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Abstracts

Information Communication to Coordinate Food Processor Customers and Suppliers

Christine Storer, Muresk Institute of Agriculture, Curtin University of Technology

Chain coordination is growing in importance to maintain access to global markets and competitive advantage. Information communication facilitates coordination and is seen as the glue that holds organisational chain relationships together (Mohr & Nevin 1990). How Australian food processors are exchanging information to coordinate customers and suppliers is presented. Details are provided of who is involved, communication media used, frequency of exchanges, direction of information flow and formality of the process.

Consumer Trade-Off Factors for GM Food: A Queensland Case Study

Geon Shim-Prydon - Queensland Department of Primary Industries

The identification of clear benefits to consumers in buying genetically modified (GM) food has been an issue pursued by the industry and researchers alike. Consumers' intention to trade-off perceived risks of GM food for A Lot Lower Price, Slightly Lower Price, Major Health Benefits, Minor Health Benefits, Better Taste, Better Appearance, Well-Known Brand and Good for the Environment was investigated using a phone survey of 389 QLD consumers in May 2002. Major Health Benefits, Better Taste and Good for the Environment were revealed to be the strongest trade-off factors in decreasing order. A Lot Lower Price was a more attractive trade-off factor to buying GM food than Slightly Lower Price to consumers, but not a great deal more. It may be that only slightly larger number of people will buy GM food for A Lot Lower Price than for Slightly Lower Price, contrary to a common belief that a heavy price discount will attract a large number of buyers who are price-conscious. On the other hand, a substantially larger number of consumers would be willing to buy GM food for Major Health Benefits alone than for Minor Health Benefits. More buyers may be attracted if Major Health Benefits for a GM food product were developed and communicated instead of Minor Health Benefits.

Agrifood Globalisation And Asia: Asia And The Agrifood Trade Framework

Andrew Mitchell - Department of Foreign Affairs and Trade

The Department of Foreign Affairs and Trade (DFAT) study on *Agrifood Globalisation and Asia* examines globalisation in the agrifood sector, especially as it affects Asian markets. It is designed to help Australian food companies gain a better understanding of the fast developing global agrifood system and continuing changes in Asia's agrifood markets. Volume IV (*Asia and the Agrifood Trade Framework*) of the study provides a valuable one-stop guide for all Australian agrifood exporters interested in access to Asian markets. It looks at the global agrifood trade framework, Asian economies' agrifood trade regimes, and issues for agriculture in the new WTO Doha Round. It details the tariff and other barriers facing Australian agrifood exporters in 14 Asian economies, as well as Australia's approaches to trade with the region. Key points include: Australia's agrifood sector stands to reap enormous potential benefits from the new round of WTO negotiations. Poorer developing countries complain too that their exports still face high tariffs and other barriers in the rich countries' markets and they want to see big cuts in them. These export barriers are a central issue in the new WTO trade negotiations. But environmental issues, food safety and the globalisation of the agrifood industry will also influence the final outcomes.

Excellence in Food Value Chain Management: Ensuring Results by Creating and 'Netweaving' Communities of Practice

Richard Coutts, Primary Business Solutions Pty Ltd

Changed behaviour resulting from learning is fundamental for the innovation necessary to build globally-competitive, customer-responsive, food value chains. For learning to occur, knowledge must lead to action (practice). Strategies for gaining new knowledge need, therefore, to be coupled with tools that ensure the circle of learning can be completed and that knowledge is put into commercial practice by food value chain participants. Often, however, the innovation strategies of firms and industries tend to concentrate on creating knowledge and assume that action will automatically follow. Essentially, this leaves action/behavioural change to chance leaving the way open for anti-change/'balancing' forces to maintain the status quo. To

ensure that the outcomes intended from food industry value chain improvement initiatives are realised, implementation action must be guided by robust strategies that are deliberately designed for identifying key enabling projects/activities and anticipating and dealing with the challenges that will inevitably arise. This involves the integration of change management and experiential learning processes. The purpose of this presentation is to describe a powerful new process to share and convert knowledge about excellence in food value chain management into practical outcomes.

Agrifood Globalisation and Asia:Food Retailing and Foodservice The End of the Line for Asian Food Retail and Foodservice Players?

Judith Laffan, Principal Analyst, Agrifood Research, Office of Trade Negotiations, DFAT

The increased presence in Asia of Western multinational corporation (MNC) food retailers since the mid-1990s, has been widely interpreted as signalling the fall of Asian food retailing to the forces of globalisation, and the beginning of the end of Asian food retailing companies. Yet "globalisation" of food retailing is still in its early stages. All leading MNC food retailers still derive the greatest share of their turnover from Europe and/ or North America. Less than a third of the top 30 MNC food retailers have any presence in Asia, and Asia forms a very small proportion of their global operations. Certainly, the arrival of the Western MNC food retailers and their global operating systems has brought the start of irreversible change to the Asian food retailing sector, and established new performance benchmarks for food distribution and retailing across the region. The face of Asian food retailing is rapidly changing, with traditional single stores and wetmarkets being left behind, and chains of hypermarkets, supermarkets and convenience stores increasingly preferred by Asian consumers. But while leading Western food retailers are increasing their presence and market share in the region, they are by no means yet dominant. Also, several have withdrawn from one or more Asian markets, with further shakeout in their ranks bound to occur.

Economic Forces Effecting Plant Breeding – Public Funding and Private Ownership

Emeritus Professor Bob Lindner - University of Western Australia

The world of plant breeding is changing rapidly in response both to scientific developments and to economic forces. In particular, there is a growing trend to widespread privatisation of crop breeding. An economist's perspective on some of the key differences between traditional public plant breeding and private plant breeding will be presented together with some of the key driving forces behind the emerging trend to privatisation of plant breeding. A possible consequence of much greater private involvement in Australian plant breeding is the crowding-out of all other competition by a very small number of large multi-national firms, who might then exploit their market power to capture almost all of the value created by plant breeding. Australian grain growers have already demonstrate a willingness to fund local plant breeding firms to forestall such a threat, and to ensure ongoing access to locally bred varieties that maintain Australia's competitive advantage in international grain markets. Another threat is the risk that government and grower support of pre-breeding research will decline without any compensating investment by the private sector. As this type of research provides the foundation for ongoing long-term variety improvement and productivity gains, eventually private investment in plant breeding may stall as a result. Alternatively there may be wasteful duplication and/or inefficient utilisation of such related R&D as firms strive for competitive advantage in the market place.

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*Learning from others: forming and managing agribusiness supply chains **

Ray Collins, School of Natural and Rural Systems Management The University of Queensland

This CD uses extensive footage from interviews with agribusiness managers to support three supply chain management learning modules. The modules address the need to form supply chains, how to form supply chains, and how to manage supply chains. In addition, the CD contains a downloadable workbook so that the user can interrogate their own business using questions that mirror CD content in each module. There is also a library of readings and two complete case studies of supply chains in action, one in the flower industry and one in the meat industry. The CD was produced as a partnership between AFFA's New Industries Development Program, the Food and Fibre Chains Program (now administered by the National Food Industry Strategy Ltd.) and The University of Queensland. It has been extensively evaluated through a series of workshops with agribusiness managers, consultants and educators.

* *A copy of the CD ROM is being provided to delegates.*

drumMUSTER Stewardship Success - The Collection and Recycling of Farm Chemical Containers

Sam Ponder - General Manager - Agsafe Limited

Empty crop protection and animal health product containers have presented a problem for farmers, the agricultural chemical industry and local government alike for many years. The large volume and potential contamination risk that used chemical containers pose generates significant problems for their safe and effective disposal by traditional methods such as council landfill, burning and on farm burial. Together, the National Association for Crop Production and Animal Health (Avcare), the National Farmers Federation (NFF), the Australian Local Government Association (ALGA) and the Veterinary Manufacturers and Distributors Association (VMDA) have jointly developed an Industry Waste Reduction Scheme (drumMUSTER), whose aim is to reduce and recycle chemical packaging materials. drumMUSTER is the national program for the collection and recycling of empty, cleaned, non-returnable rigid metal and plastic crop protection and animal health chemical containers. From the 1st February, 1999, farm chemical users have paid a 4 cents per litre or kilogram levy on eligible products sold in non-returnable containers over 1 litre or kilogram in content. The levy funds the drumMUSTER program and is available to reimburse participating Councils for costs incurred in running drumMUSTER collections and for container processing costs.

Aesop on Australian Agriculture

Bruce Gardiner

Agriculture in Australia is 1% agri and 99% culture. The decision-making processes of farmers and the advice delivered by experts are predicated on myths and fables.

- We are the most efficient farmers in the world.
- We are leaving our land in better condition than we got it.
- Increasing production increases profit.
- A low dollar is good for Australia's international trading performance.
- Subsidies in the USA and Europe are bad for Australian farmers.
- Rainfall is the most limiting factor to our agricultural production.

