APL Submission 3

Productivity Commission Australian Pig Meat Industry Public Inquiry

24 December, 2004

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1 Executive Summary

This is the third of four submissions Australian Pork Limited (APL) is providing for the Pig Meat Inquiry. This submission addresses in detail, APL's export strategy and also assesses the effectiveness of past APL R&D programs aimed at improving the competitiveness of the Australian industry. The competitiveness of the Australia's pork supply chain relative to key international pork trading nations will now be addressed in APL's final submission.

APL's final submission will be tabled at the PC public hearing that APL will be attending in January 2005. This will provide updated information on the specific initiatives APL intends to pursue as part of the industry restructure, identifying specific government measures that can also enhance the competitiveness of the industry, outline findings of international benchmarking of the Australian pork supply chain (as mentioned above) and also provide a response to the Productivity's Commissions draft report released on 15th December 2004.

Export Strategy

- APL's first submission highlighted that a higher $A has made exporting less competitive, resulting in a measurable fall in Australian export volumes. Noticeably, a number of exporters have recently redirected supply away from exports back into Australia due to the comparatively higher prices being offered in the Australian domestic market. From a peak in April 2003 of 66.9m tonnes moving annual total (MAT) valued at $270m MAT, exports for the corresponding figures for October 2004 had fallen to 51.2m tonnes and $174.4m representing a 23% reduction in export volume.

- Beyond the difficulties arising from the currency appreciation, exporters to Japan have continued to face the problem of receiving relatively poor returns for those cuts of the larger Japanese specific carcase that are not exported to Japan. Difficulties encountered with the Japanese market also relate to the safeguard snap back tariff that continues to be enforced on an annual basis.

- A 20% strengthening of the $A against the Singapore dollar has put further pressure on pork prices in Singapore, while an additional potential future challenge for growing sales of Australian chilled pork in Singapore is the increasing acceptance in this market of low priced frozen imported product.

- Despite the recent falls in export trade, export sales still provide a significant source of revenue for Australian producers, making up approximately 16% of total pork production. A number of recent joint industry government export programs have been highly successfully in assisting significant export growth in key markets such as the Confederation of Australian Exporters (CAPE) and the Singapore Market Alliance (SMA).

- The draft industry restructure process currently being developed by APL focuses on consolidating existing export markets in the immediate future and building domestic demand for Australian pork products. A key focus of the draft Industry Restructure Plan involves implementing measures that will increase the competitiveness of Australian pork both domestically, and consequently, internationally. APL's export marketing strategy is currently being revised; the final strategy will build on the insights provided by the joint Industry-Government Pork Market Improvement Program (PMIP).

Effectiveness of Recent Industry Programs

- In an attempt to identify the effectiveness of recent industry programs APL has conducted an economic evaluation of completed research projects or programs for which some quantitative data was available to estimate the likely industry impact since completion.

Industry benefits considered in the analysis included lower production costs, increased farm productivity, higher quality production and industry development. All project costs, which included PRDC/APL and partner organisation resources, were included in the cost-benefit framework. The average benefit-cost ratio for a range of rural development corporation projects was estimated to be 7.2:1 (see AFFA, 2001 – Innovating Rural Australia, Rural Development Corporation Outcomes, AFFA, Canberra).

Projects that were identified as providing a high pay-off (more than $10 of benefit for every $1 invested) included:

1. Singapore market development: Very high commercial payoffs derived from large volumes of product now shipped into Singapore with an estimated Net Present Value (NPV) of $60m representing a Benefit Cost Ratio (BCR) of 70:1
2. Prohand (pig handling) training workshops: The high participation rates in industry workshops and large forecast benefits from adoption result in large economic benefits for this investment with a NPV of $39.6m representing a BCR of 20:1

3. FeedCheque: This project has provided an estimated benefit of $113 per sow per year with an overall NPV of $39.6m representing a BCR of 20:1
4. Disease eradication: This has lead to a reduced prevalence of key pig diseases and has generated considerable economic benefits with a NPV of $39.6m representing a BCR of 20:1

- A number of the projects evaluated in this analysis indicate that selected APL research is delivering economic benefits above average returns experienced by other funding bodies; APL acknowledges that it is difficult to draw conclusions about portfolio performance from a number of selected projects. However, due to the limited time frame entailed in the Pig Meat Inquiry, APL was unable to conduct a more extensive analysis of the numerous R&D projects that have been undertaken in recent years.

Key Findings

1. ***Since mid 2003 a number of Australian exporters have, and continue to, redirected supply away from exports back into Australia, due in part to the appreciation of the $A, resulting in comparatively higher returns being offered in the Australian domestic market.***

2. ***Progress to date in gaining access and/or to enhancing trade arrangements with a number key countries through multilateral negotiations has been slow, while bilateral negotiations have not provided substantive new trade opportunities for Australian pork exports.***

3. ***In light of the changed dynamics in both the domestic market and key export markets, APL is currently in the process of developing a new export strategy, that will seek to build on the joint industry-Government funded PMIP and also the strategies of the draft Industry Restructure Plan[1].***

4. ***For a number of the industry programs recently undertaken by PRDC/APL, a recently completed benefit-cost analysis indicates that significant ongoing economic benefits have been achieved.***

[1] Details regarding the draft Industry Restructure Plan will be outlined in APL's fourth submission to the Pig Meat Inquiry.

2 Export Strategies

APL's first submission highlighted that a higher $A has made exporting less competitive, resulting in a measurable fall in Australian export volumes. Noticeably too, a number of exporters have recently redirected supply away from exports back into Australia due to the comparatively higher prices being offered in the Australian domestic market. While the recent depreciation of the $A has helped competitiveness, Australian exporters remain much less competitive than three years ago. Section 2.1 below recaps the Australian pork industry's recent export performance as documented in APL first submission to the PC Pig Meat Inquiry.

2.1 Exports – The Current State of Play[2]

APL's first submission noted that a higher $A makes imports more competitive and at the same time makes exporting less competitive. The industry's export markets are now valued at over $177 million per year compared to $24 million in 1997. Demand from overseas markets for Australian pork has increased substantially over the past four years, from just 2.6 percent of Australian pork production in 1997 to approximately 16.5 percent in 2004, peaking at 21.5 percent in January 2002. Whilst moderately smaller as a percentage of overall production, Australian exports peaked in April 2003 in value and volume terms at 66.9m tonnes moving annual total (MAT) and $270m MAT respectively. Australian pork exports for the year ending October 2004 were 20.6 percent below year earlier levels (Chart 35). Since 2002, the Australian exchange rate changes have meant that pig and pork suppliers have faced reduced export competitiveness (into Singapore and Japan). While the AUD has depreciated against the Japanese Yen and the Singapore dollar in recent months, it remains considerably higher than the 2002 and 2003 average. This factor has had the greatest single impact on export volumes in the past 12 months and resulted in many exporters reconsidering their positions within the market. These exchange rate movements have favoured suppliers from key international pork markets such as the US and South America. Strong domestic pork conditions since July have also added to the opportunity cost of export.

Australia's key markets are in Asia, with Singapore and Japan providing export income of $77m and $54m per year respectively[3] (Table 12). Of major significance is the fact that both of these markets place a particularly high level of importance on food safety and animal heath issues, as highlighted by Japan's response to recent BSE outbreaks in Canada and the USA, involving

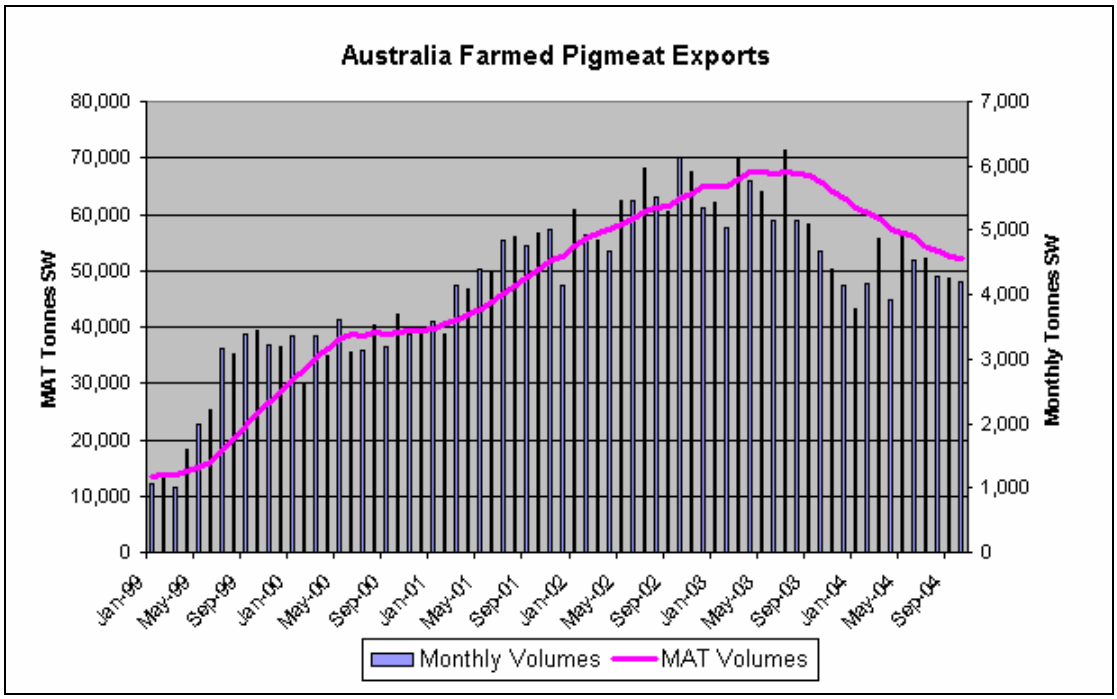
[2] Australian Pork Industry: Microeconomic Analysis; ACIL Tasman; June 2004
[3] ABS August 2004

temporary bans on imports of beef from those countries. With growing global consumer concern for food safety in the wake of increasing disease outbreaks, the Australian pig herds health status becomes even more desirable and an increasing competitive advantage.

Beyond the difficulties arising from the currency appreciation, exporters to Japan continue to face the problem of relatively poor returns for those cuts of the larger Japanese specific carcase that are not exported to Japan[4]. Difficulties encountered with the Japanese market also relate to the safeguard snap back tariff that continues to be enforced on an annual basis.

A 20% strengthening of the $A against the Singapore dollar has put further pressure on pork prices in Singapore, while an additional potential future challenge for growing sales of Australian chilled pork in Singapore is the increasing acceptance in this market of low priced frozen imported product.

Chart 35. Australian pork exports: 1999 to 2004



2.2 Shift from Export to Domestic Focus

Australian pork exports in August 2004 were 18 percent below previous year volumes with exporters reluctant to increase export volumes while domestic pig prices have been increasing. Prices of Australian baconer weight pigs

increased by 16 percent between July and August 2004, effectively increasing the input costs for exporters. Pressured by a strong $A, some exporters were tempted by the strength of the domestic market, viewing it as a more lucrative alternative to an export trade pressured by a strong $A. For those organisations continuing to supply pork export markets, medium to long-term gains remain the major attraction.

2.3 Japan

Pork is the second most consumed meat in Japan after chicken. Annual consumption is currently around 2m tonnes. Almost 48% of Japan's pork is imported, largely from the EU and USA, with Australia's share being approximately 1 per cent market share.

Japan is Australia's second largest pork export market. It accounts for approximately 30 per cent of all pork exports revenue [$A52m (Sept. 04)]. Australia exported almost 9,000 tonnes to Japan for the 12 month period up to September 2004. It is acknowledged, even by those companies involved in the trade that Australia is a 'minnow' in the market, and there is very little awareness in Japan about Australian pork.

Australia's Moving Annual Total (MAT) pork exports to Japan are now 38.2 percent below year ago levels. The strong $A has unfortunately cancelled out much of the margin gains from the positive pork price trends experienced in Japan in recent months, and the increasing relative prices being offered in the Australian market has meant many Australian exporters are redirecting heavy weight Japanese market specifications pigs back into the domestic market.

It has been well documented that pork consumption in Japan has been strengthened by the Japanese ban on US beef imports since late last year due to the BSE finding in the US. On 23 October 2004, the United States and Japan reached a basic framework agreement outlining the conditions for the resumption of the beef trade between Japan and the US. The conditions stipulate that the trade will be limited to beef items derived from cattle 20 months of age or under. Under these guidelines, many industry commentators have argued that it is likely to take several months before significant volumes of US beef are again exported to Japan.

There have been reports that imported chilled pork wholesale prices are increasing in Tokyo, due to a decrease in imports caused by the Safeguard as well as a delay in shipments due to the recent typhoons (Japan Economic Journal, 15 September 2004). This is positive news for Australian pork exporters, who primarily sell chilled cuts to Japan. The easing of the $A to an average of 77.2 Yen in September is also offering some assistance. **That said, the $A still remains considerably higher than the 2002 and 2003 average. This factor has had the greatest single impact on export volumes in the past**

12 months and resulted in many exporters reconsidering their positions within the market.

According to Japan's Agriculture & Livestock Industries Corporation (ALIC), Australian pork comprised 1.2 percent of total Japanese pork imports in October 2004 and 3.1 percent of total chilled pork imports. This compares with October 2003, when Australian pork comprised 1.6 percent of total Japanese pork imports and 5.3 percent of total chilled pork imports. Australian chilled pork received 657 yen/kg in October 2004, which was 5 yen above the chilled pork import average. The FOB per kg value of Australian pork exports to Japan has decreased by $0.36 $A in the past 12 months.

A key difficulty for producers involves the poor returns they receive for those portions of the carcase not exported to Japan, such as the leg and to a lesser extent the shoulder and belly (Table 9). At the same time as the exchange rate reduced the profit/return from the market (Yen prices stayed high for the cuts sold to Japan), the returns for the non-Japan cuts faced increased competition and downward price pressure on the Australian markets from imports of legs and bellies. Therefore, the overall profitability of the pig grown for the Japanese market was reduced, due both to the lower return from Japan for a portion of the animal, and lower returns from Australia for a large portion of the remaining carcase.

