based on APW2 highest average free-in-store price less \$20/t between 9th December and 23rd December 2013 (with price to be confirmed 1st January 2014). However, there was very little interest in this contract on the part of grain producers and so contracts were not written for the 2013/14 season. The main reason for little interest was the lack of financial incentive for the grain producer.

In SA an average pricing model and a contract-farming model were developed as alternative marketing arrangements to the spot market. A number of pork producers attended an information session on the Berkshire triticale supply-chain concept. Despite the interest, just one contract farming option was considered by a grain grower in the Mallee of SA and a pork producer in the lower north of SA. Given the variability in production in the Mallee environment and associated price fluctuations based on yield, as well as the impact of freight costs given distances involved, the pork producer chose not to continue with the option. This was because, in his view, he was bearing the majority of the risk with the arrangement. There was also a disincentive given the freight component, which could have been overcome by using a grain grower in closer proximity to the pork producer. There was also just one average pricing contract considered by a Berkshire grower and a pork producer. Despite the detailed average pricing model presented to them, the pork producer was reluctant to pay the suggested price. A non-verbal supplier-buyer arrangement was entered into and when the parties eventually conferred to determine a sale price, the spot market price was agreed upon.

Despite formal contract marketing arrangements being put into place to encourage Berkshire production, the deal breaker in each case was the price. Pork producers need to be convinced of the superior attributes of such a cultivar within their production system and need to be prepared to pay a competitive price from a grain grower's perspective. Findings from this project suggested that triticale would be selected in a least-cost formulated ration at a higher price than producers were willing to pay. However, feed grain purchase decisions are principally driven by the goal of procuring energy at the lowest possible price and as triticale has traditionally been priced in the "feed grain" category, it will be difficult to change this mindset especially if there are substitutes available.

Known seed sales of Berkshire have taken place in WA and SA from 2009 to 2012. To date, however, there has not been an official 'premium' paid for Berkshire. Without expensive testing, it is also difficult to detect Berkshire from other triticale varieties. Hence there is little incentive on the part of the grower to declare a triticale crop as Berkshire. Due to this obscurity, the quantity of Berkshire in the supply chain remains ambiguous. Computer modeling for a WA scenario suggests that conservatively there may be between 3,000 and 5,000 tonnes of feed available with seed kept for 2,000 to 5,000 hectares. Whilst these figures are speculative, they provide an insight into what the current situation

regarding Berkshire in WA might be and the potential that could be reached with favourable conditions.

As there is little incentive to declare a variety as Berkshire by either the grower or buyer, the issue of whether the plant breeder's rights (PBR) status should remain active on Berkshire is ripe for debate. To retain the PBR for Berkshire, an annual registration renewal fee must be paid for the protection period. Once the PBR has expired, the variety reverts to the public domain and is available to everybody. There have been 29 varieties of triticale registered for PBR in Australia with only 15 still having an active PBR status.

Additional supply options and (or) financial incentives such as those that might originate out of a food grain market may induce some enthusiasm in triticale production. Dennett *et al.* (2013) presented results of the baking characteristics and food value of triticale (including Berkshire). They concluded that there was potential for triticale to be used as a flour substitute to wheat for some goods. This research is particularly encouraging in that if there is a food market for triticale, the spin-off for the feed industry may be positive in terms of increased triticale supply.

Triticale is grown in WA and SA as an option for grain growers and buyers. Whilst it might grow well on acidic soils, grain growers are hesitant to grow it due to what they perceive to be a lack of financial incentive. Despite what feed formulations might suggest, buyers prefer to buy it at around \$20 to \$30/t less than what they are willing to pay for wheat. Given the grain-growing substitutes available, triticale growers are generally price takers and hence have little incentive to produce triticale.

If pig producers are serious about having triticale in their rations then they have to ensure supply. Evidence from this project suggested that pork producers naturally choose to continue to operate in the spot market for grain acquisition needs. For this to change, the industry may (unfortunately) need to experience a grain supply and price 'shock', where pork producers are perhaps forced to purchase grain at import parity prices. Such an event may force a change to attitudes.