These messages are reinforced on a daily basis. The imputation is clear – Australian farmers are doing all they can but are continuously frustrated by factors beyond their control. There is no objective data to support any of the above premises. This paper will dismantle the myths and fables that are preventing agriculture in Australia from becoming sustainable, environmentally and economically. Individual farmers hold the key to their own success. Data will be presented to identify the real winners and losers from current agricultural policy. Economic and scientific logic will be used to progress an alternative policy direction that revitalises regional Australia while addressing environmental degradation on farmland.

Roundup Ready canola: Agronomic, Economic and Environmental Benefits

David Hudson, Monsanto Australia

Since 1996, Monsanto Australia has been developing Roundup Ready Canola in preparation for its introduction into the Australian canola market. In collaboration with its industry partners, this has involved 105 Roundup Ready Canola trials being established across Australia's canola growing regions.

Information Communication to Coordinate Food Processor Customers and Suppliers

Christine Storer
Muresk Institute of Agriculture, Curtin University of Technology

Introduction

Chain coordination is growing in importance to maintain access to global markets and competitive advantage. Information communication facilitates coordination and is seen as the glue that holds organisational chain relationships together (Mohr and Nevin 1990). Many support for the idea that suppliers' efforts to assist communication increases customer satisfaction and relationship behaviour (eg Anonymous 1993, Anderson and Narus 1990, Ellinger et al. 1999, Keith et al. 1990, Leuthesser and Kohli 1995, Mohr and Nevin 1990, Mohr and Sohi 1995, Mohr et al. 1996, Trienekens 1999, Uzzi 1997, Vlosky & Wilson 1996). To date, much of this research has examined the efficiency of transactions and primary processes (such as placing orders, scheduling production, filling orders and organising logistics through enterprise resource planning (ERP), electronic data interchange (EDI) and e-commerce (Bowersox & Closs 1996)). For example Vlosky & Wilson (1996) examined the impact of transactional inter-organizational information systems (bar coding) on buyer-seller dyad relationships. Improving high volume transactional processes has the potential to create great efficiencies and cost savings.

Research on higher level information systems such as management and strategic systems includes Mohr and Nevin's (1990) theoretically based channel information strategies model. Mohr et al. (1996) studied the interrelationships of governance and communication, and the effect of collaborative communication on channel outcomes (the dealer's perceptions of commitment to, satisfaction with and coordination of activities with a focal manufacturer) across various levels of integration and control. Mohr and Sohi (1995 p393) test a model of the "relationships between: 1. norms of information sharing and communication flows of frequency, bidirectionality and formality, 2. these communication flows and dealers' assessments of the quality of communication and satisfaction with communication, and 3. formality of communication flows and dealers' distortion and withholding of information". Bensaou (1992, 1997, 1999) developed a dyadic information system model examining the influence of perceived level of cooperation on characteristics of the environment; economic and behavioral characteristics of the relationship as well as interorganizational information technology applications. None of these studies, however, looked in details at the types of information shared between organisations to manage the relationship. In addition, none of these studies looked at on chains or networks of organisations.

There also appears to be a lack of detailed studies of perishable goods systems. It has been argued that food chains have different product characteristics than do non-perishable products, as there is greater uncertainty (Trienekens 1999). Ancona and Caldwell (1992) suggested task environment uncertainty affects the required information processing capacity and frequency of information exchanges and Bensaou (1999) argued that it might affect the nature of the relationship. Perishable product chains therefore, are likely to have different inter-organizational information systems than durable product chains. While the Supply Chain Partnerships Program (2000) web site provides guidance about general changes in information systems in chains over time in the food and other industries, it has not been tested empirically. Spekman, Kamauff & Myhr (1998) have examined perishable chains but did not look in detail at information systems aspects. Mohr et al. (1996) and Mohr and Sohi (1995) used a sample of computer dealers to test their models. Bensaou (1992, 1997, 1999) tested his model on a sample of automobile manufacturers.

In conclusion, there would seem to be a gap in the research on the role of information systems to manage inter-organisational relationships in chains and networks of organisations, especially for those dealing with perishable goods. In addition, little has been written about the practical details to answer the how, what and why questions of what to do in practice. What types of information are most commonly communicated? How often? Who is involved? What types of communication tools are used? This paper will address some of these issues by describing how Australian food processors are communicating with their customers and suppliers to manage the relationship.

Method

The research has been conducted in two phases using a linked 'sequential mixed methods' approach with the first phase based on the 'interpretivist' paradigm (qualitative approach) that was linked to the second phase based on the 'positivist' paradigm (quantitative approach) (Tashakkori & Teddlie 1998). The aim of the first phase was to explore the role of information systems to manage inter-organisational relationships in chains and networks of organisations, especially for those dealing with perishable goods. A grounded theory approach (Denzin & Lincoln 1994) was taken using literature reviews, informal in-depth interviews with experts internationally and a case study network of five organisations involved in several chains ('netchain'

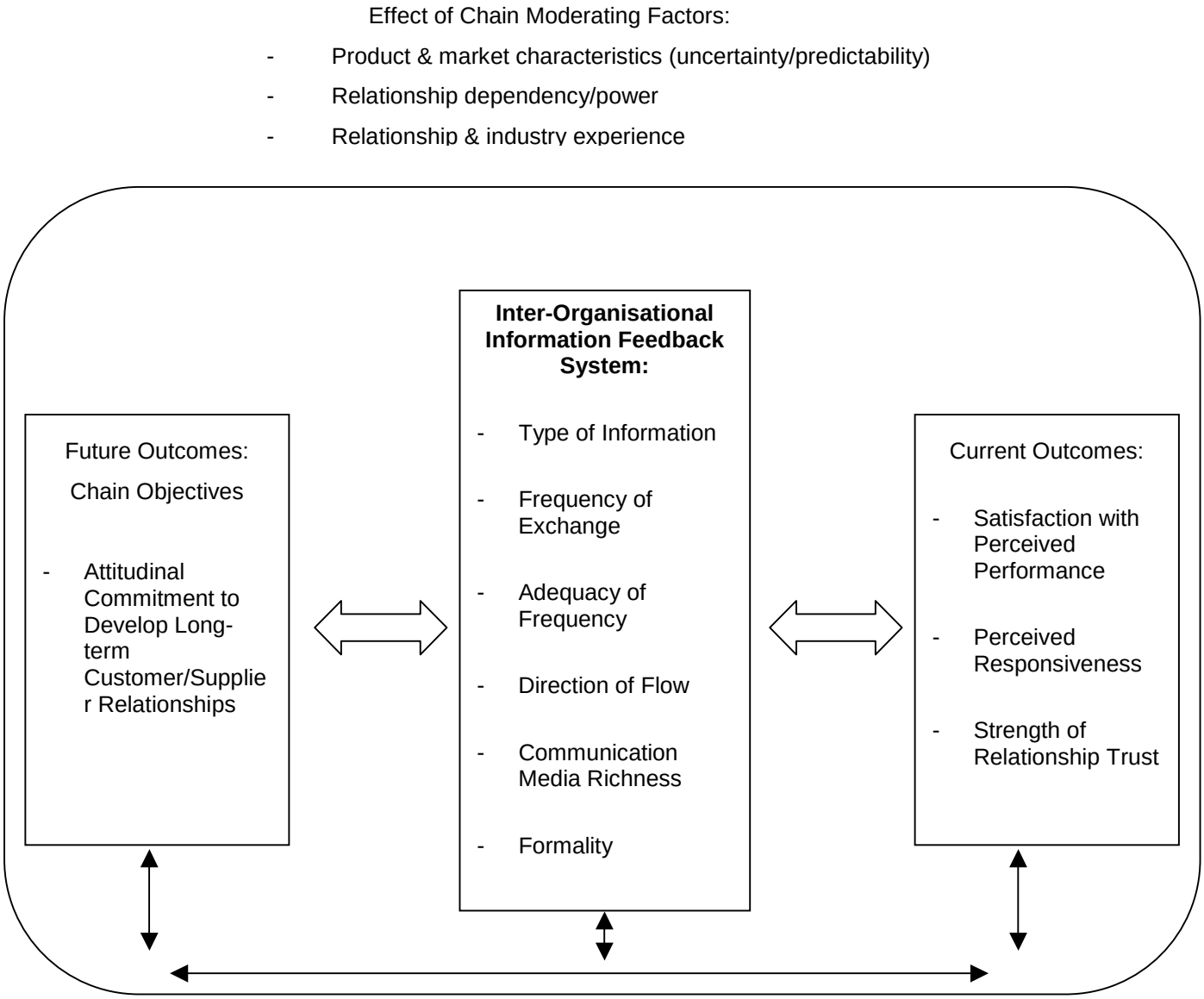
(Lazzarini, Chaddad & Cook 2001)). The result was a proposed framework of inter-organizational information feedback systems[1] (Figure 1) Storer (2001).