Table 1. Australian Exports to Japan – October 2004

Pork Cut	Percentage of total pork exports to Japan in October
Loins	23.5%
Bellies	22.4%
Shoulders	22.1%
Collar Butts	15.0%
Sow meat	2.9%
Manufactured pork*	2.9%
Leg cuts	8.3%
Tenderloins	3.0%

**Further processed pork*

Source: DAFF

An additional challenge for exporting into the Japanese market is the snap back safeguard tariffs. In an effort to curb a sharp increase in imports, Japanese officials announced in July 2004 that they would increase pork tariffs for the fourth time since 2001. Emergency restrictions on pork imports are typically triggered every year in Japan. Once imports in one quarter exceed the average import volume in the previous three years, the safeguard

measures are imposed automatically. A jump of 19 percent or more allows a country to impose emergency tariffs under World Trade Organization rules[5]. Tariff increases of almost 25 percent came into effect from August 1, 2004, and will continue until March 31, 2005. This means the average price of imported pork will jump by as much as $A0.35 per kilogram[6]. In 2004, high levels of pork imports have been attributed partly to the replacement of pork for beef, following the Japanese ban on beef imports from the U.S. after mad cow disease was discovered in a cow there[7].

A further challenge in attempting to sell into the Japanese market is the gate price system, as documented in the Appendix of APL's second submission. The Japanese government sets a gate price. Pig imports priced above the gate price require the Japanese importer to pay a tariff of 4.3 per cent. However, imports priced below the gate price require the Japanese importer to pay a duty to the government covering the extent of the difference. In this way, there is no advantage to Japanese importers in seeking competitively-priced products below a certain price. However, this system is exploited by packaging higher priced cuts with cheap cuts to create shipments below the gate price. **This, in turn, skews the types of cuts imported and limits the amount of lower-cost cuts that can be imported, creating a distortion of the free market.**

2.4 Singapore

Exports to Singapore dropped by 22 percent over the past 12 months from 29.5 thousand tonnes to 23 thousand tonnes (Sept. 04) due to the appreciating Australian dollar. Singaporeans consume some 100,000 tonnes of pork each year. Pork is a staple in the largely Chinese heritage diet, typically consumed several times per week both at home and when eating out. Singapore is entirely dependent on imports for its food requirements.

The Malaysian poultry ban, resulting from the Avian Flu outbreaks, has seen Singapore consumers hit by rising poultry and egg prices, resulting in increased demand for pork supplied by countries such as Australia. However, the Singapore Agri-Food & Veterinary Authority (AVA) has now declared the Malaysian provinces of Johor and Malacca as bird-flu free zones. The AVA ban on poultry and egg imports from these areas will therefore cease, effective from 30th September 2004, and potentially impact on pork consumption and subsequently Australian pork exports.

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[5] 'Japan to raise tariffs on soaring pork imports'; Ann Bagel 30/07/04 for Meatingplace.com

[6] 'Japan to raise tariffs on soaring pork imports'; Ann Bagel 30/07/04 for Meatingplace.com

[7] Japanese Pork Imports to Exceed Trigger; TFC Commodity Charts/Trading Charts, July 2, 2004

i. Exports to Singapore Fall

Significant commercial pressures have affected this business over the past year. The drought in Australia has constrained pork availability for Singapore (as it has for all markets). This has been compounded by:

- The unprecedented hike in pork demand from USA in the wake of the USA BSE incident.
- The tight supply of beef and lamb boosting domestic demand and prices for pork in Australia, resulting in some exporters exiting the export market to supply the higher priced offers in the Australian domestic market.
- A 20% strengthening of the $A against the Singapore dollar putting further pressure on pork prices in Singapore.

One AUD bought 1.23 Singapore dollars in October 2004 compared with 0.98 during the equivalent month in 2002. This 24.6 percent appreciation over a two year period has hurt the Australian pork export trade with Singapore, with FOB per kg export values decreasing by $0.63 AUD during the same time. Increasing jet fuel prices have also placed pressure on the trade, with Singapore Airlines lifting their fuel surcharge on 8 November for the third time since June.

It is reasonable to view these developments as exceptional and temporary market circumstances. Over the next twelve to eighteen months, it is likely that the post-drought pressures on beef and lamb supply in Australia will ease, and Japan will recommence importing beef from USA to 'rebalance' its sourcing options. Pork supply and demand in Australia should also stabilize, providing a better basis to evaluate the long term viability of business with Singapore relative to Australia and other markets. The plan is to build on the strong base that has been achieved in this market.

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ii. Future Singaporean Export Challenges

A potential future challenge for growing sales of Australian chilled pork is the increasing acceptance in the Singapore market of frozen imported product. Chilled pork has been an important unique product offering that Australia has been able to cost effectively supply as opposed to our competitors that has

enabled us to avoid competing on a lowest cost basis. To the extent that frozen product may substitute chilled pork, presents a competitive challenge to Australia, particularly against increasing supplies of low cost Brazilian pork. Further to this, APL has evidence of frozen pork being labelled as chilled in the Singaporean market, and has consequently made representations to the Singapore Government as part of an effort to stamp out this practice.

The potential lifting of the ban on Malaysian pork products, following the late 1990's Nipah Virus outbreak, may also present increased competition for Australian chilled product.

2.5 Export Strategies

A number of joint industry government export programs have been highly successfully in assisting significant export growth in key markets detailed below. As the industry developed its export focus, a number of processors upgraded their boning facilities, with substantial investments undertaken in South Australia at both Murray Bridge, in the form of the Big River Pork development, and also at Primo's facility at Port Wakefield.

2.5.1 Confederation of Australian Pork Exporters[8]

In April 1999, the Australian Government provided $2.7m to fund the Confederation of Australian Pork Exporters (CAPE). The original CAPE membership consisted of a committee of 8 members – four Government appointed and four pork industry representatives. CAPE was an initiative of the National Pork Industry Development Group (NPIDG) to facilitate the marketing and promotion of Australian chilled pork overseas. It is administered by APL and strongly supported by all sectors of the pork industry. (Since 2003, the 'CAPE Forum' has replaced 'CAPE', with the new entity being jointly funded by CAPE Forum members and APL.) Any company that is involved in exporting Australian pork may join the CAPE Forum. The CAPE Forum meets at least twice a year to formally discuss common issues, network, and share information about export markets and marketing development.

CAPE's major objective has been to build Australia's reputation in export markets as a reliable and competitive supplier of high quality pork. The CAPE budget of $5.4m was initially allocated over three years to April 2002, and extended to conclude in June 2003. Budget contributions comprised $2.7m from the Australian Government; $2.1m from levy paying producers; and around $0.7m via membership fees of pig meat processors and exporters.

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[8] http://www.affa.gov.au/content/output.cfm?ObjectID=3B7AE53A-74CF-40EF-9AA1AD8D9A15C72E

CAPE also worked closely with the complementary Singapore Market Alliance (SMA) Program (see section 2.5.2). Through this alliance, CAPE commissioned extensive consumer and trade surveys and developed a comprehensive marketing strategy, which highlights Australia's distinct competitive advantage in supplying air freighted fresh chilled carcase pork to Singapore.

CAPE also developed and launched the brand AIRPORK in March 2000. The AIRPORK media campaign and supporting marketing programs evidenced a significant impact on exports to Singapore with growth from approximately $90m in March 2000 to a peak of $122m per year in May 2002.

CAPE continues to provide existing and potential exporters with a complete range of services to assist them with the export of premium quality and competitively priced pork and pork products. These services include:

- access to market research results from various countries
- access to industry workshops
- a Trade Access database for existing and potential markets
- market intelligence updates on issues affecting pork export markets
- details of export inquiries received by CAPE
- access to use the brands developed by CAPE such as AIRPORK in Singapore and the 'Australian Pork Mark of Quality' in Japan.

2.5.2 Singapore Market Alliance[9]

In June 2000, $2.6m in Australian Government funding was allocated under the National Pork Industry Development Program (NPIDP) to support the Singapore Market Alliance (SMA) Program. SMA was developed and funded in cooperation between the pork industry and the Australian Government to strengthen the long-term market access for Australian pork into Singapore.

The SMA program commenced on 1 July 2000 and aimed to secure long-term access for fresh chilled Australian pork into the Singapore market by building generic marketing and local networking initiatives, ensuring product integrity and providing quality assurance throughout the supply chain. The total program budget was $4.26m, with $2.6m contributed by the Australian Government and $1.66m from industry.

The SMA links closely with the National Networks and Alliances Program (NNAP) and the Confederation of Australian Pork Exporters (CAPE) and consolidates Australia's market presence in Singapore.

[9] http://www.affa.gov.au/content/output.cfm?ObjectID=3B7AE53A-74CF-40EF-9AA1AD8D9A15C72E

Key strategies of SMA were to enhance Australia's fresh and nutritious image initially under the generic brand name AIRPORK; to develop a *Code of Practice* to ensure the product integrity of chilled pork throughout the supply chain; and to develop product and export specifications supported by grading and $Ait systems to ensure quality assurance.

The 'Airpork' brand campaign has demonstrably achieved a high level of awareness for Australian pork in Singapore over the past five years, from virtually a 'standing start'. This, together with exporters' commercial activities and growing commitment to the market, and limited competition for fresh pork from other origins, has helped establish a solid 25% market share for Australian pork.

The SMA project provided a strategy that can be adapted to developing sustained exports of Australian pork to other markets, particularly in Asia.
Early in the SMA project, a Singapore Alliance Manager was appointed to assist Alliance partners in developing and implementing SMA projects. As a result, strong relationships have developed between Australian exporters and Singaporean importers through information trade seminars and presentations. Training courses have also been held for Singaporean importers, both in Singapore and Australia.

A key component of the program was the launch of the AIRPORK media campaign to increase Singaporean consumer awareness of the attributes of Australian pork. Consumer perceptions of Australian pork improved markedly as a result of the campaign and export volumes. Exports to Singapore grew 36% from approximately $90m in March 2000 to a peak of $122m per year in May 2002. Whilst the SMA Program concluded on 30 June 2003 and there has been since a drop in the level of exports to Singapore, APL is seeking to build on the progress made through the SMA.

2.5.3 Other Recent National Pork Industry Development Programs

i. Promotion / marketing in Japan[10]

Separate to the CAPE program, but funded through the NPIDP, was the APL managed 'Promotion/Marketing in Japan' project, which received $105,000 funding.

The objective of this project was to support the promotion and merchandising of Australian pork in designated Japanese markets over a 12-month period. Chilled Australian pork was marketed through major Japanese supermarket chains, such as Mycal and Fuji, carrying Australian identification labels and using merchandising materials at point of sale indicating Australian

[10] National Pork Industry Development Program – Project Outcomes for the Pork Industry; Australian Government Department of Agriculture Fisheries and Forestry; July 2001.

origin. Whilst the sales volumes achieved were affected by increased competition from North America and Europe, the promotion nevertheless, achieved sales of $5.9m of Australian pork under the development program. More significantly, despite competition, prices for Australian pork product in the market place were able to be held.

Australian pork product was part of the Nichirei Premium Pork Program, which remains ongoing. The Australian supplier has forged an enduring business with their customer. The project provided a model for sales and distribution of Australian chilled pork in overseas markets, which has been adopted by CAPE.

The significant lesson from the project was the necessity to combine the different elements of marketing strategy to maximise the sales outcome. The combination of consumer promotion, trade promotion, in-store demonstration and sampling working together, ensured the success of the project.

2.6 Current Export Development Programs

APL's current export development program aims to provide a realistic assessment of the likely commercial benefit that exports can bring to the industry and implement initiatives to achieve this. Further, it seeks to provide a sound commercial rationale and structure to help build exports as a viable part of the industry's ongoing business, recognising both Australia's current position in the global market and also our future potential. The long term objective of the program is to build a commercially sustainable integrated supply chain to service key export customers.

The program will identify:

- priority markets;
- export/marketing initiative resources and skills required;
- their ongoing development to support priority markets;
- funding – sources and process for application; and
- targeted value growth and return on proposed investments.

For the short-term period up to June 2005, the focus of the APL export program has been in developing and implementing collaborative marketing strategies with exporters in priority markets, specifically Singapore and Japan. Specifically this entails:

- An integrated marketing strategy involving APL, Exporters, Buyers, Retailers.
- Reinvigorating and implementing the next phase of the strategy for Singapore.
- Developing the market entry strategy for Japan.

A key component of the draft Industry Restructure Plan is the first strategy to increase consumption of Australian pork in both domestic and export markets and entails increasing the level of both pork sales and producer margins. This strategy highlights the integral link between domestic and export markets as outlined in the previous submissions. Ambitious export targets have not been set in the draft Industry Restructure Plan because APL is strongly of the view that the Australian industry must, as a first step, address a number of fundamental competitive issues to reduce costs of production, enhance margins, and ultimately, put itself in a much stronger long-term position domestically in order to significantly grow our export markets.

2.6.1 The Market Development Committee

APL has established a Market Development Committee (MDC) as an advisory committee to APL's domestic and export marketing and promotional activities. The MDC's mission is to develop a substantial, profitable and sustainable Australian pork export industry.

The committee is made up of eight members consisting of three APL representatives CEO and APL Board Directors, and five industry representatives drawn from vertically aligned producers, processors, importers/exporters etc. APL provides executive support to this committee.

The MDC has identified the following objectives to drive these strategic objectives:

1. Create a database of trade access information for potential markets for Australian pork beyond Singapore and Japan.
2. Build Australia's reputation in export markets as a reliable and competitive supplier of high quality Australian pork.
3. Encourage the development of an export culture.
4. Build consumer awareness of MDC's umbrella brand in our export markets.

The MDC has four key priorities:

1. Develop marketing strategies for Australian chilled pork in export markets, with priorities on Singapore and Japan.
2. Establish and develop a sustainable position in premium export markets for Australian chilled pork, with priorities on Singapore and Japan.
3. Co-ordinate the development of an export culture and disciplines for the MDC members.
4. Encourage efficient export production capacity to reliably service and supply export markets.