Overall, it can be concluded that whilst there is adequate communication within the supply chain, demand for Berkshire is spasmodic with price incentives being limited due to seemingly adequate supply of alternative grains. Further, supply of triticale is irregular and after poor seasons is unlikely to be grown unless the grain producer has ample resources to use it as a break crop, or receives a price incentive to grow it. Failure to establish a successful closed-loop supply chain was due in part to the vehicle, Berkshire, having limitations from the grain grower's perspective and also the buyer not being willing to accept responsibility for production risk. In addition, price risk associated with Berkshire seems to be underestimated. Despite this outcome, it should be noted that throughout the conduct of the project there was recognition of the advantages of a closed-loop supply chain approach in relation to feed grains and support for the broad concept from both pork producers and grain growers.

3.2. General outcomes and project outputs

This project has delivered:

- Desktop reports, that incorporated findings from Pork CRC Project 4B-103 1112, detailing Berkshire yield and DE in Western Australia and South Australia (Appendices 2 and 3).
- A nutritional profile for Berkshire (Appendix 4).

- Notes for Berkshire value and tonnage (Appendix 5).
- A report titled Advancing Berkshire triticale supply for the Australian pig industry: An assessment of the supply chain in SA (Appendix 6).
- A report titled An assessment of the Berkshire supply chain system in WA (Appendix 7).
- Papers presented at APSA 2013 (Appendix 8).

4. Application of Research

4.1. Application of the research findings in the commercial world

Currently the most likely market that currently exists for Berkshire remains with mixed pork/grain businesses where both a grain growing and a pork production enterprise are conducted.

Should a new high-energy grain variety become available for use in pig feed (e.g., there are 14 relatively new triticale varieties), it is not likely to be available in all regions nor is it likely to be a requirement in all pig diets. Generally the market is not currently sophisticated enough to ensure that the value of DE is reflected in prices, despite the technology (AusScan) existing. Hence any premiums are likely to arise only by negotiation of individual parties. Should such negotiations arise, supply of a particular variety would be more secure and pig producers may benefit from the higher energy content.

For this reason, and given the substantial cost of variety development, it is recommended that the Pork CRC should not be involved in plant breeding of niche varieties. It is envisaged that existing plant breeding programs of mainstream species and varieties will meet the feed grain needs for the pork industry.

4.2. Opportunities uncovered by the research

The current feed grain market that pork producers are operating in requires players to have knowledge, an appropriate skill set and tools to effectively manage grain price risk. An awareness campaign and follow-up skills development workshop program could be useful for Australian pork producers.

An awareness campaign could be used to highlight: (a) the risks associated with feed grain supply in Australia; (b) how the feed grain market operates; and (c) why price risk management is important. The role of a supply-chain relationship can be canvassed as a topic as part of the exercise. The awareness program could be delivered via articles in pork industry publications, the rural media and presentations at pork industry conferences and expos.

A workshop program could (also) be held around the country for producers wanting additional knowledge about grain purchasing. Topics such as principles of price risk management, development and maintenance of relationships within a supply chain, contract law and management, forward contracting, grain trade rules and the role of Grain Trade Australia, the use of grain swaps and other risk management products, and pricing models for feed grains within supply chains (including both rolling average and contract farming developed as part of this project), could be covered. Financial coaching support for individuals as well as facilitation of meetings between pork producers and grain growers could also be useful in properly developing supply chain arrangements for grains bought for feed. Further, and with regard to supply-chain development, there is merit in testing the supply-chain concept again, but with a mainstream commodity such as wheat or barley.

4.3. Adoption strategies

Feed buyers have indicated that there will always be a place for triticale in pig diets. Hence the conversation regarding supply of and demand for triticale should continue. In the current market atmosphere the *ad hoc* buying and selling strategies will continue, as there appears to be reasonable communication within the supply chain. However, once demand for grain for feed tightens then buyers will have to become more savvy in procuring grain. It is likely that they will need to adopt price risk management tools and become more transparent with the quantity that they want and be prepared to pay a price that is acceptable to the suppliers.