The aim of the second phase was to evaluate, test and refine the theoretical framework based on a survey of food processors and a further perishable product chain case study. Reported in this paper are the results of a survey of Australian food processors involved in producing a range of 44 food categories from dry, fresh and chilled food products.

In-depth interviews of 94 Australian food processor purchasing managers, sales/marketing mangers and owners were conducted during April to October 2002. Where possible interviews were conducted face to face with phone interviews and self completion used as a last resort. Relationships with 74 suppliers and 109 customers were discussed in the interviews. Interviewees were asked to discuss two suppliers or two customers that were significant in terms of volume, value or strategic intent.

Figure 1 Theoretical Framework – Inter-Organisational Information Feedback System in a Chain Context

Source: Adapted from Storer (2001)



[1] A system can be defined as a group of related objects with a common purpose. A chain can be defined as a sequence of at least three organisations (supplier, focal firm and customer) working to satisfy customer needs at a profit. The inter-organizational information feedback system (IOIFS) has been defined as the information exchanged by organizations in a chain for the purpose of building the competitive advantage of the chain.

A structured questionnaire (Appendix 1) was developed based on the framework developed in the food processor netchain case study (Storer (2001). The description of the IOIFS was based around whether information was exchanged about performance feedback, problem resolution, new product developments, forecast supply and demand, and opportunities and threats. Based on the netchain case study, performance feedback was expanded to specifically cover product quality, on time delivery, completeness of orders, flexibility to change orders and invoice accuracy. If information was exchanged, respondents were then asked about the frequency of exchange, communication medium used and formality of the process as well as the direction of these exchanges. Respondents were also asked about the nature of their relationship commitment, trust, performance satisfaction, responsiveness, experience, dependency and environmental uncertainty.

The questionnaire was structured so respondents were initially asked 'easy to answer questions' about their experience in the relationship and about the industry. They were then asked about relationship and environment perceptions followed by details about the inter-organisational information system and their satisfaction with it. Most questions were either 'yes'/'no' dichotomous scales or seven-point disagree-agree scales with a "don't know" option. Open-ended questions were also asked to understand problems, as well as provide explanations as to why there had been changes in the last five years. As a result of explanations about reasons for change, two additional questions were added about perceptions of customers/suppliers initiating new ideas to improve the category/business or improving the organisations knowledge of the industry.

Results

Firstly results are presented on the characteristics of the respondents, followed by the people involved in information communication, the communication media used and how frequently information is exchanged, direction of information flow and the formality of the process.

Sample Characteristics

The food processors manufactured or handled a range of 45 categories of goods. Most goods were shelf stable boxed, UHT and canned goods (64%). Some goods were the more difficult to handle and manage perishable fresh and chilled goods (28%) and frozen goods (9%).

On average interviewees had 11 years experience working in their organisations and 18 years experience in the industry. Most interviewees were executives or general managers (31%), sales category managers (26%), sales department managers (19%) or purchasing category and department managers (15%). There was greater success in getting interviews with sales/marketing staff dealing with customers than with purchasing staff dealing with suppliers. As sales staff tended to be more specialised in dealing certain categories of customers, more sales staff were interviewed per organisation and they tended to talk about more customers. In addition, discussion about customers was usually for a wider product range than supplier discussions. As a result the responses were about more customers (66%) than suppliers (34%) even though most organisations (80%) discussed both.

Customer and supplier counterparts discussed were primarily retail supermarkets (37%) as well as wholesalers (28%), food processor/food service (15%), packaging suppliers (9%) and primary producers (9%). Most organisations had been in relationships with the counterpart customer or supplier for an average of 22 years.

The way customer and supplier relationships were perceived by respondents is shown in Table 1. As would be expected of significant customers and suppliers, respondents perceived their organisations were highly committed to developing long term relationships with them. In addition they perceived that their organisations had become more committed in the last five years. The overall performance of customers and suppliers was perceived to be better than others in the industry and had improved over the last five years. Responsiveness was more varied and depended on the relative equality of the organisations, although it was seen to have improved over the last five years. Trust was not as strong and had not improved for very many over the last five years.

Table 1 Perceptions of Customer & Supplier Relationships

	Mean	Std Dev'n
Commitment	6.5	1.0
Commitment change in last 5 years	4.8	1.3
Performance	5.4	1.0
Performance change in last 5 years	5.0	1.2
Responsiveness	5.0	1.8
Responsiveness change in last 5 years	4.8	1.3
Trust	4.8	1.4
Trust change in last 5 years	4.2	1.0

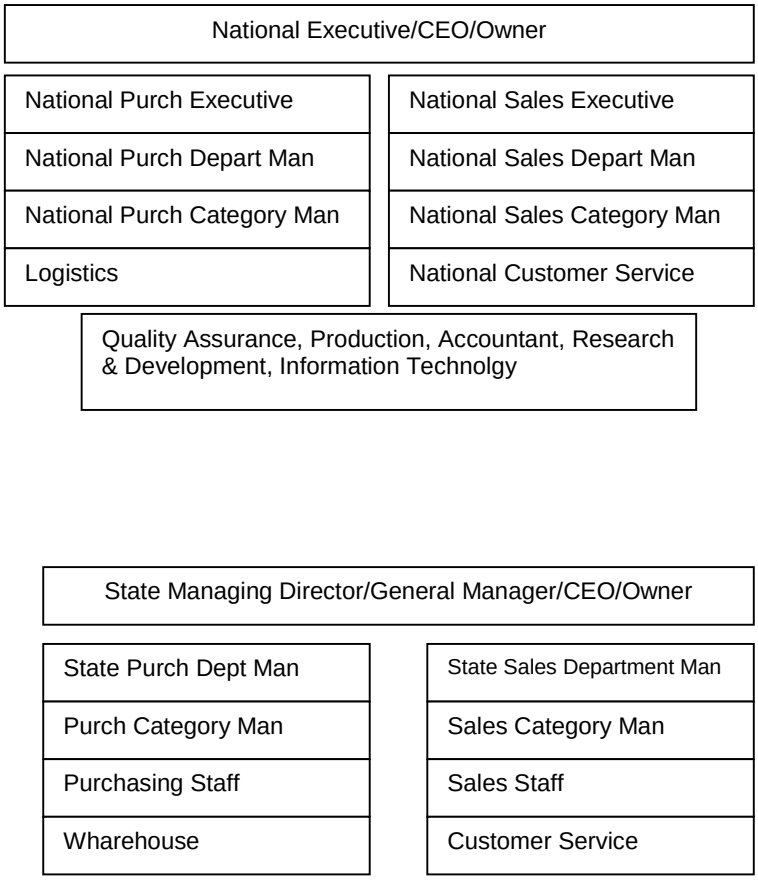
Scale 1 to 7 with 1 being low and 7 being high

Who is Involved in Communicating with Customers and Suppliers

Sales/marketing staff mostly exchanged information with customers and purchasing/acquisitions staff mostly exchanged information with suppliers. For newer or more sensitive relationships it may be that all communication was channelled through a category purchasing/sales person. However, for well developed relationships, increasingly a wide range of staff from different departments were involved with both customers and suppliers (Figure 2). Problems were more likely to involve a wider range of staff from different departments. Quality issues had a high level of involvement of quality staff and senior management.

As expected, most communication took place at operational levels through local sales representatives and category managers especially for late deliveries, incomplete orders, order changes and invoice errors. Issues would escalate to be handled by department managers, general managers and national staff where they were significant or if they were ongoing or could not be resolved. Senior staff and appropriate other departments would be advised of any major issues by internal communications. More senior staff were involved in more complex issues such as price negotiations, new products development and introduction as well as discussing opportunities and threats.