Whilst not yet finalised, the specific strategies for the Singapore and Japanese markets have begun to take shape and are documented in section 2.6.1 (i. and ii) below.

i. Singapore – "Next Phase" Marketing Strategy

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ii. Japanese Market Strategy

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iii. Pork Market Improvement Program

One of the key actions undertaken by the 2004 Joint Industry Government Working Group[11] was the establishment of the Pork Industry Market Improvement Program (PMIP). The $2m jointly funded industry-government PMIP was announced in May 2004 which, amongst other things, has a strong focus on enhancing Australia's export performance. More specifically, the export arm of this program aligns with APL's Export Development Program and activities of the MDC. The Program seeks to:

- Improve strategic pork promotion funding to facilitate export growth, including the trialling of new product innovations.
- Food solutions that target export markets.
- Identifying and developing potential new (mainstream and niche) markets, including those in Asia (eg. Taiwan), North America, Europe.
- Development of specific strategies to further develop existing markets such as Japan and Singapore.

Australia's pork exports to other markets are quite small, and currently restricted by supply in Australia and competitive pricing pressures in the target markets. As stated previously, APL is currently reviewing the feasibility of collaborative marketing programs (such as implemented in Singapore) in markets such as New Zealand, Hong Kong, and Korea.

Innovation and differentiation are also a significant challenge in a business dominated by commodity trading, but needs to be an essential part of the development work to help build a more sustainable export presence. Product development work on 'moisture enhanced' product, carcase size and utilisation, innovation in fresh meat cuts and versatility and downstream products and smallgoods will assist in helping to position Australian pork in value added niches in export markets.

[11] The Joint industry Government Working Group was established in March 2004 in response to severe financial crisis being experienced by the Australian pork industry.

In the immediate future the APL's Export Development Program is focused on:

1. Confirming whether there is any commercial value in investigating other markets, i.e.
    a. Other Asia – Korea, Hong Kong, Taiwan
    b. Europe
    c. North America
    d. New Zealand

2. Confirming strategic priorities for identified markets including:
    a. Size and market coverage of key international competitor companies including:
        - Benchmark data on competitor price/costs/margins
        - Value and price impact of subsidies in Denmark, Canada and USA

    b. Innovation and product development research for export markets
        - IP research project priorities (eg: "Moisture Enhanced"), funding of these, and ownership
        - Strategies for 'Larger Carcase' and 'Whole of Carcase' utilisation
        - Smallgoods and 'down stream' shelf stable products

    c. Sustainability of pork production in key regions in Australia comparing likely growth of demand

3. Identify priorities for export-related training and skill development programs in relation to:
        - Export and international marketing professional disciplines
        - Supply chain integrity, traceability and quality assurance
        - IP management
        - Cross-cultural relationship management

4. Confirm optimal funding arrangements for the Export Development Program across stakeholders

2.7 Trade Barriers to Export Growth

Australia's potential new export opportunities continue to be effected by various trade barriers currently in existence in a number of overseas markets. An assessment of potential opportunities and threats for Australia in these markets was identified in a study conducted by the consultancy, International Trade Strategies in 2002. These are outlined in the following sections.

i. Opportunities to expand exports

Table 2 provides a summary of what opportunities are available to Australian exporters (whether there are barriers to be reduced); where they can best be pursued (bilateral or multilateral trade negotiations); and, rates prospects for achieving them by market. It illustrates markets that present the most viable opportunities to be achieved through trade negotiations, and the least viable.

Table 2. Opportunities for Australian Exporters to expand exports

Export Market	Barriers to market access	The opportunity	WTO Prospects	Bilateral Agreements	Best opportunity	Status
			Time of completion 2005 - 2008			
China	H	• Remove/reduce tariffs	G	NO	WTO	Scoping Study stage
India	H	• Remove/Reduce tariffs	G	NO	WTO	Progress difficult
Hong Kong	L	-	N/A	NO	-	-
Japan	M	• Remove/Reduce tariffs and special safeguards	G	2004	WTO/Bilateral	Slow progress
Korea	H	• Remove/Reduce tariffs and tariff quotas	G	NO	WTO	Slow progress
New Zealand	ANZCERTA - No barriers	-	N/A	ANZCERTA	-	-
Singapore	L	• To secure current quarantine access	N/A	2002/03	-	Agreement completed
Taiwan	H	• Remove/Reduce tariffs, tariff rate quotas	G	NO	WTO	-
Thailand	H	• Remove/reduce tariffs	G	2007/12	WTO/Bilateral	Final agreement disappointing

(H = High; M = Medium; L = Low; G = Good; B = Bad; F = Fair)

Unfortunately, progress to date in gaining access and/or to enhancing trade arrangements with a number of these countries, (with the exception of Singapore), progress through multilateral negotiations has been slow while bilateral negotiations have not provided substantive new trade opportunities for Australian pork exports. This is particular evident in the case of Japan, the country that provides the second highest source of export income.

ii. Threats to Australian Producers

The threats to Australian pork producers with respect to market access, are identified in terms of the threats trade negotiations represent firstly, for competitors to gain preferential access to existing and prospective markets of interest to Australian pork producers (competitive preferential advantage) and secondly, the threats posed to Australian producers from lifts in the level

of subsidies granted to export competitors (subsidised advantage). Table 3 summarises the main threats posed which are explained below.

Table 3. Threats to Australian export markets

Source of threat	Activity	Threat to Australian domestic market	Australian export market or prospective market threatened
WTO negotiations	• No perceived threat		
Canada	• Canada/Japan Bilateral Agreement • Canada/China Protocol on Quarantine • Increased subsidies	• More Canadian imports, lower prices	• Japan • China • Japan, Singapore, Korea
United States	• Singapore/US Bilateral Agreement • Increased subsidies • Australia/US Bilateral Agreement	• US secures greater access	• Singapore (monitor quarantine in negotiations) • Japan, Singapore. Korea, Hong Kong
China	• Not a significant threat unless quarantine rules relaxed • Increased subsidy levels		• Hong Kong
EU	• Increased subsidy levels • Non trade concerns – environmental , animal welfare, food safety • TRQ's	• Cheaper Danish imports	• Japan, Singapore, Korea • General implications for competitiveness in global markets
Brazil	• Increased subsidy levels		• Singapore, Hong Kong

2.8 Trade Barriers to Fairer Export Arrangements

As part of the PMIP project, documented earlier in this section, a comprehensive competitor benchmarking study is underway, which amongst other things, addresses the extent and price impact of subsidies in Denmark, Canada and USA. In the context of Denmark, APL wishes to highlight that this country is able to sell those cuts that have the biggest margin in the protected EU market, enabling them in turn to sell the remaining cuts at a lower price in international markets. This can have the effect of depressing the price of pig meat products around the globe and thereby reduces the returns to pork producers from all countries. Combined with subsidies provided to EU producers these factors can significantly influence the extent to which other international pork trading nations are able to compete. **This situation further highlights the legitimacy of safeguards actions in Australia so as to enable Australian producers the necessary adjustment period to restructure in order to effectively address such ongoing competitive disadvantages.** Please refer to APL's Submission 2, Appendix D for a full list of support arrangements in both the EU and other competitor countries.

3 Effectiveness of Industry Programs

APL contracted a consultancy, eSYS Development, to carry out an economic evaluation of ten completed research projects or programs. Due to the limited time frame entailed in the Pig Meat Inquiry, APL was unable to conduct a more full scale analysis of the numerous R&D projects that have been undertaken in recent years. The following projects/programs were selected because they were believed to have generated benefits and because some quantitative data was available to estimate likely industry impact since completion:

1. Effect of weaner performance and weaning age on the overall productivity of pig meat production.
2. Canola meal studies
3. Effective use of ergot-infected sorghum in pig feeds
4. ProHand (handling training) for stockpersons
5. Agronomic value of deep litter.
6. Deep litter and alternative housing systems for growing pigs.
7. Investigating the pork supply chain into Singapore
8. FeedCheque – feed mixing training program for home mixers
9. Disease eradication and on-farm demonstration.
10. Pig Meat Hygiene Program

A benefit cost analysis provided the evaluation framework within which an estimate of each project's expected economic pay off was derived. Pay off was measured by a project's net present value (the difference between project benefits and costs over a 20 year period) and benefit cost ratio (the ratio of all project benefits to all project costs).

Industry benefits considered included lower production costs, increased farm productivity, higher quality production and industry development. All project costs, which included PRDC/APL and partner organisation resources, were included in the cost-benefit framework. Both benefits and costs were discounted using a six percent discount rate

Lower cost projects evaluated included canola meal projects, ergot infected sorghum, FeedCheque, weaner performance and on-farm disease eradication. The Pig Meat Hygiene Program, Singapore market development and ProHand were the most costly of the selected projects.

The average benefit-cost ratio for a range of rural development corporation projects was estimated to be 7.2:1 (see AFFA, 2001 – Innovating Rural Australia, Rural Development Corporation Outcomes, AFFA, Canberra). **A number of the projects evaluated in this report indicate that selected APL research is delivering economic benefits above average returns experienced**

by other funding bodies. It is, however, difficult to draw conclusions about portfolio performance from a number of selected projects. All, or a random selection of stratified projects, need to be assessed to evaluate overall performance of the portfolio.

Four of the projects analysed were estimated to have a relatively sound expected pay off (more than $10 of benefit for every $1 invested). High pay-off projects included:

- Singapore market development
- Prohand (pig handling) training workshops
- FeedCheque
- Disease eradication

These four projects have been documented in this section, whilst details on the remainder of the projects analysed can be found in Appendix A.

A summary of economic attractiveness as dictated by benefit-cost ratio (BCR) and net present value (NPV) estimates, and comments about industry value and pay-off of all the assessed projects is provided in the following Table 4.

Table 4. Summary of Industry Programs Effectiveness

PROJECT	COST	NPV	BCR	COMMENT	QUANTIFIED BENEFITS	PAY-OFF
1.Weaner performance	$204,640	$2.6 m	8:1	The BCR is moderate due to relatively low cost of the project. Adoption is likely to be limited to large corporate piggeries	$1.2 million per year	***Moderate***
2.Canola meal	$208,444	$2.0 m	7:1	The BCR for this relatively low cost project is significant, although industry net present value is moderate. Moderate adoption of higher canola inclusion rates limit project impacts	Saving of $70 per tonne for canola meal.	***Moderate***
3.Ergot- sorghum	$191,316	$0.9 m	4:1	Farmers in northern NSW and Queensland who utilise sorghum are potential beneficiaries of this research. The low cost of the project generates a moderate BCR.	Average economic benefit of $33 per sow	***Moderate***
4.ProHand	**$950,000**	**$39.6 m**	**20:1**	**The high participation rates in industry workshops and large forecast benefits from adoption result in large economic benefits for this investment**	Average economic benefit per sow $49	***High***
5.Deep litter for cropping	$394,000	$3.9 m	7:1	Positive additional environment benefits from improvements in soil structure and reduced problems associated with litter storage and resultant odour have been realised.	Identified $7 per tonne could be charged for litter	***Moderate***
6.Housing systems	$264,397	$2.5 m	4:1	The benefits from this research flow from the adoption of improved deep litter management practices.	Adoption of best mgt practices leading to increased growth rate of pigs.	***Moderate***
7.Singapore Market	$516,235	$60 m	70:1	Very high commercial payoffs derived from large volumes of product now shipped into Singapore. Penetration of the market was also driven by Nipah Virus outbreaks in the region	Local producers: captured $1.52 million for each additional kilo tonne of product sold in Singapore	***Very High***
8.FeedCheque	$73,822	$3.0 m	33:1	Significant commercial pay-off, even with adoption restricted to the proportion of industry that home mixes. Relatively low cost project generates high BCR	Benefit of $113 per sow per year	***High***
9.Disease eradication	$355,000	$7.5 m	14:1	Reduced prevalence of key pig diseases has generated considerable economic benefits. Adoption currently limited to 30,000 pigs, although increased future adoption is expected	Decreased prevalence of mange, swine dysentery and mycoplasma	***High***
10.Pig Meat Hygiene	$1.85 m	$33 m	9:1	Research and development has led to changed industry inspection practices, which has reduced labour costs in abattoirs and increased meat yields. The probability of food safety issues affecting the industry has also been reduced.	Labour cost savings in abattoirs, increased meat yields	***Moderate***

3.1 ProHand (Handling Training) for Stockpersons[12] [13] [14]

3.1.1 Background

Negative handling of pigs causes stress, which in turn causes reduced animal productivity and product quality. An improvement in the attitude, behaviour and handling skills of pig stock people, along with improving stock people selection would decrease the incidence of stress-related trauma in pigs and also improve farm productivity.

Prior to this suite of projects, collectively known as ProHand (Professional Handling) being financed, little quantitative information about the relationship between stress and productivity and best pig handling practices was available. These relationships required investigation, along with the synthesis of a training package and computer tools, to extend practices to industry.

ProHand began with Project DAV 93P in July 1991 and has been followed with a series of projects over the last 10 years. Most recently, the Project UM 69/1458 was supported to improve handling practices within abattoirs.

3.1.2 Project cost

Read Sturgess (2000) indicated the total cost of the projects was about $863,000, with PRDC committing around $517,913. With follow-on projects and the cost of demonstration workshops, the total cost to date of ProHand for all parties involved is about $950,000.

3.1.3 Outputs and qualification of outcomes

The projects have essentially involved the development of tools to improve stock person management of pigs and minimisation of stress. Specific outputs include:

- Research to identify stockperson attitude and behaviour and pig fear and productivity relationships
- A computerised attitude questionnaire was developed and utilised on a large scale to predict the behaviour of people towards pigs

[12] eSYS Development (2004) Cost Benefit Analysis of 2004/05 Short Listed Projects, APL Number – 2002, June 2004

[13] Hemsworth, P. (2002) A Handling Training Program for Pig Handlers at Abattoirs, Report to APL.

[14] Read Sturgess and Associates Consulting Economists (2000) Project Con 102/1388 – Benefit Cost Analysis of PRDC Projects, Progress Report Number 5, Report to PRDC, October 2000.