4.4. Research papers associated with this project

Pluske, J.M., Pluske, J.R. and Kim, J.C. (2013). Digestible energy content for Berkshire triticale varies depending on season and site. In “Manipulating Pig Production XIV”, p.118, ed. J.R. Pluske and J.M. Pluske. (Australasian Pig Science Association: Werribee).

Pluske, J.M. and Pluske, J.R. (2013). Why pork producers should consider the value of triticale. In “Manipulating Pig Production XIV”, p.119, ed. J.R. Pluske and J.M. Pluske. (Australasian Pig Science Association: Werribee).

5. Conclusion

Whilst the project objective of facilitating production of up to 10,000 tonnes of Berkshire in WA and SA was not officially realized through this project, the assessments of the supply chain provided valuable information. Knowledge gaps were identified and outputs were prepared and distributed to address this lack of information. Generally, communication within the supply chain appeared to be sufficient to facilitate growing and using Berkshire within the supply chain. Even so, demand for Berkshire is spasmodic with price incentives being limited due to seemingly adequate supply of alternative grains. Further, supply of triticale is irregular and after poor seasons is unlikely to be grown unless the grain producer has ample resources to use it as a break crop or receives a price incentive to grow it. Failure to establish a successful closed-loop supply chain was perhaps due to an overestimation of production risk and an underestimation of price risk. However, in due course when supply of grains for feed is limiting the advantages of a closed-loop supply chain for both pork producers and grain growers will be evident.

6. Limitations/Risks

It was not possible to validate the quantity of Berkshire produced in WA or SA. However, based on simulation modeling it is quite possible that up to 10,000 t of Berkshire could be currently produced in WA.

7. Recommendations

As a result of the outcomes derived from this study the following recommendations have been made:

1. Endorse triticale varieties as energy substitutes for wheat to encourage triticale demand at a market price;
2. Should demand increase, encourage feed buyers to communicate with agronomists and triticale growers to stimulate supply;
3. In the short term, to increase the area grown of triticale and specifically Berkshire, the focus should be the “Grower-User” market segment involving mixed pork/grain businesses;
4. Remove the PBR status from Berkshire;
5. Follow the progress of triticale as a food grain and use any positive market developments to benefit feed grains;
6. A market awareness campaign for grain bought as feed and a workshop program focusing on price risk management and grain trading be made available for producers and buyers of grains purchased as feed;
7. To ensure security for grain used as feed, there is merit in testing the closed loop supply chain concept again with a mainstream commodity such as wheat or barley;
8. The Pork CRC should not be involved in plant breeding of niche varieties.

8. References

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Dennett, A. L. Wilkes, M.A. and Trethowan R.M. (2013). Characteristics of Modern Triticale Quality: The Relationship Between Carbohydrate Properties, α -Amylase Activity, and Falling Number. *Cereal Chem.* 90(6):594-600

Grainsearch (2007). Pork CRC Final Report. Prepared by Grainsearch Pty Ltd. Project Reference Number: 1A-103-0506. August.

King, R. (2010). Triticale: stock feed guide. Waratah Seed Co Ltd Information Note, February, Henty, NSW. www.waratahseeds.com.au

Pluske, J.M. and Pluske, J.R. (2011). Dedicated feed grain production systems: Stakeholder interviews pertaining to wheat, barley and triticale systems in Australia. Report prepared for the CRC for an Internationally Competitive Pork Industry, August. 31pp

9. Appendices

1. Appendix 1: Information releases
2. Appendix 2: Berkshire Triticale in Western Australia
3. Appendix 3: Berkshire Triticale in South Australia
4. Appendix 4: Nutritional Profile of Berkshire
5. Appendix 5: Notes for Berkshire value and tonnage
6. Appendix 6: Advancing Berkshire triticale supply for the Australian pig industry: An assessment of the supply chain in SA
7. Appendix 7: An assessment of the Berkshire supply chain system in WA
8. Appendix 8: APSA 2013 Papers