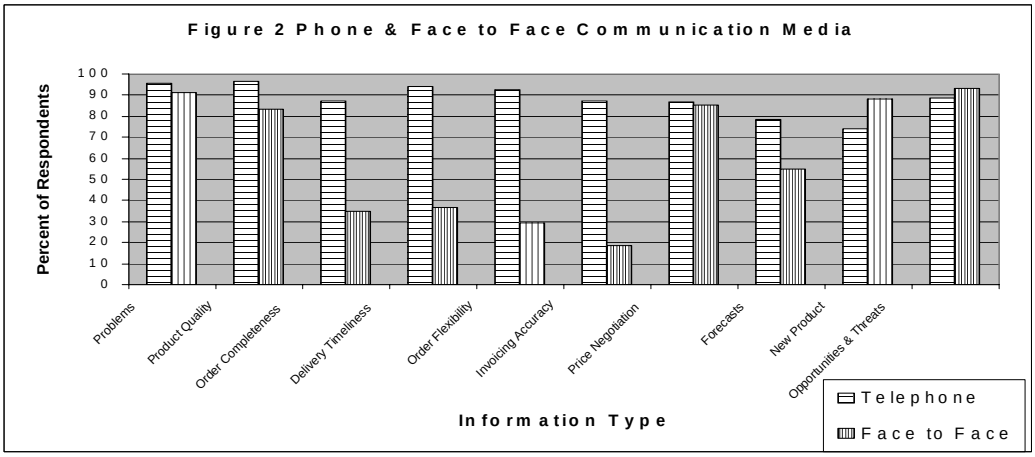
Figure 2 Staff Involved in Customer and Supplier Communications



One change that was noticed through the interview process was the rate of change in organisational structures. Most organisations had moved to category managers within departments (matrix structure), especially in the sales/marketing departments so that service levels could be better managed. Purchasing was less likely to move to category mangers unless there was a large number of suppliers or suppliers required close management such as for perishable primary produce.

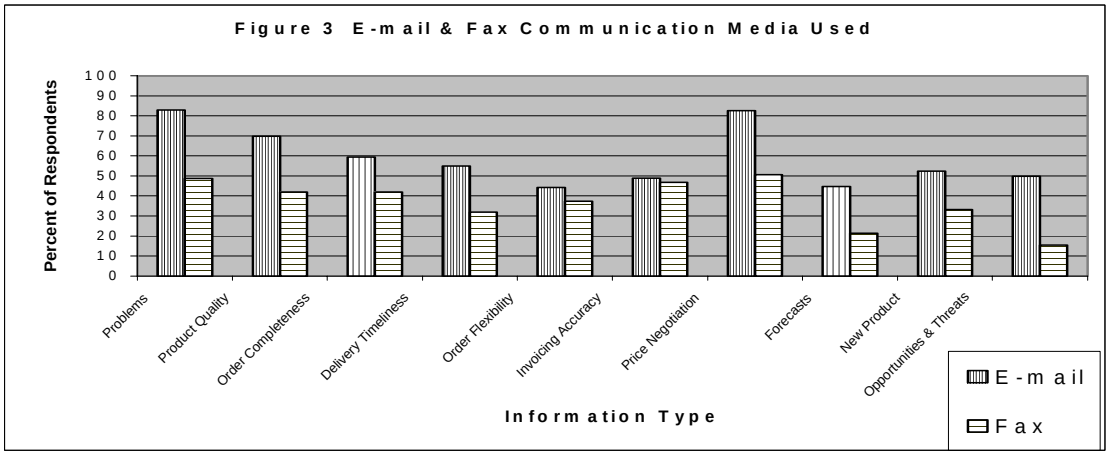
Communication Media Used to Manage Relationships

For each type of information exchanged, respondents were asked about the types of communication media used. According to Daft & Lengel (1986) the nature of communication media can be categorised by it's ability to transmit 'rich' information, or a variety of cues including feedback, facial cues, language variety, and personalisation. Using Huber and Daft's (1987 p152) hierarchy of media richness, face-to-face meetings would be the most rich, followed by telephone, electronic mail (E-mail), personally addressed documents such as letters and faxes, and finally, formal unaddressed documents such as reports, credit notes and electronic data interchanges (EDI). The richer communication media (phone and face-to-face) were generally more used than the less rich media (Figures 2 to 4). However whether a rich communication media was used depended on the situation. Face-to-face communication with follow up telephone calls were preferred for discussion of problems, product quality, price, new products, opportunities and threats (Figure 2).



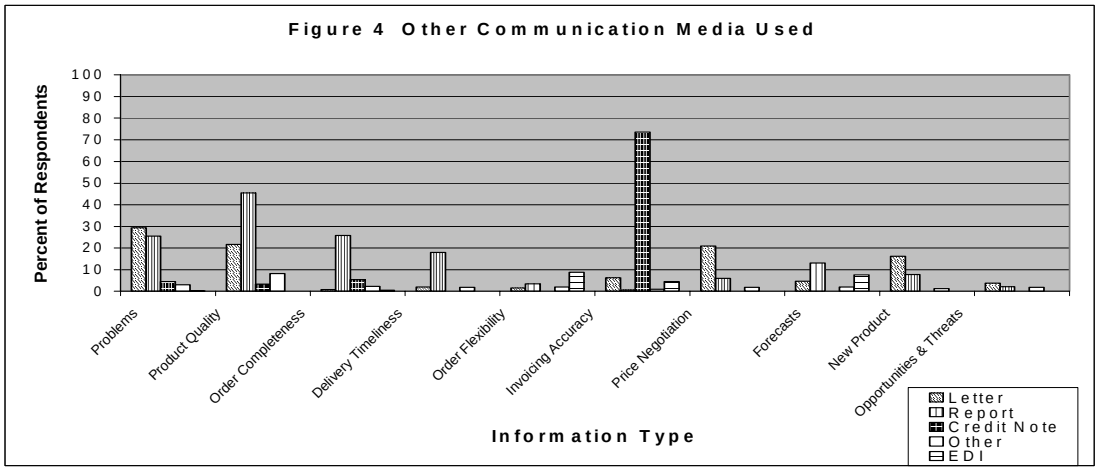
The need to exchange the more difficult tacit information would explain the need to use these more resource intensive methods. The extensive use of telephones for the exchange of all information types may be because it is widely available and very effective in getting an immediate response to issues that need attention. Telephones were used more to address issues as soon as they arose. Face-to-face meetings were used to regularly evaluate performance in all these areas or to address an ongoing problem.

E-mails were also very popular communication tools with increasing use for all issues and especially those requiring timely responses (problems, product quality, prices) (Figure 3). Many commented that faxes were not used as much any more unless the customer or supplier did not use e-mail.



E-mails were increasingly used to advise people of an issue, confirm arrangements in writing as well as send attachments. The ability to share electronic documents and detailed information such as planograms and forecasts that was used by both parties was seen to be a big advantage. Email attachments of images of problems were also very popular when there was a large physical distance between parties or highly perishable goods.

Other communication media that were not very widely used but were being increasingly used were reports, electronic data interchange and intranets (other) (Figure 4). These were used more for customers and suppliers that had well established relationships and both were of a sufficient size to warrant the investment.



Frequency of Information Exchanges

Information to resolve problems was exchanged very frequently with many (60%) making phone calls weekly or more often. Some also used follow up e-mails (50%) and face-to-face meetings (38%) weekly or more often. Most discussed problems monthly or more often by phone (80%), face-to-face (72%) or e-mail (66%). Nearly all had discussions several times a year or more often by phone (91%), face-to-face (88%) or e-mail (77%).

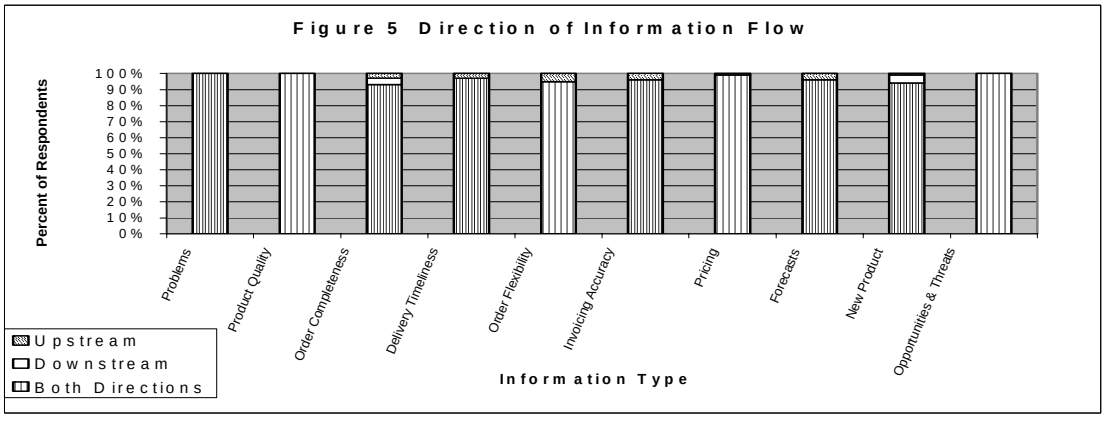
Information about order completeness was also frequently exchanged with some having discussions weekly or more often by phone (44%), e-mail (35%) or face-to-face meetings (27%). Most were in contact several times a year by phone (89%), email (65%), face-to-face (59%) or fax (41%).