- A cognitive-behavioural intervention procedure was developed and used by trainers to improve the attitude and behaviour of stock-persons
- The questionnaire and behavioural interventions were packaged in a training program which included $Aio-visual material, computer software, a manual and integrated training materials
- Following commercialisation in 1996, ProHand training workshops were conducted. Between 1997 and 2003 a total of 624 stock persons were trained.

The extension of improved handling recommendations has production benefits, animal welfare benefits and could possibly improve farm hand self esteem. In the case of production benefits, the Trainers Manual (cited Read Sturgess, 2000) suggest that the program leads to enhanced reproductive performance of the sow and an improvement in pig growth performance of 5%.

3.1.4 Economic Impact

Profipork simulations presented in eSYS Development (2004) indicated that profitability increases by $59 (per sow) for each 0.5 additional pig born per litter. On an annual basis this is equivalent to one additional pigs born per sow per year. The ProHand training manual suggests this is a typical production benefit from adoption of program recommendations

For the purposes of this evaluation it is assumed that, on average, an additional 0.5 pigs are born per sow per year as a result of ProHand adoption. This increased reproductive performance is estimated to have an annual benefit of $30 per sow.

The potential impact of elevated growth rates are also included in the cost-benefit evaluation, but at a lower rate than those outlined in the training manual. It is estimated that growth rates are increased by 1% in piggeries where ProHand systems and practices have been adopted.

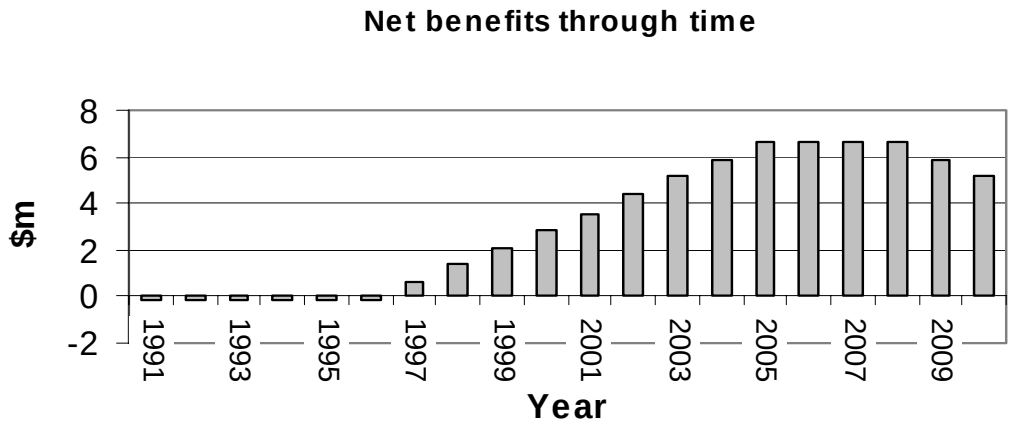
Profipork simulations presented in eSYS Development (2004) indicated that an increase in slaughter liveweight gain at 23 weeks of 1kg was worth an increase in profit per sow of $19 per year. The combined reproductive and growth rate benefits of improved stock person handling is estimated to total $49 per sow per year

3.1.5 Social and other Benefits

In addition to production benefits, animal welfare benefits have been derived from successful implementation of ProHand. The program supports the

adoption of practices which reduce the stressing of pigs, hence improving their well-being.

Chart 1. Net Benefits: ProHand for Stockpersons



Given the growing concern about animal welfare the development of approaches to minimise animal stress are important from an animal well-being perspective and also in terms of maximising enterprise profitability. The development and implementation of the ProHand system has improved stock person handling of animals and generated considerable industry benefits. The recent extension of this project to train lairage workers on correct handling of pigs is likely to improve meat quality in the future.

3.1.6 Quantified Benefits

Based on approximately 0.3 million sows in the national herd, an average economic benefit of $49 per sow and a maximum adoption of ProHand of 60% – the total annual benefits accruing to ProHand research and development are about $9 million per annum

3.1.7 Pay Off

Chart 1 above shows the stream of benefits over the period 1991 to 2010. It is evident that the annual benefits are considerable, and correspondingly, the economic pay-off in net present value (NPV) and benefit-cost ratio (BCR) are $39.6 million and 20:1.

3.2 Investigating the Pork Supply Chain into Singapore[15]

3.2.1 Background

Singapore has emerged as a major market for Australian pork, with annual sales of $81 million in 2004. Up until the late 1990s, this market was a small destination for Australian pork as trade was restricted due to poor shelf life and concerns about the microbiological quality of the product.

In order to address these concerns and re-open this market to Australian product, research and industry development was required to ensure Australian processors were aware of Singapore market requirements, and could meet them. Additionally, end-users in Singapore needed to be trained in the handling of chilled product and cold chain requirements to maintain adequate shelf life needed to be identified.

With these issues in mind, PRDC financed a series of chilled pork quality assurance and product development projects with the objective of increasing penetration of the Singapore market. The series of projects began with Project 1319 *Trial Shipment of Chilled Pork to the Singapore Market*.

3.2.2 Project cost:

The projects cost PRDC $345,283. Both projects involved the Victoria Institute of Animal Sciences (now Victorian Department of Primary Industries) who contributed $135,952 for both projects. In addition, within Project 1566, direct contributions of $25,000 and $10,000 were received from Supermarket to Asia Limited and the Confederation of Australian Pork Exporters. The total cost of the series of projects was $516,235.

3.2.3 Outputs and qualification of outcomes:

Specific findings included:

- All shipments from all processing plants in Australia passed minimal microbiological acceptance criteria set out by the Singaporean authorities
- The shelf life of vacuum packed product was at least 3 weeks at 4 degrees for all processors

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[15] APL (2001) PIGSTATS 2000 and 2001, APL, Canberra.

Coates, K (2000) Trial Shipment of chilled Pork to the Singapore Market, Final Report to PRDC, February, 2000

Coates, K (2000) Investigating the Pork supply Chain into Singapore, Final Report to PRDC, February, 2000

eSYS Development (2003) Economic Evaluation of Portfolio, APL Number 1898, APL, July 2003

- Time and temperature profiles were measured for chilled pork shipments using data loggers and the information used to estimate impact on shelf life potential using food spoilage software (Gemini)
- Opportunities for Singaporean importers, retailers and processors were noted. 200 Singaporean pork industry personnel were trained to handle Australian chilled product
- Better insulation of containers and best packing methods were pointed out. Improvements included the use of coolants in polystyrene boxes, and false floors in containers
- Ideas for improving supply chain management in Singapore were also specified and included container unloading protocols, truck refrigeration temperatures and arrival times for receival of product.
- It is estimated that the project accelerated market development by about five years and enabled Australian exporters to respond faster, therefore capturing greater share in the market.
- This project has already accrued a phenomenal return on the modest funds that were committed. The market penetration that has already been achieved, positioning of AIRPORK and growth in the market have generated considerable benefits.

The key result of this research has been growth in the Singapore chilled pork market over the last 5-7 years. As a result of this project the market has grown to about $81 million per year (for year ending June 2004) and further growth is forecast. Australian pork producers benefit through higher farm level prices as a result of the increased demand for Australian product this project.

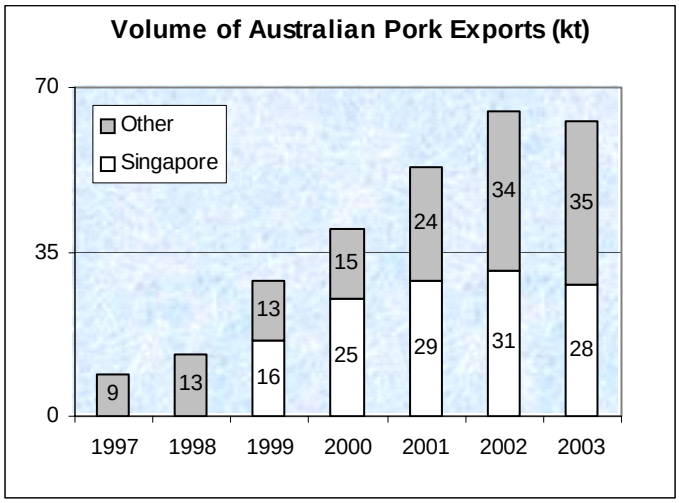
The implementation of the project coincided with Nipah Virus outbreaks in the region. This event allowed Australian exporters to step in and take the major share of the market. This position has been maintained.

3.2.4 Economic Impact

The Singapore market has a total size of about 97 kt (carcass weight). Australia, Indonesia, Canada and Denmark are major suppliers of the market, although Australian pork accounts for a large proportion of the supermarket trade and of all imports.

The high penetration of the market by Australian suppliers is a recent phenomenon as shelf life concerns precluded Australian product from the market until the late 1990s. The growth in Australian export volume to Singapore is presented in the following chart.

Chart 2. Volume of Australian Exports



An increase in export sales of this order creates increased domestic demand and consequent increased farm-level prices for Australian pigmeat. Econometric analysis by Collins in eSYS Development (2003) found that local producers captured $1.52 million for each additional kilo tonne (thousand tonnes) of product sold in the Singapore market.

Since 1997 the Singapore market has grown to 28 kt in 2003 generating $43 million per year in benefits to Australian pig producers. For evaluation purposes it is assumed that 25% of the growth in demand flows from PRDC supported research and development, as the outbreak of Nipah Virus also drove export growth.

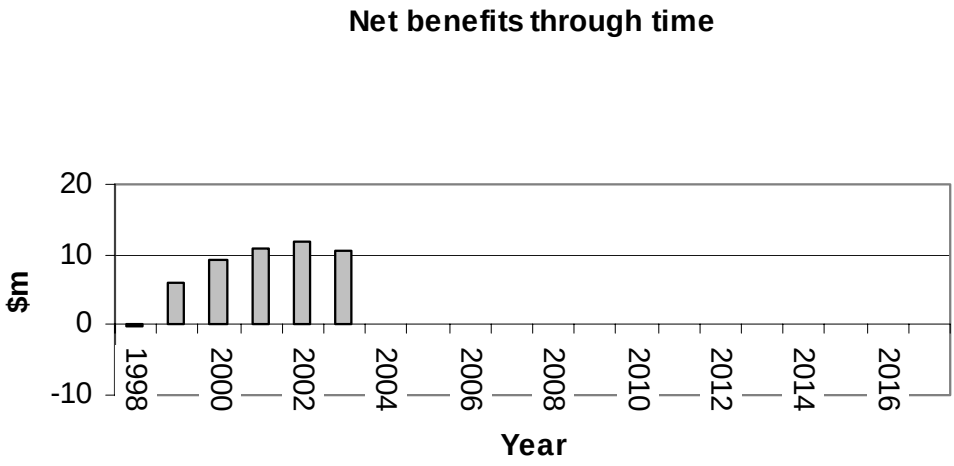
3.2.5 Quantified Benefits

The key benefit for pig producers is the increase in demand Singapore market development has created. The market consumes around 28 kt of Australian pork and further growth in demand is expected. The value of such an increase in demand has been estimated to be $43 million per year, with 25% attributable to APL/PRDC investment.

3.2.6 Pay Off

The economic pay-off in terms of net present value (NPV) and benefit-cost ratio (BCR) are $60.4 million and 70:1 when a 6% discount rate is used. A pay-off of this magnitude is considerable, as for each dollar invested a benefit of $70 will accrue to industry.

Chart 3. Net Benefits: Investigating Singapore Supply Chain



3.3 Feedcheque – Feed Mixing Improvement Program[16]

3.3.1 Background:

Feed costs are the largest cost component in Australian pig rearing enterprises, representing 67% of overall 2002/03 production costs (Australian Pig Annual, 2003). Most feed purchased by pig farmers is commercially manufactured, although a large proportion of diet preparation is performed on-farm.

A number of factors underpin the high proportion of home-mixers, and include the ability to value add grain, significant capital costs being already tied up in equipment and the convenience of mixing on-farm (APL, 2004). It is estimated that home-mixers represent about 50% of all pig producers.

Given the widespread adoption of home mixing, it is important that diet preparation practices follow best practice. Sub-optimal diet formulation results in feed wastage, depressed animal growth rates and elevated fat deposition.

With the need to extend best practice to industry in mind, PRDC financed development of a prototype SARDI (South Australian Research and Development Institute) training package for quality assurance in on-farm diet preparation and storage, and extension of the package to industry through a series of workshops.

3.3.2 Project cost:

The projects cost PRDC $73,822. This cost included support for regional training workshops.

3.3.3 Outputs and qualification of outcomes:

Specific outputs included:

- The FeedCheque package contains assessment guides and notes, testing kit, particle size sieves and commodity standards manual.

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[16] APL (2001) Australian Pig Annual, 2003, APL, Canberra.
APL (2004) Producer Survey, Unpublished Report, APL, Canberra

eSYS Development (2003) Economic Evaluation of Portfolio, APL Number 1898, APL, July 2003

van Barneveld, R. (1999) FeedCheque Assessment Guide, Report for the PRDC, Canberra.

- A workshop format was formulated to extend the package which enables farmers to examine feed preparation areas, raw material storage, diet formulation, mixing procedures, quality control and record keeping.
- Since the commencement of FeedCheque extension in 2002, staff from 110 piggeries, with an average sow herd of 320, have attended FeedCheque workshops.
- It is estimated that this project investment has accelerated adoption of best mixing and diet preparation practices for five years.

A survey of producers by APL in 2004 examined the perceived benefits of FeedCheque. From the 17 respondents to the FeedCheque component of the survey, the key benefits from adoption of the system included improved control of particle size (affects growth and conversion efficiency), improvements in mixing time and more accurate feed formulation.

Respondents reported increases in growth rate by 10-60 grams per day and a 5% reduction in feed usage.

Adoption of FeedCheque helps farmers identify and rectify feed formulation problems without having to incur expenditure for new equipment.

3.3.4 Economic Impact

An increase in growth rate following the adoption of improved feed preparation practices enhances farm profitability. Profipork simulations estimate that an increase in liveweight gain of 1kg at 23 weeks of age is worth $19 on a per sow basis. Based on the 10-60 g / day increase reported by FeedCheque adopters in an APL survey, it is estimated that live weights would be 2 kg greater in 23 week pigs, worth $38 per sow per year.