Most exchanged all other information types several times a year (72%-89%). However, close to half exchanged information monthly about delivery timeliness (53% by phone), new products (49% by phone), prices and invoices (42% by phone), quality (39% by phone) and opportunities & threats (38% by phone). The extent of the frequency depended on how much of a problem this was. With the customers and suppliers discussed some commented that they had “very few problems with them” and “that is why we do business with them”.

When respondents were asked if they thought they were exchanging the different types of information as often as was necessary, most said that they were. Many commented that the reduction in staff and higher job pressure meant more information exchange would be difficult to fit in unless there were clear benefits. There was seen to be room for improvement in exchange of forecasts about supply and demand by a third of respondents (37%). Some (20%) thought there could be more discussion of new product developments rather than just advise of new products available for introduction. In addition, nearly a third (30%) thought there could be more discussions about opportunities and threats.

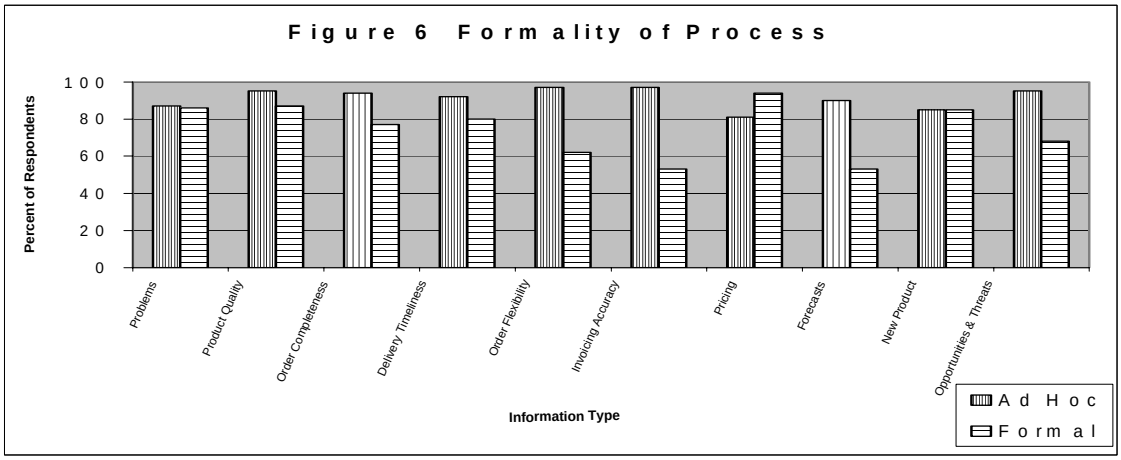
Direction of Information Flows

Most of the time, information flowed in both directions upstream to suppliers and downstream to customers (Figure 5). Occasionally only notice was required so information only flowed in one direction eg advise of incomplete orders, late deliveries, changes to orders, errors in invoices, forecasts or new product introductions.



Formality of Processes

Mostly information was exchanged on an ad hoc basis when the need arose although many organisations also had formal processes (Figure 6). Formal processes were generally in the form of monthly, quarterly, biannual or annual face-to-face meetings to review progress or report on performance. Formal processes were more common for larger organisations or those who have had ongoing problems in the past that were formally monitored.



Information Satisfaction

Generally respondents were satisfied with the information system with customers and suppliers (Table 2). They were slightly more satisfied with the accuracy, reliability, completeness, usefulness and relevancy of the information received from customers and suppliers. However the satisfaction rating was only slightly less for information being timely and up to date as well as the depth and range of content shared.

Table 2 Information System Satisfaction

	Mean	Std Deviation
Accuracy, Reliability & Completeness	5.2	1.1
Accuracy, Reliability & Completeness change in last 5 years	4.9	1.2
Usefulness & Relevancy	5.2	1.1
Usefulness & Relevancy change in last 5 years	4.9	1.1
Timely & Up to date	5.1	1.1
Timely & Up to date change in last 5 years	5.0	1.2
Depth & Range of Content	4.9	1.1
Depth & Range of Content change in last 5 years	5.0	1.2

Scale 1 to 7 with 1 being dissatisfied and 7 being satisfied

Generally respondents perceived that they were a little more satisfied with all aspects of the information system over the last five years. Many commented that they were getting more detailed information that was more useful as they got to understand each others requirements better. Information technology such as e-mails, EDI, intranets and scan data had improved the timeliness and depth of information shared.

However, not everyone was happy with these changes. Some were happy to spend less time talking as they felt more time pressure in their jobs. Others missed the closer contact and opportunities to keep in touch and catch up on other issues. As a result they continued to rely on telephone and face-to-face conversations with support or follow up with e-mails. Many commented that e-mails were often misused and that phone calls should be used if more than two or three emails may be needed to resolve an issue. The added depth of information was not always appreciated with two stating it could be “paralysis by analysis”. Another commented that perspective can be lost by looking to closely at recent in-depth historical information and not looking at the “big picture”.

Summary

Overall some aspects of information systems to manage relationships with customer and suppliers had been changing. Generally over the last five years there had been more commitment to developing long-term relationships and perceptions of improved performance. There were varying changes in responsiveness and trust.

As relationships developed, a wider range of organisational departments become involved in communications with customers and suppliers especially for problem resolution. There were moves to matrix structured organisations with category managers responsible for customer/supplier management, especially for sales/marketing departments, larger organisations and relationships requiring close management. The use of matrix structures at both the state and national level did mean that some staff were answerable to three or more bosses. This could possibly cause some confusion in prioritising activities and internal communications. These matrix structures also meant large teams of people were involved in complex issues such as new product developments and introductions.

Traditional telephone and face to face were still very popular methods for communicating. However, faxes have been increasingly superseded by e-mails. There were also moves to increased use of reports, electronic data interchange and intranets especially for more well established relationships where size warrants the investment. These changes in communication media were the source of some increased satisfaction with information systems by improving the timeliness and depth of information shared. However, they were not without some downsides with comments on “paralysis by analysis”, information overload and perceived inappropriate use.

The most frequent information exchanged was to resolve problems. Operational issues were only discussed when exceptions arose and this was decreasing over time as problems were resolved and processes improved. There was seen to be opportunities to exchange more complex and commercially sensitive information such as forecasts, discuss new product developments, opportunities and threats. There was also a move to formalising processes to review progress and performance.

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Appendix 1 - Questionnaire

How long have you been working with this organisation?

How long have you been working in the Industry?

How many years has your organisation been doing business with these *customers/suppliers*?

How well do you understand these *customer's/supplier's* business?

How well do you understand the *customers/suppliers* in this industry?

I do not understand it					I understand it very well	
1	2	3	4	5	6	7

How** responsive **do your feel these** **customers/suppliers** **are to your requirements and how willing are they to change relative to others in the industry?

Not at all responsive & willing to change		Somewhat Responsive			Highly responsive & willing to change	
1	2	3	4	5	6	7

How responsive do your feel these *customers/suppliers* are to your requirements and how willing are they to change relative to others in the industry now compared with 5(*k*) years ago?

Much less responsive & willing to change		No change			Much more responsive & willing to change	
1	2	3	4	5	6	7

If some change ask Why?

How** committed **do you think your organisation is to developing long-term relationships with these** **customers/suppliers?

Not at all committed long-term		Somewhat committed long-term			Highly committed long-term	
1	2	3	4	5	6	7

How committed do you think your organisation is to developing long-term relationships with these *customers/suppliers* now compared to 5 (*k*) years ago?

Much less committed long-term		No change			Much more committed long-term	
1	2	3	4	5	6	7

If some change ask Why?

How would you rate the **performance** of these *customers/suppliers* compared to others in the industry?

Worst Performance in Industry		Mediocre			Best Performance In Industry	
1	2	3	4	5	6	7

Do you perceive these *customer's/supplier*'s performance is better or worse now than 5(*k*) years ago?

Much Worse		No change			Much Better	
1	2	3	4	5	6	7

If some change ask Why?

Do you find these *customers/suppliers* more or less **trustworthy** than others in the same industry?

Less Trustworthy		Average			More Trustworthy	
1	2	3	4	5	6	7

Do you perceive these *customer's/ supplier's* trustworthiness is better or worse now than 5(*k)* years ago?

Much Worse		Same			Much Better	
1	2	3	4	5	6	7

If some change ask Why?

Environment

Could you please indicate if you agree or disagree with each of the following statements

Strongly		Neither Agree			Strongly	
Disagree		nor Disagree			Agree	
1	2	3	4	5	6	7

Dependence & Influence:

These *customers/suppliers* are crucial to your organisation's future performance
Your organisation is important to these *customers/suppliers*
These *customers/suppliers* exerts a strong influence over your organisation
It would be difficult for your organisation to replace these *customers/suppliers*

Predictability:

Demand by these *customer's/your organisation* is predictable
Volume of supply by these *customers/your organisation* is predictable
Quality of supply by these *customers/your organisation* is predictable
Production yields from *our product /these supplier's are* highly variable

Uncertainty:

The level of competitive activity in these *customer's/supplier's* markets are high
Consumer's preferences in these *customer's/supplier's* markets are changing
If alternative customers/suppliers are available to you, your organisation would choose to remain with these *customers/suppliers*

Interorganisation Information Feedback System

Do you exchange information with *customer/supplier 1/2* about:

Problem resolution Invoice accuracy

Product quality Profitability, costs & prices

On time delivery Forecast demand & supply

Completeness of orders New product development

Flexibility to accept order changes Opportunities & threats

If yes ask the following for each type:

Who in your organisation exchanges this information with *customer/supplier*?
(record position title)

Do they exchange this information with anyone else?
Probe for details of flows to/from customers/suppliers for internal sources

How do you exchange the information?
(phone, fax, email, face to face meetings, letter, report, invoice/credit note, telex, EDI)

Is this information only exchanged upstream or downstream or is it exchanged in both directions?

Is the information exchanged as part of a formal process as well as on an ad hoc basis when necessary?

How often is information exchanged on average in a year?
(times a day, daily, times a week, weekly, times a month, monthly, yearly, occasionally)

Could indicate if you consider you exchange this information as often as necessary?

Not as often as necessary		As often as I consider necessary					Don't Know
1	2	3	4	5	6	7	9

To what extent are you satisfied/dissatisfied with the information your get from these *customers/suppliers* in terms of:

Timely, up to date

Accuracy, reliability, completeness

Usefulness, relevancy

Depth & range of content

Extremely Dissatisfied		Neither Dissatisfied Nor Satisfied			Extremely Satisfied	
1	2	3	4	5	6	7

To what extent are you more/less satisfied with the information your get from these *customers/suppliers* now compared with *5(k)* years ago in terms of:

Timely, up to date

Accuracy, reliability, completeness

Usefulness, relevancy

Depth & range of content

Much less satisfied		No change			Much more satisfied	
1	2	3	4	5	6	7

Do you agree or disagree that the information you share with these *customers/suppliers* has improved your organisation's knowledge of this industry?

Strongly Disagree		Neither Agree nor Disagree			Strongly Agree	
1	2	3	4	5	6	7

Do you agree or disagree that these *customers/suppliers* initiate new ideas to improve the category

Strongly Disagree		Neither Agree nor Disagree			Strongly Agree	
1	2	3	4	5	6	7

Consumer Trade-Off Factors for GM Food: A Queensland Case Study

Geon Shim-Prydon
Queensland Department of Primary Industries

Summarised Paper

The identification of clear benefits to consumers in buying genetically modified (GM) food has been an issue pursued by the industry and researchers alike. Consumers' intention to trade-off perceived risks of GM food for factors that are likely to influence consumer food purchase decisions was investigated using a phone survey of 389 QLD consumers in May 2002.

Method of Analysis

The question asked respondents to rate the importance of trade-off factors for which they were willing to compromise their concerns or perceived risks toward GM food on a scale of 1 to 10. The investigated trade-off factors included A Lot Lower Price, Slightly Lower Price, Major Health Benefits, Minor Health Benefits, Better Taste, Better Appearance, Well-Known Brand, and Good for the Environment. As such, a consumer's rating '1' given to Better Taste would indicate that the taste factor would have no influence in her decision to buy GM food at all. A rating '10' given to A Lot Lower Price would indicate that a big price discount is extremely important that she may almost definitely buy GM food when the price is a lot lower than a non-GM equivalent or substitutes.

The ratings to each trade-off factor were then grouped into four categories. The ratings 8, 9 and 10 were grouped and categorised into Great Importance, the ratings 5, 6 and 7 into Some Importance, 2, 3 and 4 into Little Importance, and 1 into No Importance.

Finally, these four categories of ratings were crosstabulated with the demographics of gender, age, main grocery shopper, occupation, pre-tax household income, number of people 17 and under in household, and postcode. In interpreting the results, only those that satisfied chi-square tests were adopted which denote the existence of statistically significant differences between the involved variables. Crosstabulations that showed statistical differences were:

- Gender with A Lot Lower Price
- Pre-tax household income with A Lot Lower Price, Slightly Lower Price, Minor Health Benefits, Better Taste, Better Appearance, and Good for the Environment
- Occupation with Major Health Benefits, Minor Health Benefits, Better Appearance, and Well-Known Brand

In conducting analysis of the crosstabulated percentages, ratings of Great Importance and No Importance were mainly accounted. Mid-range ratings were discounted due to an uncertain nature attached to consumer behaviour dynamics. Often clearly stated intentions by consumers would fail to convert into behaviour, and typically low correlations were observed between food-consumption-related intention and actual consumption behaviour (Sheppard, Hartwick & Warshaw, 1988).

Findings

Overall

Major Health Benefits, Better Taste and Good for the Environment were revealed to be the strongest trade-off factors by decreasing order. A Lot Lower Price was a more attractive trade-off factor to buying GM food than Slightly Lower Price to consumers, but not a great deal more. It may be that only slightly larger number of people might buy GM food for A Lot Lower Price than for Slightly Lower Price, contrary to a common belief that a heavy price discount will attract a large number of buyers who are price-conscious. On the other hand, a substantially larger number of consumers may be willing to buy GM food for Major Health Benefits alone than for Minor Health Benefits. More buyers may be attracted if Major Health Benefits for a GM food product were developed and communicated instead of Minor Health Benefits.

Proportions of those to whom lower price was not a trade-off factor for buying GM food at all were relatively stable between A Lot lower and Slightly Lower Price, and the same was observed between Major and Minor Health Benefits. These consumers are likely to be more concerned about the underlying, trade-off issue than the magnitude of the trade-off benefit itself. Among those who exhibited zero trade-off intention across trade-off factors, smaller proportions of consumers showed zero trade-off intention toward Health Benefits and Better Taste than for the Price factors. To this unwilling segment, health benefits and taste factors may prove more effective than the common, price factor.

By Trade-Off Factor

Women are speculated to hold a stronger, polarised view on GM food than men in general. More women showed zero intention to trade GM food for A Lot Lower Price as well as high intention.

As A Lot Lower and Slightly Lower Price appeared an influential trade-off factor to 18-19, 30-44, 50-54, and over 65 age groups, price discount may be considered to attract these age groups. By income, Under $20K groups in general and $30K-40K group were found vulnerable to price discounts.

As Major Health Benefits were found a stronger trade-off factor specially to 35-39 and 50-54 age groups, these groups may be more willing to purchase should health benefits be offered by GM food. More Lower Blue Collar I group (Cleaner, Fruit Packer, Window Washer) and Upper Blue Collar I group (Carpenter, Butcher, Cook) would trade GM food for Health Benefits, both Major and Minor, than any other occupation groups.

Better Taste was an important trade-off factor to 30-34, 18-19, and 50-54 groups by decreasing order. By income, it was extremely important to Less $10K group, followed by $25K-30K, $10K-20K, and $40K-60K groups. These groups may buy GM food for superior taste.

The 18-24 and 55 and over age groups would be most willing to buy GM food for Better Appearance than any other age groups. Lower Blue Collar I (Cleaner, Fruit Packer, Window Washer), Lower Blue Collar II (Removalist, Truck Driver, Roadworker), and Upper Blue Collar I (Engineer, Chemist, Senior Manager) groups appeared most likely to buy GM food for Better Appearance. By income, it was a significantly strong trade-off factor to Less $20K income groups, followed by $25K-30K group.

Well-known brand appeared an important trade-off factor to 18-19 and 55-64 age groups, and Lower Blue Collar I (Cleaner, Fruit Packer, Window Washer) and Upper Blue Collar I (Engineer, Chemist, Senior Manager) groups.

Good for the Environment was an important trade-off factor to 20–24, 50-54 and 35-39 age groups, and to Under $15K and $25K-60K income groups.

By Demographic Group

The 45-49 and 25-29 age groups showed the greatest unwillingness to trade GM food for all trade-off factors investigated. Although estimated to be small by size, marketers of GM food may need to be aware of this potentially negative sentiment in these groups.

The $20K-25K and Over $60K income groups showed lower-than-average Great Importance ratings to all trade-off factors proven statistically significant, i.e. A Lot Lower and Slightly Lower Price, Minor Health Benefits, Better Taste, Better Appearance, and Good for the Environment. Meanwhile, higher-than-average No Importance ratings were observed in $60K-80K group for all statistically significant trade-off factors. On the other hand, $80K+ group showed higher-than-average No Importance ratings for all statistically significant trade-off factors except for Minor Health Benefits and Good for the Environment. Higher-than-average proportion of anti-GM consumers is speculated in these Over $60K income groups.