In addition, a 5% reduction in feed usage per year (based on a cost of feed per sow per year of $1,500) is worth $75 per sow. The total economic benefit per sow is $113 per sow per year.

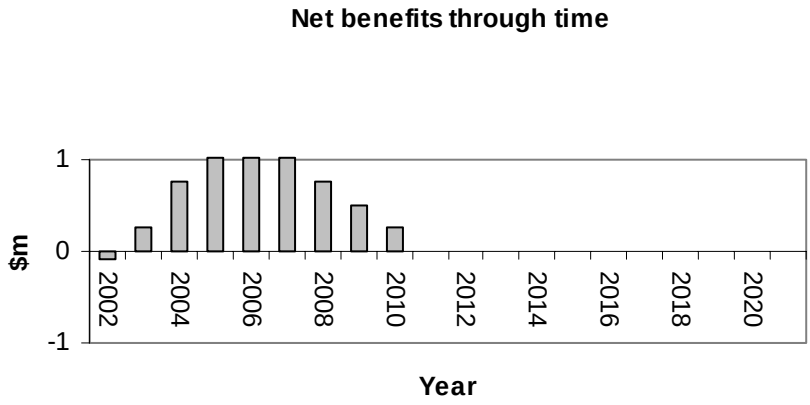
3.3.5 Quantified Benefits

Based on an industry capacity of 0.3 million sows, a benefit of $113 per sow per year from FeedCheque and a 3% level of adoption, an annual benefit of $1.0 million is attributable to the financing of these workshops.

3.3.6 Pay Off

The economic pay-off in terms of net present value (NPV) and benefit-cost ratio (BCR) are $3.0 million and 33:1 when a 6% discount rate is used.

Chart 4. Feed Mixing Improvement Program



3.4 Disease Eradication and On-farm Demonstration[17]

3.4.1 Background

Diseases are a constant threat to pig production, as many inflict mortality, depress growth rates and adversely affect animal welfare. Management of major pig diseases is a major cost for the industry. In 2001, it was estimated that direct animal health costs (ie. medication) averaged around $7.94 per pig produced (PIGTATS, 2001)

Many key diseases could be eradicated with the introduction of all in/out and multi-site rearing, although these systems are not practical in many instances, and continuous production relying on the use of antibiotics is typically employed.

This form of production may not be sustainable in the longer term. Antibiotic resistance is becoming more of a problem, consumer groups are increasingly concerned about mass medication of animals, and there is continued pressure on farmers to reduce production costs.

Eradication of major diseases is a solution to on-going disease problems. Medication and de-population programs targeting the eradication of major diseases have short pay-back periods. Research into best eradication practices for Australian diseases and conditions was scant in the late 1990s. To address this information gap, PRDC financed a series of projects in this field.

3.4.2 Project cost:

The projects cost PRDC $254,701. Assuming this included 50% of the costs for projects 1333 and 1624, and 100% of the costs for 1462, total costs were $355,000.

3.4.3 Outputs and qualification of outcomes:

Specific outputs included:

- The manual '*Eradicating Diseases of Pigs*' was published and has been disseminated across industry
- Case studies in disease eradication were mainly successful in demonstrating that key diseases could be eradicated. Greatest success

[17] APL (2001) PIGSTATS 2000 and 2001, APL, Canberra; Cutler, R. (2001) Eradicating Diseases of Pigs, APL, Canberra; Fahey, T. (2002) On Farm Demonstration of Disease Eradication, Final Report 1624, APL, Canberra

appeared to be associated with Swine Dysentery eradication from smaller farms and also Sarcoptic mange. *Mycoplasma pneumonia* was also eradicated.

- Case studies were presented at the Bendigo launch of the *Eradicating Diseases in Pigs* manual. Producer and consultant groups were addressed in WA, SA, Vic, NSW and NZ
- Technical support was provided by the Victorian government (Pig Disease and Research Unit) to a number of farms.

Results of the research are particularly relevant to low health continuous flow farms where diseases have an impact on production and animal welfare. Adoption of eradication methods will result in increased animal production and longer term reductions in animal health expenditures.

Feedback from veterinarians (eight pig vets were telephoned in November 2004) is that these projects greatly increased awareness of disease costs and control options. Many requests were received about eradication programs.

3.4.4 Economic Impact

Case studies were most successful in eradicating mange, swine dysentery and mycoplasma, and consequently, it is estimated that recommendations from the project have resulted in decreased prevalence of these diseases.

Mange eradication has been successful in 90% of cases, with the disease being eradicated for an average of five years. Following eradication, costs of production are typically 2c /kg (carcase weight) less than production with the disease. Increased production costs stem from a slow-down in growth and increase in food consumption (Cutler 2001).

Cutler (2001) estimated the costs of pneumonia to be $55-71 per sow, while a study in Western Australia found mycoplasma reduced performance per sow by $64 per year and medication could cost up to $100 per sow per year. Economic costs result from reduced growth rates, reduced feed efficiency, increased medication costs, higher management costs and increased mortality.

Mycoplasma pneumonia has been successfully eradicated in 80% of cases using procedures outlined in publications generated by this project. Typically eradication lasts 3-4 years before re-infection occurs. An initial (first years) cost of eradication of $160 per sow is realised, then followed by three years of higher profitability through absence of the disease. This benefit is assumed to be $100 per sow per year.

There also has been success in eradicating swine dysentery, but at a lower rate of 60%, and typically only for 2-3 years. As outlined in Cutler (2001), there is no benefit in the year of eradication (costs of eradication are equal to any benefits), then for two years, increased feed conversion efficiency generates an increased profit of $85 per sow per year.

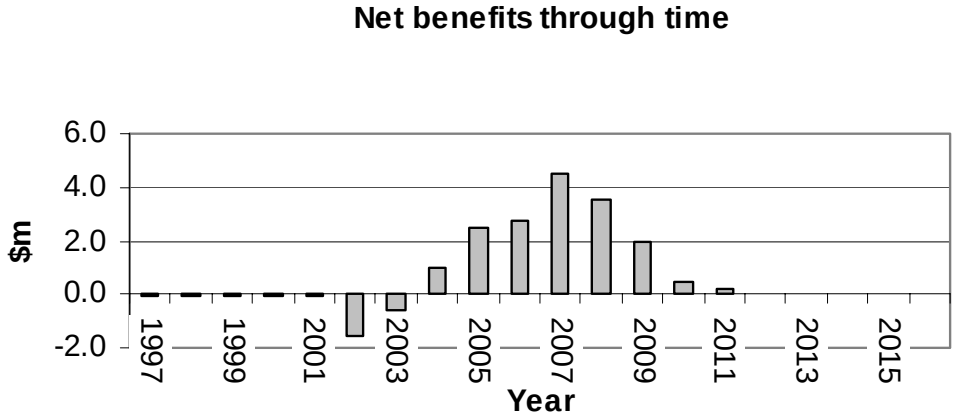
3.4.5 Quantified Benefits

Based on disease eradication trialled on 50,000 sows and the success rates and benefits outlined above, the maximum annual industry benefit is estimated to be more than $4 million.

3.4.6 Pay Off

The economic pay-off in terms of net present value (NPV) and benefit-cost ratio (BCR) are $7.5 million and 14:1 when a 6% discount rate is used.

Chart 5. Disease Eradication and On-farm Demonstration



4 Conclusion

This is the third of four submissions APL is providing for the Pig Meat Inquiry. This submission firstly addresses APL's recent and proposed export strategies and secondly provides an assessment of the economic value of recent industry R&D programs undertaken by APL that have been aimed at improving the competitiveness of the Australian industry.

The higher $A has made exporting less competitive, resulting in a measurable fall in Australian export volumes. A number of exporters have redirected supply form exports back into Australia due to the comparatively higher prices being offered in the Australian domestic market. From a peak in April 2003 of 66.9m tonnes moving annual total (MAT) valued at $270m MAT, exports for the corresponding figures for October 2004 had fallen to 51.2m tonnes and $174.4m representing a 23% reduction in export volume.

Further to this, exporters to Japan have continued to face the problem of receiving relatively poor returns for those cuts of the larger Japanese specific carcase that are not exported to Japan[18]. Difficulties encountered with the Japanese market also relate to the safeguard snap back tariff that continues to be enforced on an annual basis. A 20% strengthening of the $A against the Singapore dollar has put further pressure on pork prices in Singapore, while an additional potential future challenge for growing sales of Australian chilled pork in Singapore is the increasing acceptance in this market of low priced frozen imported product.

Despite the recent falls in export trade, export sales still provide a significant source of revenue for Australian producers, making up approximately 16% of total pork production. A number of recent joint industry government export programs have been highly successfully in assisting significant export growth in key markets, including the Confederation of Australian Exporters (CAPE) and the Singapore Market Alliance (SMA).

The drafting the industry restructure focuses on consolidating existing export markets and building domestic demand for Australian pork. A focus of the Restructure Plan involves implementing measures that will increase the competitiveness of Australian pork both domestically, and consequently, internationally. APL's export marketing strategy is currently being revised, with the final strategy building on the insights provided by the joint Industry-Government funded Pork Market Improvement Program (PMIP).

In an attempt to identify the effectiveness of recent industry programs, APL has conducted an economic evaluation of a selection of completed research projects or programs. Industry benefits considered in the analysis included lower production costs, increased farm productivity, higher quality production and industry development.

A number of the projects evaluated in this submission indicate that selected APL research is delivering economic benefits above the average returns experienced by other funding bodies. APL acknowledges that it is difficult to draw conclusions about portfolio performance from a number of selected projects; however due to the limited time frame entailed in the Pig Meat Inquiry, APL was unable to conduct a more extensive analysis of the numerous R&D projects that have been undertaken in recent years.

Key Findings

1. ***Since mid 2003 a number of Australian exporters have, and continue to, redirected supply away from exports back into Australia, due in part to the appreciation of the $A, resulting in comparatively higher returns being offered in the Australian domestic market.***

2. ***Progress to date in gaining access and/or to enhancing trade arrangements with a number key countries through multilateral negotiations has been slow, while bilateral negotiations have not provided substantive new trade opportunities for Australian pork exports.***

3. ***In light of the changed dynamics in both the domestic market and key export markets, APL is currently in the process of developing a new export strategy, that will seek to build on the joint industry-Government funded PMIP and also the strategies of the draft Industry Restructure Plan[19].***

4. ***For a number of the industry programs recently undertaken by PRDC/APL, a recently completed benefit-cost analysis indicates that significant ongoing economic benefits have been achieved.***

APL's will table its final submission to the PC at the Melbourne public hearing in January 2005. This submission will provide updated information on the specific initiatives APL intends to pursue as part of the industry restructure, including identifying specific government measures that can also enhance the competitiveness of the industry, outline findings of international benchmarking of the Australian pork supply chain (as mentioned above) and

[19] Details regarding the draft Industry Restructure Plan will be outlined in APL's fourth submission to the Pig Meat Inquiry.

provide a response to the Productivity's Commissions draft report released on 15th December 2004.

Appendix A: Ex-post Benefit-Cost Analysis of Selected APL Projects 2004

1. Effect of Weaner Performance and Weaning Age on the Overall Productivity of Pig Meat Production20

BACKGROUND:
The PRDC funded project 1019 *Effect of Weaner Performance and Weaning Age on the Overall Productivity of Pig Meat Production*, was commenced in July 1995 and concluded in June 1998.

The focus of the research was to improve the management of weaner pigs through better understanding the impact of weaner age and diet on pig performance. At the time the project was commissioned weaning ages were decreasing – largely due to USA producers moving to segregated early weaning as a means of disease management for viruses not present in Australia.

The precise impact this practice has on pig performance and consequent enterprise profitability in Australia was poorly understood.

PROJECT OBJECTIVES:

- To improve the overall productivity of pig meat production by improving growth performance in the post-weaning period
- To establish the major nutritional and physiological constraints on the growth performance of pigs weaned between 14 and 28 days
- To establish the effect of weaning at 14 or 28 days of age on overall growth performance and productivity
- Determine the lysine requirements and develop cost effective diets for pigs weaned at 14 days of age

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[20] ABARE (2003) Australian Commodity Statistics 2003, ABARE, Canberra

ABARE (2004) Australian Commodities, Vol 11, 3, September, 2004.

APL (2002) PIGSTATS 2000 and 2001, Australian Pig Industry Handbook, APL, Canberra.
Dunshea, F (1996) The Effect of Weaner Performance and Weaning Age on the Overall Productivity of Pig Meat Production, Final Report for PRDC, APL, Canberra.
eSYS Development (2004) Cost-benefit Analysis of 2004/05 Short Listed Projects, Report to APL, June 2004.Main et al (2002) KSU Swine Day, 2002

RESEARCH GROUP:
The research was undertaken by Agriculture Victoria and Bunge Meat Industries, with Frank Dunshea being the principal investigator.

PROJECT COST:
APL (then PRDC) provided $109,640 while Agriculture Victoria provided around $60,000, Bunge Meat Industries $15,000 and Murdoch University $20,000 representing a total research budget of $204,640.

ECONOMIC IMPACT
An increase in P2 by 2mm would reduce carcase value by about $0.05 per kg (carcase weight) on price grids for the industry prevailing at that time. Given the average slaughter weight of a pig is about 70 kg, this premium was worth $4 per pig marketed.

Additionally, early weaning results in higher mortality. Studies in the USA have shown that reducing weaning age from 21 days to 14-15 days increases piglet mortality from 0.5% to 3% (Main et al 2002). An increase in post weaning mortality of 2% was estimated to cost $46 per sow per year (Profipork simulation in eSYS Development, 2004)

This information persuaded many producers not to try early weaning and saved production and financial losses that would have accompanied this practice.

It is possible that these findings may have been arrived at or generated by other researchers. Therefore, Project 1019 most likely eliminated industry-wide experimentation with early weaning over a three year period.

ADOPTION
The outcomes of the research were adopted by Bunge Meat Industries and possibly a number of other players who otherwise would have trialled the system. It is estimated that 10% of industry pig production capacity would have early weaned without the project. Results of the research were estimated to dissuade adoption of this practice over a 3 year period commencing in 1999.

BENEFITS
Based on 10% of industry avoiding the costs associated with early weaning (equivalent to 500,000 pigs marketed at lower carcase value and higher post weaning mortality for 30,000 sows), then total benefits accruing to the research are about $3.5 million (about $1.2 million per year).

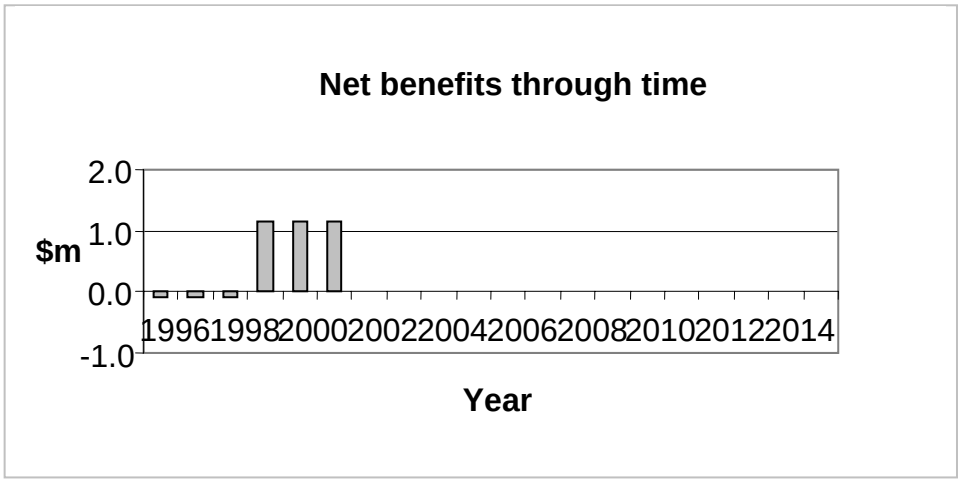
PAY OFF
The graph below shows the stream of net benefits over the period 1996 to 2016.

Given the project was relatively low cost, (ie. around $200,000), and the annual benefits are considerable, the economic pay-off in net present value (NPV) and benefit-cost ratio (BCR) is significant.

It is estimated that the NPV, with a 6% discount rate is $2.6 million and the BCR is 8:1. In the case of the BCR, a ratio of this order suggests that for each dollar invested, industry has gained $8

COMMENT
Significant commercial benefits are likely to have resulted from this project, because the more innovative sector of the industry was dissuaded from trying early weaning. Based on estimates outlined in the assessment, the project has yielded a BCR of 8.

4.1 Effect of Weaner Performance and Weaning Age on the Overall Productivity of Pig Meat Production



2. Canola Meal for Pigs[21]

BACKGROUND:
The production of canola in Australia grew rapidly in the 1990s with production beginning at about 98,000 tonnes in 1991 and increasing to 1.7 million tonnes by 2001. Canola meal, a co-product of canola oil production, represented an attractive source of protein and energy in pig diets as these elements are costly and there are limited alternate sources

Little was known, however, about the nutritional properties of canola meal, the impact of different methods of extraction on nutritional value and potential impact of factors such as glucosinolate on pig performance.

In response to these information gaps PRDC financed a series of canola meal projects in the late 1990s. Projects included the '*Influence of Oil Extraction Method on the Nutritional Value of Canola Meal for Growing Pigs, A Guide to the Use of Australian Canola Meal in Pig Diets and Canola Meal for Pigs.*

PROJECT OBJECTIVES:

- Recommend to industry the maximum inclusion levels of canola meal in weaner, grower and lactating sow diets commensurate with optimum growth and reproduction performance
- Extend nutritional information about canola meal to canola millers and pork producers to help pricing and purchasing decisions
- Define the digestibility of amino acids, lysine and digestible energy content of solvent extracted, expeller extracted and cold pressed canola meal
- Validate the measurements in a series of animal growth experiments

RESEARCH GROUP:
The research was primarily undertaken by the South Australian Research and Development Institute at the SARDI-Pig and Poultry Production Institute Nutrition Research Laboratory and the Victorian Institute of Animal Sciences.

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[21] ABARE (2003) Australian Commodity Statistics 2003, ABARE, Canberra

ABARE (2004) Australian Commodities, Vol 11, 3, September, 2004.

King, R. (2000) Canola Meal for Pigs, DV174/1543, Final Report, PRDC Canberra.
Mailer, R. (2004) Canola Meal – limitations and opportunities, Report to the Australian Oilseed Federation, September 2004.
van Barneveld R. (1998) Influence of Oil Extraction Method on the Nutritional Value of Canola Meal for Growing Pigs, Final Report to PRDC, September 1998.
van Barneveld R. (2001) A Guide to the Use of Australian Canola Meal in Pig Diets, Final Report to APL, August 2001

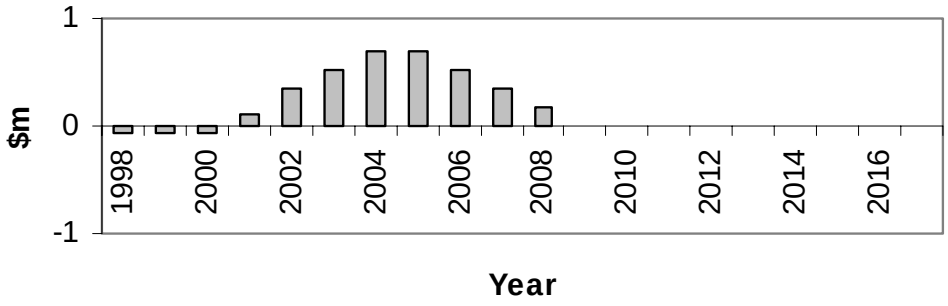
PROJECT COST:
The PRDC contribution totalled $76,300. The Department of Natural Resources and Environment – Agriculture Victoria, SARDI and the Australian Oilseeds Federation also made contributions to the series of projects. In total, contributions from all partners were $208,444. Project 1188 commenced in July 1997 and concluded in June 1998, while Project 1543 ran from July 1999 to June 2001.

ECONOMIC IMPACT
As a result of the research it was shown that canola meal inclusion rates in diets could be increased without negatively impacting on pig production. Canola meal represents a cheaper protein meal than other conventionally used meals and increased inclusion rates decrease production costs for adopting farmers.

ADOPTION
Canola meal production increased through the 1990s to a maximum of about 1.7 million tonnes in 2001. Much of the production is exported and there has been some volatility in supply due to seasonal conditions. Export and domestic usage of canola meal is provided in the following figure using ABARE (2003, 2004) statistics. It is evident that domestic use for stock feed has remained relatively steady at about 200,000 tonnes per annum

Pig producers are a major buyer of canola meal, and based on current domestic availability, it is assumed that about 40,000 tonnes are regularly purchased (Mailer, 2004). Other major protein meals include soybean and cottonseed meal.

This level of consumption is forecast to increase to 77,000 tonnes per annum, as usage is currently concentrated amongst a number of large producers. Mailer (2004) noted the potential for increased usage is high given the gap in inclusion between new and major users.



A number of factors have contributed to increased canola meal usage. It is estimated that the investment in this series of projects resulted in five years of increased canola meal usage than otherwise would have been the case. This increase is estimated to be 10,000 tonnes per year and assumes usage increases by 2,000 tonnes per year from 2001 onwards.

BENEFITS

It is estimated that increased usage of canola meal by 10,000 tonnes per year generates industry cost savings of $0.7 million per year. This cost saving is equivalent to $70 per tonne of additional canola meal.

PAY OFF

The graph shows the stream of benefits over the period 1998 to 2017. It is evident that the annual benefits are considerable, and correspondingly, the economic pay-off in net present value (NPV) and benefit-cost ratio (BCR) are $2.0 million and 7.1:1.

COMMENT

The increase in the availability of canola meal provided an opportunity for an alternate protein source in pigs diets. Little was known, however, in relation to the nutritional value of the product and impact of differing processing practices on quality. This project clearly defined that canola meal could be included in diets at higher then commonly adopted rates, generating cost savings for farmers. The project has an attractive benefit-cost ratio, as it was a relatively low cost investment.

3 Effective Use of Sorghum Infected with Ergot in Pig Feeds[22]

BACKGROUND:
Sorghum ergot (*Claviceps africana*) is a fungal disease of sorghum and was introduced into Australia in 1996. The contaminated grain causes loss of milk in lactating sows resulting in death of piglets. Outbreaks of ergot toxicity occurred across northern parts of the pig industry in mid 1997. Given the recent occurrence of the disease in Australia and the severe losses that ergot can cause, it was imperative to determine ergot tolerances in pigs, develop tests and establish usage recommendations to minimise losses.

The project *Effective Use of Sorghum Infected with Ergot in Pig Feeds (DAQ 59/1345)* was supported by Australian Pork Limited to meet these objectives.

PROJECT OBJECTIVES:

- To determine the effect of sorghum ergot on all classes of pig and the amounts that could be tolerated
- To develop quick tests for ergot in pig feeds
- To develop effective procedures to use ergot-infected sorghum in piggeries, and assess economic consequences; and
- Extend all results to producers

RESEARCH GROUP:
The research was undertaken by the Animal Research Institute at the Queensland Department of Primary Industries (QDPI). The principal investigator was Barry Blaney and the final report for the project was submitted in September 2002

PROJECT COST:
PRDC/APL invested a total of $95,658 in the project. Assuming QDPI costs were similar, total project costs were estimated to be $191,316.

OUTPUTS AND QUALIFICATION OF OUTCOMES:
A number of feeding trials were undertaken in which pigs were fed ergot infected sorghum and consequent pig performance was measured, along with researchers developing a test to determine ergot infection levels. Key outputs from the project were;

- In cases where ergot infection of sorghum is less than 0.1%, all classes of pigs can be fed sorghum with no production loss consequences.

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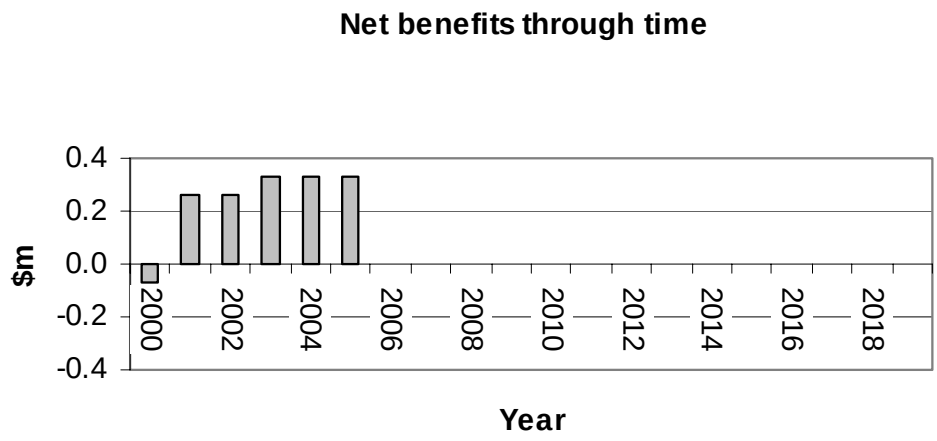
- Sorghum infected with concentrations of 0.1- 0.3 % ergot, should only be fed to growers, finishers and boars.
- If levels of ergot exceed 1%, then the infected grain could possibly be still fed to growers and finishers, but only after being mixed with clean grain.
- Simple procedures for estimating ergot concentration using salt solution were developed and published on the web and in QDPI's Pig Pen newsletter.
- A rapid ELISA test was developed for large-scale ergot alkaloid detection by the feed industry.
- In addition to impact on lactation, ergot was shown to have a lower digestible energy and consequent nutritional value. The reduced value of infected grain was estimated to be $30 per tonne.

As a result of the research, maximum ergot inclusion levels were determined and a relatively rapid ergot test was devised. These recommendations and tools were comprehensively extended to industry and it is probable that substantial ergot induced losses have been reduced. It should be noted that ergot problems are sporadic, and research has shown them to be closely linked with seasonal conditions. Ten pig farms were affected during the widespread ergot outbreaks in Central Queensland. It is difficult to ascertain how often these problems could arise, as the fungus has only recently been introduced into Australia and producer awareness now allows early intervention.

ECONOMIC IMPACT

Kopinski *et al* (2002) estimated that the average profit per sow is reduced by $68 when ergot-infected sorghum (10mg/kg ergot alkaloid) is accidentally fed to dry sows prior to farrowing and by $141 per sow when fed to dry and lactating sows around farrowing. The estimates were based on the assumptions of a 200 sow piggery and that the producer does not recognise the link between the sudden rise in piglet mortality and the feeding of sorghum.



Tools developed as part of DAQ 59/1345 have reduced the incidence and impact of the disease. This avoidance of an elevated mortality rate is estimated to have an average benefit of $100 per sow. The occurrence of ergot problems is difficult to ascertain, but seasonal conditions facilitating fungal development are likely to occur every 3 years. The annualised benefit from avoided ergot problems on affected farms is therefore calculated as $33 per sow.

ADOPTION

Sorghum is used in northern parts of the pig industry in northern NSW and Queensland. The production of sorgum in Australia is relatively stable at about two million tonnes and the pig industry is a significant consumer of this grain. Only limited numbers of pig enterprises in sorghum use areas were at risk from ergot problems during outbreak conditions, and initial problems were limited to farms around Biloela and Monto. It is estimated that an average of 0.01 million sows do not suffer the affects of ergot infected feed as a result of the tools, recommendations and publicity of DAQ 59/1345.

BENEFITS

Based on approximately 0.01 million sows being at risk from ergot, an average economic benefit of $33 per sow – then total annual benefits accruing to the research are about $0.33 million per annum. It is assumed that the PRDC/QDPI project accelerated the delivery of ergot management tools by 5 years.

PAY OFF

The annual benefits are considerable, and correspondingly, the economic pay-off in terms of net present value (NPV) and benefit-cost ratio (BCR) are $0.9 million and 4:1 are attractive.

COMMENT

The introduction of ergot and the potential consequential high production losses in selected parts of northern pig producing areas necessitated research in this area. The project has an attractive benefit-cost ratio, as it was a relatively low cost investment.