Based on the within-group percentages of Great Importance given to each trade-off factor, marketers of GM food would consider the following elements for different demographic groups.

Age Group	Trade-Off Factors of Importance (by decreasing order)
18-19	Brand, price, appearance, taste
20-24	Environment, appearance
30-34	Taste
35-39	Price, health benefits
50-54	Environment
55-64	Brand, appearance
65+	Price, appearance
Income Group	Trade-Off Factors of Importance (by decreasing order)
Less $10K	Appearance, health benefits, taste, environment, price
$10K- 15K	Appearance, price, taste, health benefits, environment
$15K-20K	Appearance, taste, price, health benefits
$25K-30K	Taste, environment, appearance
$30K-40K	Price, environment
$40K-60K	Taste
Occupation Group	Trade-Off Factors of Importance (by decreasing order)
Lower Blue Collar I	Appearance, brand, health benefits
Lower Blue Collar II	Appearance
Upper Blue Collar I	Appearance, health benefits, brand

* Average Indices figures were taken between A Lot Lower Price and Slightly Lower Price, and between Major and Minor Health Benefits. For income group, indices for Minor Health Benefits were taken only which was found statistically significant.

* Only figures with indices of 120 and over were taken.

Acknowledgement

The author acknowledges the generosity of the Queensland Department of Primary Industries in making available the base data for this study. The data was originally collected for the Department for other purposes. The data was not collected for this study.

Disclaimer

The study has been undertaken as a private work by the author and has been written from a marketing perspective. The findings of the study do not in any way represent the views or policies of the Queensland Department of Primary Industries or Queensland Government. This is a private paper, not a Queensland Government publication.

While the author has taken every care in preparing this publication, the author accepts no responsibility for decisions or actions taken as a result of any data, information, statement or advice, expressed or implied, contained in this paper.

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Trade-Off Factors for GM Food : A Study of Queensland Consumers

Geon Shim-Prydon

Agribusiness Forum
13 November 2002

1

Methodology

- Based on data from omnibus phone survey of 389 demographically balanced QLD consumers May 2002
- The Question

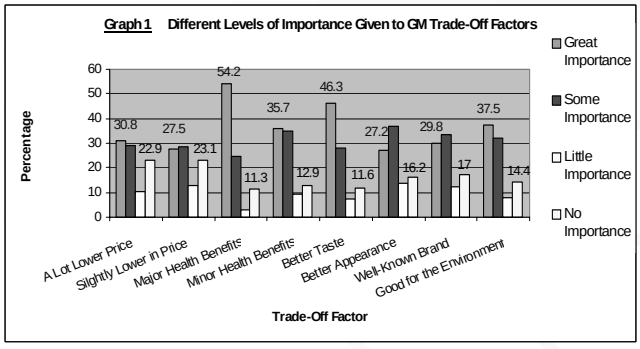
  "On a scale of 1 to 10, where 10 is ***extremely important*** - would only buy genetically modified food that meets this condition - and 1 is ***not at all important*** – has no impact on deciding to buy genetically modified food - how important to your decision is it that the genetically modified food is…. "

  1 **Not at all important** 10 **Extremely Important**

- Ratings categorised into Great, Some, Little and No Importance, and crosstabulated with demographics

2

Findings 1



3

Findings 2

Overall

- Major Health Benefits, Better Taste and Good for the Environment were the strongest trade-off factor
- A Lot Lower Price was a more attractive trade-off factor than Slightly Lower Price, but not a great deal more
- A substantially larger number of consumers are for Major Health Benefits alone than for Minor Health Benefits
- Only small percentage differences in No Importance rating between A Lot Lower Price and Slightly Lower Price, and Major and Minor Health Benefits

4

Findings 3

Price

- Women's polarised trade-off tendency re price discounts (33% vs 28.6% Great Importance and 26% vs 19.6% No Importance to A Lot Lower Price)
- Higher-than-average Great Importance ratings to A Lot Lower and Slightly Lower Price by 18-19, 30-44, 50-54, and over 65 age groups (index 103 ~ 150)
- $30K-40K (index 158 & 177)
  Under $20K income groups (index 148 ~ 121)

5

Findings 4

Health Benefits

- 35-39 (index 123 & 118)
  50-54 age group (index 116 & 112)
- Lower Blue Collar I (Cleaner, Fruit Packer, Window Washer) (index 153 & 154),

  followed by Upper Blue Collar I (Carpenter, Butcher, Cook) (index 115 & 132)

6

Findings 5

Better Taste

- 30-34 (index 125)
  18-19 (index 123)
  50-54 age group (index 117)

- Extremely important to Less $10K (index 153),

  followed by $25K-30K (index 141)
  $10K-20K (index 128)
  $40K-60K (index 123) income group

7

Findings 6

Better Appearance

- 18-24 (index 131 & 138)
  55 and over age groups (index 128 & 134)

- Less $20K (index 146 ~ 194),

  followed by $25K-30K income group (index 127)

- Lower Blue Collar I (Cleaner, Fruit Packer, Window Washer)
  Lower Blue Collar II (Removalist, Truck Driver, Roadworker)
  Upper Blue Collar I (Engineer, Chemist, Senior Manager)
  (index 237, 185, 149)

8

Findings 7

Well-Known Brand

- 18-19 (index 168)
  55-64 age group (index 151)

- Lower Blue Collar I (Cleaner, Fruit Packer, Window Washer)
  (index 229)

  Upper Blue Collar I (Engineer, Chemist, Senior Manager)
  (index 120)

9

Findings 8

Good for the Environment

- 20-24 (index 147)
  50-54 (index 122)
  35-39 age group (index 118)
- Under $15K (index 121 & 141)
  $25K-60K income groups (index 122 ~ 133)

Negative Consumer Segments

45-49 and 25-29 age groups and $20K-25K income group most unwilling to trade GM food for all or most trade-off factors investigated

10

Findings 10

Age Group	Important Trade-Off Factors (by decreasing order)
18-19	Brand, price, appearance, taste
20-24	Environment, appearance
30-34	Taste
35-39	Price, health benefits
50-54	Environment
55-64	Brand, appearance
65+	Price, appearance
Income Group	**Important Trade-Off Factors (by decreasing order)**
Less $10K	Appearance, health benefits, taste, environment, price
$10K- 15K	Appearance, price, taste, health benefits, environment
$15K-20K	Appearance, taste, price, health benefits
$25K-30K	Taste, environment, appearance
$30K-40K	Price, environment
$40K-60K	Taste
Occupation Group	**Important Trade-Off Factors (by decreasing order)**
Lower Blue Collar I	Appearance, brand, health benefits
Lower Blue Collar II	Appearance
Upper Blue Collar I	Appearance, health benefits, brand

(* Only figures with indices of 120 and over were taken.)

11

GLOBAL AGRIFOOD TRADE FRAMEWORK

World Trade Organization role

- Member Governments decide key rules for global agrifood trade
- WTO Agreement on Agriculture most important
- also important are SPS (Sanitary & Phytosanitary), TBT (Technical Barriers to Trade) & Disputes agreements

WTO Uruguay Round outcomes

- Disciplines on agricultural trade agreed for first time
- Reductions in barriers & subsidies implemented: developed countries by 2000 & developing countries by 2004
- But still many distortions in many agrifood markets: e.g. EU, Japan, Korea, US

New round of WTO negotiations

- Ministers decided at Doha to complete new round by start of 2005
- Doha development agenda: developing country issues key to successful round
- Mandate confirms continuing reform & focus on '3 pillars': market access, export subsidies, domestic support
- Non-trade concerns 'to be taken into account': trade & environment, geographical indications, food safety (agrifood globalisation a factor too)

Regional & bilateral negotiations

- APEC: tariff reductions, trade facilitation, food standards, quarantine certification
- AFTA-CER Closer Economic Partnership promoting trade & investment with ASEAN
- Free Trade Agreements: Singapore now done (food standards annex); Thailand began May 02; US exploratory talks; Japan consult to mid-03, report to PMs
- Bilateral agric. trade working groups, e.g. China, Indonesia

ASIAN AGRIFOOD MARKETS

Trade important for development

- Growth in HK, Singapore, Taiwan, Korea; ASEANs more recently
- Improved agrifood market access since 1995 due to WTO – still phasing down to final levels by 2004 (except Japan)
- Intra-Asian trade growing (but disputes growing too)

But tariff barriers still a major problem

- Still high in Japan, Korea and Taiwan; and Thailand to lesser extent
- Meat, dairy, horticulture, rice, alcohol are most badly affected sectors
- Tariff escalation also a problem in some sectors in some economies
- WTO bound tariffs often > applied, so can raise applied – e.g. Indonesia 5% applied, >50% bound (sugar & rice to 30% in 2002)