4. Agronomic Value for Crops of Deep Litter from Pig Sheds[23]

BACKGROUND:
Deep litter production systems have increased in popularity in part due to the low capital cost of 'ecosheds' when compared to conventional housing systems. Recent estimates outlined by Hugh Payne (pers communication) suggest that as much as 35% of the national herd is raised using deep litter systems.

As part of this production system, straw or rice hulls are used for each batch of pigs for bedding and insulation. On average, 200 kg of wet litter is produced per pig during growing and finishing phases. With the growth in usage of this system, stockpiles of litter were accumulating across Australia, largely in response to the unknown agronomic value of this material.

To better define the agronomic value and potential uses of this by-product, PRDC financed the Project BMI 13/1228 *Agronomic Value for Broad Acre Crops of Deep Litter from Pig Sheds*. The project commenced in 1998 and was completed in 2000.

PROJECT OBJECTIVES:

- To determine the price equivalent of composted pig shed litter compared with conventional fertilisers for broad acre crop production
- To determine whether the fertiliser value of composted pig shed deep litter can be increased by using the litter for more than one batch of pigs without detriment to pig productivity and health

RESEARCH GROUP:
The project was undertaken by Bunge Meat Industries and the principal investigator was John O'Shea. Lonerenong College and the Victorian Institute of Dryland Agriculture at Horsham also participated in the research program.

PROJECT COST:

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[23] Black, J. (2000) Agronomic Value for Broad Acre Crops of Deep Litter from Pig Sheds, Final Report to PRDC, PRDC Canberra

Farran, (1999) 'Economic evaluation of adding value to pig wastes' – Report at APL, APL, Canberra.

Read Sturgess and Associates Consulting Economists (2000) Project Con 102/1388 – Benefit Cost Analysis of PRDC Projects, Progress Report Number 5, Report to PRDC, October 2000.

Read Sturgess (2000) indicated the total cost of the projects was about $394,000 over the 1998-2000 period.

OUTPUTS AND QUALIFICATION OF OUTCOMES:
The principal objective of the project was to determine the value of pig shed litter as broad acre fertiliser. In achieving this objective a series of field trials were conducted at Horsham and St Arn$A in Victoria. The value of litter was determined for different crops (plant establishment, biomass, yields, quality, weed density) and soil structures. Specific findings included:

- The usage of pig shed litter improved crop growth in all cases except for field pea
- Litter usage had the primary benefit of increasing nitrogen availability, although the structure of highly dispersive sodic soils was also improved
- The volume of litter generating maximum plant growth was somewhere in the order of 15-60 t/ha
- There was limited difference in the fertiliser value of litter based on cereal straw or rice hulls. Rice hulls were easier to handle.
- Litter was free from viable weed seeds and weed density on litter-treated blocks was not significantly higher then conventional crop establishment
- The value of litter-derived nitrogen fertiliser in the first year after application was found to be $2.2 per tonne of litter (based on an equivalent response to urea).
- Crop yield increases were also observed where litter was applied. For example, canola yield was estimated to increase by 0.5 t/ha. Gross margin analysis values of $38-50 per tonne based on crop responses for 3 years after initial application were reported.
- Pig shed litter should not be used for more than one batch of pigs as it's fertiliser value is not enhanced and odour problems could occur.

As a result of the research it was shown that litter has a fertiliser value of about $7 per tonne (fertiliser substitute and crop yield increase, see also Farran, 1999) and farmers can use the product without fear of increased weed problems. With this information, broad acre farmers will be able to optimise fertilisation programs which incorporate litter.

ECONOMIC IMPACT
A pig generates 200 kg of wet litter requiring disposal. Many pig producers are disposing of this waste 'free of charge', and could charge $7 per tonne given it's fertiliser and crop productivity improvement value demonstrated in the project.

The net economic position for the farmer is governed by the distance the litter has to carted and how the product is spread. For the purposes of the economic analysis it is assumed that similar cartage is involved for all forms of litter disposal.

ADOPTION

The project was conducted in Victora and the usage of deep litter in broad acre cropping has principally occurred in this region. It is assumed that the litter from 1 million pigs marketed, or about 200,000 tonnes of deep litter will be sold in part from the results of this project.

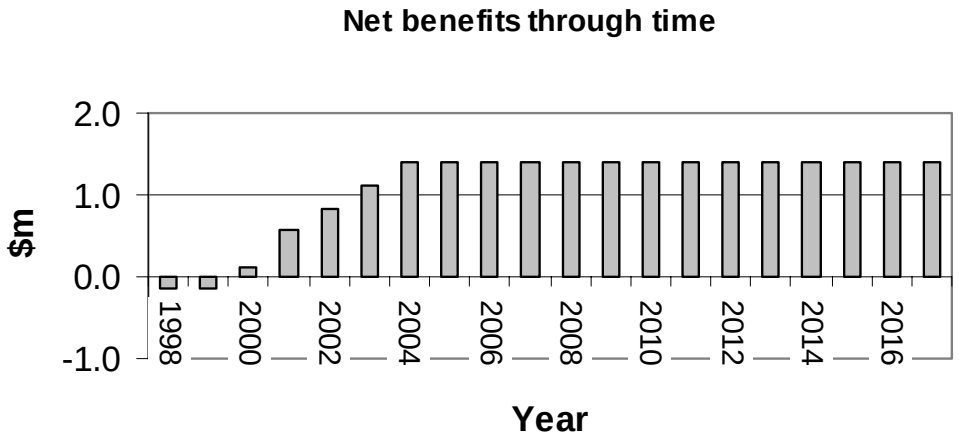
The results of the project were made available in 2000 and it is assumed that adoption will increase over a period of 5 years, until maximum adoption attributable to BMI 13/1228 is achieved in 2004.

It is possible that these practices would have been adopted by industry without this project being financed. The use of animal manures in cropping systems has widespread usage across a range of industries. To accommodate this possibility, it is assumed that 40% of the benefits are attributable to this project.

ENVIRONMENTAL BENEFITS

The use of litter was shown to benefit the structure of highly dispersive sodic soils. Such a benefit reduces the potential for nutrient leakage, run-off and erosion, and enhances the longer term productive potential of this resource. Litter was also shown to increase soil carbon.

Prior to this research, there was a lack of scientific information that regulators



required in order to approve the development of new piggeries. This document was able to quantify the nutrient concentration of solids and appropriate application rates. This facilitated a quicker response from regulators and showed that the industry was environmentally pro active.

QUANTIFIED BENEFITS

The key benefit from the research was recognition of the value of litter and the enhanced ability of pig producers to charge for litter. It is estimated that a price of $7 per tonne could be charged and somewhere in the order of 200,000 tonnes per annum will be spread in Victoria, SA and NSW.

PAY OFF

The graph below shows the stream of benefits over the period 1998 to 2017. It is evident that the annual benefits are moderate, and correspondingly, the economic pay-off in net present value (NPV) and benefit-cost ratio (BCR) are $3.9 million and 7:1.

COMMENT

The growth in deep litter production necessitated research into means of utilising the considerable amount of by-product this system generates. The project has provided an objective assessment of the crop nutrition value of composted litter and environmental benefits may stem from increased usage of litter on soils with structural problems.

5. Deep Litter and Alternative Housing Systems for Growing Pigs[24]

BACKGROUND:
Deep litter production is relatively new to Australia, although more than 35% of finishers and growers are raised in deep litter or 'ecosheds.'

PRDC had financed research projects such as *Low Cost, Straw Bedded Alternate Housing Systems for Grower / Finisher Pigs (404)* in this area since 1995, and by the late 1990s it was considered appropriate that some surveys were conducted to ascertain best production practices, emerging problems, and research gaps associated with the newly introduced production system.

The Project 1465 *Review of Alternative Housing Systems for Pigs* was undertaken in 2000 to address the above mentioned knowledge gaps.

PROJECT OBJECTIVES:

- To collate existing information and experiences, emerging problems and best practice recommendations on rearing pigs in deep litter systems
- To use AUSPIG to evaluate the economics of alternate management practices in deep litter
- Develop low cost, straw bedded alternative shelters, for grower and finishers
- Measure the performance of pigs grown in shelters
- Quantify the fertiliser value of wastes produced and to monitor pollutants
- Undertake a cost-benefit analysis of shelters

RESEARCH GROUP:
The project was undertaken by Agriculture WA, with Hugh Payne being the principal investigator

PROJECT COST:
PRDC support for Projects 1465 and 404 is estimated to total $114,397. Project 404 commenced in December 1994 and was completed in May 1997.

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[24] eSYS Development (2004) Cost-benefit Analysis of 2004/05 Short Listed Projects, Report to APL, June 2004.

Payne, H. (1997) Low Cost, Straw Bedded, Alternative Housing Systems for Grower / Finisher Pigs. Final Report to PRDC, PRDC Canberra

Payne, H., Mullan, B. and Trezona, M (2000) Review of Housing Systems for Pigs. Final Report to PRDC, PRDC Canberra

Agriculture WA estimated that about $150,000 was provided in the form of salaries and administrative support. The combined total costs of both projects is estimated to be $264,397.

OUTPUTS AND QUALIFICATION OF OUTCOMES:

The first of the series of projects aimed to develop best practices and resolve management issues associated with the introduction of deep litter systems, while the follow-up review project had the objective of gauging industry acceptance, pig performance and management issues at the farm level, and capturing individual experiences for dissemination to industry. Specific findings included:

- Shelters were found to be relatively inexpensive and versatile housing for growers and finishers
- Experiences of leading deep litter producers were collated and disseminated to other producers, helping to enhance industry management capacity
- Satisfactory pig production performance was observed during initial trials and similar costs of production to those experienced under conventional production conditions were in evidence
- The need for sustainable methods of handling waste and the lifespan of shelters were raised as potential longer term issues
- A reliable and economic supply of bedding material was identified as critical to the success of adoption
- The industry wide review of pig performance in deep litter sheds found acceptable growth and carcass quality
- Around 50% of participants reported increased P2 measurements and 40% inferior feed conversion efficiency
- The health status of pigs was found to be similar in conventional and deep litter systems
- Odour problems were reduced in deep litter production systems.

Deep litter sheds have lower capital costs, are easier to get planning permission to build (ie. no ponds, less odour), are quick to erect and are perceived to be more welfare and environmentally friendly. The adoption of deep litter systems, does however, require changed management practices.

The identification of best management practices during research trials and their extension to industry generated economic benefits for those producers using deep litter systems. As a result of the dissemination of these practices it is assumed that growth rates and consequent slaughter liveweight would be higher for pigs raised in this system than otherwise would have been the case.

ECONOMIC IMPACT

Payne (1997) noted that overall cost of production in deep litter management is likely to be similar to that of conventional production despite lower fixed

production costs. The higher costs of bedding and perhaps increased labour offset capital and fixed cost savings to some degree.

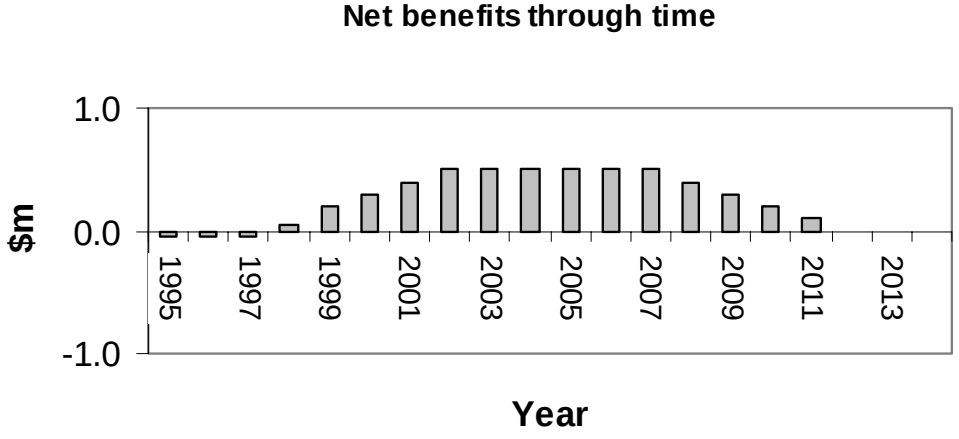
The major benefit from the projects was the identification and extension of best deep litter production practices from those leading producers who had already adopted the system. Of particular importance are measures to improve growth rate and optimise fat deposition.

For the purposes of the evaluation it is assumed that the 23 week slaughter liveweight of pigs raised in deep litter systems is 1 kg heavier, as a result of adopting best management practices. This increase is equivalent to an increased profit per sow of $19 per year (Profipork simulation in eSYS Development, 2004).

ADOPTION

About 35% of the 5.2 million pigs marketed per year are raised within deep litter systems. It is assumed that 25% of these pigs, or an overall industry adoption of 9% have improved growth rates as a result of adopting improved deep litter management practices.

This level of adoption is equivalent to an annual economic benefit of $0.5 million, or roughly $1 per pig marketed per year under improved management. Adoption was assumed to begin in 1998, with maximum adoption being achieved after 5 years. Best practices would have been adopted by many producers in the absence of this project. The investment is estimated to have sped up adoption by 10 years.



ENVIRONMENTAL BENEFITS

Deep litter systems do not require ponds and the amount of odour emanating from this form of housing is known to be considerably less than from conventional systems. PRDC financed projects are likely to have led to

improved management of deep litter housing leading to less pollution. The use of deep litter waste on broad acre farms has benefits for the soil structure.

QUANTIFIED BENEFITS
The key benefit from the research was the faster adoption of best management practices for deep litter systems. A consequence was the increased growth rate of pigs. This was calculated to total $0.5 million per year.

PAY OFF
The economic pay-off in net present value (NPV) and benefit-cost ratio (BCR) are $2.5 million and 4:1 when a 6% discount rate is used.

COMMENT
The production of pigs using deep litter systems has had a dramatic adoption in Australia with more than 35% of all finishers and growers being produced using the system. The economics of deep litter production are such that the lower fixed costs of production are offset to some degree by higher operating costs – such as bedding and labour costs.

The key benefit from this research is improving the management and profitability of deep litter production for those farmers who have adopted the systems.

6. Pig Meat Hygiene Program (PMHP)[25]

BACKGROUND:
Food safety is a major issue for all food production industries, with all levels of the supply chain responsible for ensuring product integrity and quality.

The 'Garibaldi' food poisoning outbreak in South Australian mutton products prompted PRDC to facilitate workshops in the field of food safety during January 1995. Dialogue and recommendations from this consultation, involving researchers, producer bodies, regulatory authorities and industry formed the basis of the PRDC Pig Meat Hygiene Program (PMHP).

A number of projects, which are described in the outputs section, have been successfully implemented as part of the PMHP. The costs and potential impact these investments have had on ensuring product quality are also quantified in the concluding part of this section.

PROJECT OBJECTIVES:

- To produce pork which is safe and wholesome so that domestic markets are protected
- To meet World Trade Organisation food export standards so that access to international markets is enhanced
- Assess inspection efficiency in regards to:
  - Determining lesions of food safety significance in Australia
  - Evaluate appropriate (risk assessed) inspection procedures
  - Recommend a national standard for pig inspection

RESEARCH GROUP:
The PMHP has included projects undertaken by the South Australian Research and Development Institute (SARDI), and Victorian Institute of Animal Sciences (VIAS).

PROJECT COST:
PRDC commitments to the Pig Meat Hygiene Program projects 1014, 1371 and 1482 were $768,531, $69,000 and $90,000 respectively. Total PRDC expenditure since 1995 has been $927,531. Assuming SARDI and VIAS costs were similar, total project costs were $1.85 million.

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[25] Hamilton (2002) Post Mortem Inspection Modifications – Cost benefits to industry, Unpublished Report to APL, APL, Canberra.
PRDC – Pig Meat Hygiene Program , Final Reports

OUTPUTS AND QUALIFICATION OF OUTCOMES:
A series of projects have been conducted under the umbrella of the PMHP. Specific projects included:

- *Pre-slaughter Guidelines for Microbial Hazards*
  - Quality assurance guidelines developed to minimise pre-slaughter hazards
  - Implemented nationally using Australian Pig Industry Quality Standards (APIQ)

- *Ante-mortem Inspection*
  - Effectiveness of farm-level ante-mortem inspection assessed

- *Pork Hygiene Training Program*
  - Training program prepared and extended to industry on national basis

- *Fresh Meat and Carcass Microbiology Survey*
  - Contamination of fresh pork with microbes quantified and shelf life defined

- *Toxoplasmosis Risk and Serological Survey*
  - Exposure quantified for differing production systems
  - Pre-slaughter controls validated and included in quality standards (APIQ).

- *Trichinella Status Report*
  - Defined pig status and risk assessment provided as basis for testing program

- *E.coli and Salmonella Monitoring*
  - Prevalence determined and ELISA developed

- *Inspection Efficiency*
  - Empirical risk assessment of post mortem pig meat inspection
  - Determined prevalence of lesions and consequent hazard
  - Developed 'visual' inspection system.

The meat quality assurance, risk assessments, determination of microbe prevalence and consequent adoption of these systems have reduced the potential for 'food safety' issues to affect the demand for pork. A 'poisoning' outbreak could reduce local and export market demand, dramatically reducing the price paid to pork producers and processors.

The research also led to new meat inspection practices which have reduced processing costs. In the past, post-mortem inspection involved removal of the head and lymph nodes. As a result of research within the PMHP, heads can

now be inspected visually, reducing labour costs and increasing saleable meat yield – as lymph nodes no longer need to be removed.

ECONOMIC IMPACT

It is estimated that a key economic benefit from PMHP has been associated with the changes in inspection practices and the resulting increase in yields and reduced labour costs associated with inspection.

Hamilton (2002) surveyed eight export abattoirs to ascertain the magnitude of these benefits. In the case of reduced labour costs, it was found that 'trimmer' costs declined by an average of $0.2 per pig slaughtered, while the value of 0.3 kg of meat saved per pig (as a result of not having to remove lymph nodes) was valued at about $0.6 per pig slaughtered. The total benefit from changed inspection practices is estimated to be equivalent to $0.8 per pig slaughtered.

In addition, it is estimated that the PMHP has decreased the probability of a Salmonella outbreak and consequent reduction in the average price received for Australian pork products.

In the event of an outbreak it is assumed that farm-level prices would decrease for 8 months by 0.2/kg and it would cost an additional $0.5 million to recapture market share.

ADOPTION

Inspection procedures were changed in September 2002 and most export abattoirs adopted revised procedures in a short period of time.

It is assumed that 50% of the 5.2 million pigs slaughtered are now processed using revised inspection practices.

It is possible that inspection practices may have changed in the absence of the PMHP. To account for this possibility, it is assumed that PMHP accelerated amendments to inspection practices by 10 years.

It is also assumed that production of about 386 kt (Australian production in 2002) will be better protected from a food poisoning outbreak (beginning in 1999) as a result of the investment in PMHP. Such protection provides benefits to the pork industry through reducing the probability of a decline in prices received for pork product following an outbreak.

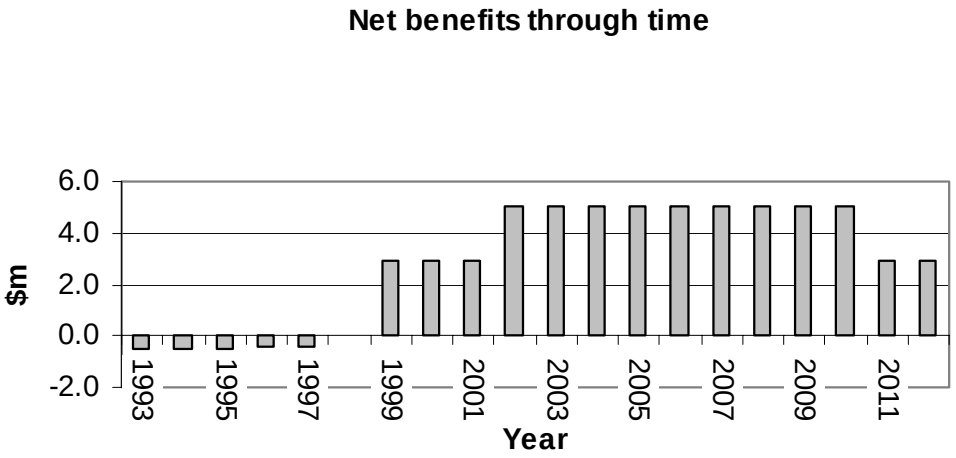
QUANTIFIED BENEFITS

Based on an economic benefit of $0.8 per pig slaughtered, total economic benefits of $2.08 million are attributable to changed inspection.

It is difficult to ascertain by how much the probability of an outbreak has been reduced as result of the PMHP. For the purposes of the evaluation it is assumed that the program has reduced the probability by 5% in any one year

PAY OFF

The economic pay-off in terms of net present value (NPV) and benefit-cost ratio (BCR) are $33 million and 9:1 when a 6% discount rate is used.



COMMENT

Changes to meat inspection as a result of this research program have delivered considerable economic benefits to industry through labour cost savings in abattoirs and increased meat yields.

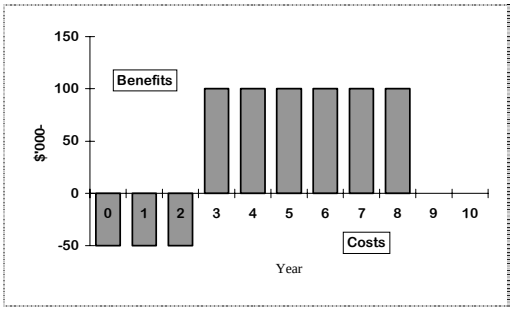
Additionally, the program has reduced the probability of food poisoning outbreaks. There is a great deal of uncertainty surrounding an estimate of how much the program has reduced the chance of an outbreak. A break-even probability of the research resulting in a lesser chance of a *Salmonella* outbreak of about 1% would alone be required to justify project expenditure.

Appendix B: Details of Cost Benefit Analysis - Evaluation Method

Cost-benefit analysis is a process that compares the benefits against the costs of undertaking research and development projects. In this section, the cost-benefit procedure is outlined following the guidelines provided by Collins and Collins (1993). The following figure demonstrates the costs and benefits that a research project generates. In the figure, it is evident that the costs are incurred until year 3 at which point a series of benefits are realised for the following six years.

To determine whether investment was worthwhile, net present value and benefit-cost ratio criteria are commonly employed to compare the benefit and cost streams of differing projects. The net present value of a project measures the difference between the discounted value of project benefits and costs of undertaking the research. In this example, project benefits of $100 000 per year are expected for six years.

Project costs on the other hand are confined to the first three years of the project and total $50 000 per year. The net value of the project is $450 000. To account for the time value of money, future benefits and costs are discounted to present value returns. Using a 10% discount rate, the net present value of the example is $203 000.



The benefit-cost ratio indicates the magnitude of industry benefits resulting from each dollar invested in the project. Industry benefits total $600 000 over the six years whilst project costs are $150 000. Hence the ratio of benefits to costs is 4:1. Once a 10% discount rate is introduced, the benefit-cost ratio is reduced to 3.5:1. The reduced magnitude of the ratio reflects the lower value of future benefits once discounting is introduced.

When a number of projects have been evaluated, the relative attractiveness of each of the projects can be determined. The use of these criteria provides a consistent method of valuing research projects and facilitates the elucidation of key parameters affecting project success or failure.

Project costs

Project costs are expenditures over the life of the research project. Items such as materials, staff and other overhead expenses are combined on an annual basis to generate project cost estimates. Total projects costs were taken from records and allocated in equal amounts to each year of the specified project period. Costs were inflated into 2004/05 terms.

Project benefits

The estimation of project benefits is the most critical component of cost-benefit analysis. During this phase, the gains to users of new technology need to be considered, potential industry adoption estimated, and the probability of the project generating tangible industry benefits assessed. Initially, the target segment of the industry relevant to the research technology needs to be defined. Key factors in the production system relevant to the success of research delivery and adoption need to be determined using survey techniques, consultation with industry participants, historical data, and documentation of previous research successes

Once features of the industry relevant to the technology are described, the impact and possible benefits for the technology user can be estimated. Benefits could be derived from:

- Increased yields or increased output from the current input mix;
- Decrease in the cost of an input;
- Improved product quality and price; and
- Decrease in the amount of an input used

Adoption

The nature of the adoption profile is a function of the lag prior to commercialisation, rate of adoption, and the maximum level of adoption.

- The adoption lag represents the time difference between the start of the research project and the time when the commercial outcome of the project will be available to the industry. The adoption lag for basic research is longer than that of applied research designed to modify an existing process or product.
- The rate of technology adoption also dictates the magnitude of benefits accruing to the industry. Because future benefits are reduced in magnitude by discounting, more rapid adoption of technology generally results in larger industry benefits in present value terms.
- The maximum level of adoption dictates the maximum number of potential adopters in the target market that will pick up the technology. In previous studies into the diffusion of innovation, the opinion of extension officers, and assumptions about the characteristics of technologies, were used to make assumptions about the adoption of technology

Capture of Benefits

Increased profitability of pigmeat production as a result of R&D adoption provides a stimulus to expand total industry production through time. As this happens more pigmeat is made available within recognised markets with the ultimate impact being a fall in prices. In this way some of the initial profits earned by Australian pigmeat producers are eroded because of the fall in prices. This fall in prices is beneficial to consumers of Australian pigmeat products as these consumers effectively get products at a cheaper price. Simply, because of this price effect the initial increase in profit realised from APL's investment will be distributed between producers and consumers.

An economic model developed by BDA Group and described in eSYS Development (2003) provides a means of estimating how much of the initial gain (profit increase) is captured by producers and consumers.

Estimated distributions were calculated in percentage terms, but can be readily converted to a dollar basis. It was estimated that for every $100 dollars of profit generated at the farm level through APL's investment, the ultimate capture by pig producers would be:

-$65 for suppliers to the Japanese market; and
-$64 for suppliers to the fresh and processing markets.

For supply shifts in the non-Japanese market it was assumed that the productivity impact would be divided between fresh and processing markets in proportion to the volume of supply to each.

Investment criteria

Net present value and benefit-cost ratio are investment criteria commonly used in cost-benefit analysis.

Investment Criteria	Notes
Net Present Value (NPV)	NPV represents the discounted difference between project costs and project benefits. A positive NPV indicates that project costs have been exceeded by project benefits.

Benefit-Cost Ratio (BCR)	BC ratio demonstrates the ratio of discounted benefits relative to project costs. A ratio greater than 1 indicates that the project benefits are greater than costs.

References

Alston, J.M., Norton, G.W. and Pardey, P.G. (1995), Science Under Scarcity, ISNAR, Cornell University Press

Chudleigh, P., and Bond, K., (1993), *Gains for Grain*, Volumes 1-4, Occasional Paper Series No.2, GRDC, Canberra.

Collins, D., and Collins B., (1993), *Overview of MRC Benefit-Cost Evaluation of Projects: Guidelines for Funding Applicants*, MRC, Sydney.

Davis, J.S., Oram, P.S., and Ryan, J.G., (1987), *Assessment of Agricultural Research Priorities: An International Perspective*, Published by the Australian Centre for International Agricultural Research and the International Food Policy Research Centre, Canberra.

Edwards, G.W., and Freebairn, J.W., (1981), *Measuring a Country's Gain From Research: Theory and Application to Rural Research in Australia*, Report to the Commonwealth Council for Rural Research and Extension, AGPS, Canberra.

Edwards, G.W., and Freebairn, J.W., (1982), "The social benefits from an increase in productivity in part on an industry", *Review of Marketing and Agricultural Economics*, 50, pp 193-210.

eSYS Development (203) Economic Evaluation of APL Portoflio, APL Project 1898, July 2003.

Pearce, D.W., and Turner, R.K., (1990), *Economics of Natural Resources and the Environment*, Havester Wheatsheaf, London.

World Bank (1998) Handbook on Economic Analysis of Investment Operations, Operations Core Services Network, January, World Bank