Non-tariff barriers often major problem too

- Quarantine, import licensing, standards issues can be difficult in most of Asia
- Problems include lack of transparency, arbitrary administration, complicated rules
- Developing country governance issues are further difficulty in less-developed markets
- But domestic support & export subsidies not major issues in most of Asia (except DS very high in Japan & Korea)

Information on 14 Asian economies

- For each economy, brief summary of agriculture in the economy, tariffs & quotas, non-tariff measures, export subsidies & domestic support
- Tables of applied & bound tariffs, quotas and some non-tariff measures for >100 agrifood products (at HS 4-digit level)
- Appendices: detailed data on Aust. food trade to 14 economies, plus agency roles & contact details for more information, eg USDA reports on import regulations

KOREA (REPUBLIC OF)							
HS Code	SITC Code	Product Description	Applied Tariff	WTO Bound Ad valorem	WTO Bound Specific	WTO Quota Rate	Non-tariff measures & other conditions
OILSEEDS			(%)	(%)	(won/kg)	(%)	
1201	222	Soyabeans	503.2	487	956	5	SSG; import markup on top of quota rate
1202	222	Groundnuts (peanuts)	238.2	230.5		40	SSG
1205	222	Rape or colza seeds (canola)	10	20			
1206	222	Sunflower seeds	25	36			
1207	222	Other oilseeds	651	630	6660	40	Govt. may control market & revenue
1208	223	Flours & meals of oilseeds	3	27			
1210	054	Hops	30	45			
1213	081	Cereal straw and husks	8	19.7			
1214	081	Other forage products	103.9	100.5		5	SSG

Asian economies' agrifood trade regimes

- Japan & Korea have high protection, but Japan one of world's biggest importers
- ASEAN economies hover between continued protection & more liberalisation
- China & Taiwan making major adjustments in trade regimes to join WTO
- India & South Asians breaking away from old protection & self-sufficiency approach

Asian approaches to WTO new round

- Japan, Korea want minimal reform – some in Japan want to raise tariffs
- ASEAN Cairns Group members pushing for continued liberalisation, some strongly
- China, India & Pakistan have key roles in dynamics – China's market size; India & Pakistan influence in developing countries
- Special & differential treatment; food security; further reform vs protection?

Excellence in Food Value Chain Management: Ensuring Results by Creating Communities of Practice

Richard Coutts and David Milstein [2]

A major change is taking place in the way firms, regions, industries and nations compete. The leadership imperative that arises is a need to think differently about how food value chains operate, and how the knowledge necessary for innovation and competitiveness is transformed into business success. This paper proposes a new and powerful approach for converting knowledge about excellence in business and industry development (BID) into practical outcomes.

Why has this paper been written?

Globally, the nature of competition continues to change rapidly. The consequence is an imperative for continuous improvement in every aspect of business.

Convergence is resulting in a loss of relevance of traditional concepts such as industry and sector; changing *societal values* about agricultural production are being felt at supermarket check-outs; and the *globalisation* of businesses and communities is reducing the sovereignty of national and regional governments.

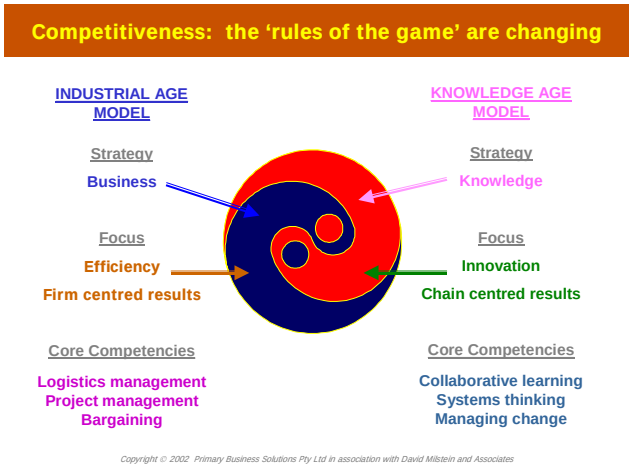
New technologies are emerging that have the potential to revolutionise the way food and fibre is produced, who produces it, and the way business is carried out. Concepts such as work, products, supply chains, industries, markets, location and competition are being redefined. New *business strategies* are emerging with a shift from predominantly firm-to-firm adversarial business models to relationship-based competition, including 'value chain against value chain' competition.

The twin principles that firms have boundaries and that these should be kept sharp are basic assumptions in much of our traditional thinking about management.

They are also ideas whose time has passed.

Joseph Badaracco, "The Knowledge Link: How Firms Compete Through Strategic Alliances", Harvard Business School Press, 1991

A key feature of the '*Industrial Age*' organisational structures and business models that characterised 20th Century commerce was a business strategy mindset predominantly driven by operational efficiency in a firm-against-firm competitive environment. In contrast, business strategies in the current '*Knowledge Age*' are being supplemented by, and integrated with, knowledge strategies as innovation, the leveraging of knowledge, and relationship-based competition increasingly drives business success. This major change (discontinuity) in the nature of business competition is depicted below.



[2] Richard Coutts is a Director of Primary Business Solutions Pty Ltd, a firm providing business and industry development strategy services to clients in the public and private sectors. David Milstein is the principal of David Milstein and Associates, a specialist in learning systems, strategic thinking, and leadership. During 2001-2002, Richard and David assisted Agriculture, Fisheries and Forestry – Australia with the development and implementation of a national food chain learning network initiative. The network is a component of the National Food Industry Strategy that commenced on 1 July 2002, and is designed around a Netweaved Communities of Practice model conceived by the authors.

In circumstances of continuous and rapid change 'business as usual'/'more of the same' strategies are high-risk and can quickly lead to irrelevancy in the communities and marketplaces of tomorrow. Changed behaviour is fundamental for innovation and economic progress.

Doing things differently requires learning. For learning to occur, knowledge must lead to action. This can be enabled by the deliberate design of processes that integrate the key building blocks of successful change - knowledge, capability building and implementation action (also referred to as "*practice*").

Practice leads to 'know-how', much of which is not captured or shared. Because of its unwritten nature, formal knowledge transfer strategies tend to miss it. Referred to as 'tacit knowledge', know-how is increasingly being recognised as a valuable source of competitive advantage. Difficulty in accessing it within and across businesses is, however, widely regarded as a significant factor inhibiting learning.

Much of what any of us knows is 'tacit knowledge' embedded in the practices we share with others.

Peter Henschel, Institute for Research on Learning

Another problem preventing successful business innovation is that strategies developed to encourage and introduce innovation, tend to concentrate on creating knowledge and assume that action will automatically follow. Essentially, this leaves action/behavioural change to chance leaving the way open for anti-change/'balancing' forces to maintain the status quo, i.e. the 'immune systems' of firms tend to naturally resist organisational change.

To address these issues, businesses in a wide range of areas of economic activity are discovering that Communities of Practice are a useful means of facilitating the creation and sharing of knowledge, capability building and the implementation of action. This change of approach is, however, occurring on an ad hoc basis and at a rate that is not commensurate with global competitiveness imperatives.

To ensure that the outcomes intended are realised, the implementation of action must be guided by robust strategies that are deliberately designed to identify key enabling activities and anticipate and deal with the challenges that will inevitably arise. This involves the integration of change management and experiential learning processes and can best be achieved through the dynamics of Communities of Practice (CoPs) whether by individual businesses, value chains or whole industries.

To do things differently, we need to see things differently.

Paul Allaire, Chairman and CEO, Xerox

Australian industry stands to gain major benefits by operating in carefully designed CoPs and networks of CoPs, as they provide a powerful mechanism for initiating, guiding and achieving desired outcomes.

About Communities of Practice

What are they?

"Communities of Practice are groups of people informally bound together by shared expertise and passion for a joint enterprise." [3]

Communities of Practice are a social innovation process. They comprise groups of individuals focused on creating, stewarding and applying knowledge about a specific issue, opportunity or topic. Members of CoPs share a strong desire to increase their knowledge and capabilities by working together, and by sharing their experiences. CoPs add-value to knowledge-creation processes by providing systems that ensure practical application of knowledge (*practice*).

The idea is not new. Communities of Practice "were our first knowledge-based social structures, back when we lived in caves and gathered around the fire to discuss strategies for cornering prey, the shape of arrowheads, or which roots were edible. … It is not communities of practice themselves that are new, but the need for organisations to become more intentional and systematic about 'managing' knowledge..." [2]

The model described in this paper is new and has been designed to also address factors that impede progress (anti-change/'balancing' forces). These are seldom incorporated into current approaches.

[3] Wenger, E., R. McDermott, and W. Snyder. (2002), *Cultivating Communities of Practice*, Harvard Business School Press, Boston, Massachusetts

What are the benefits to businesses and industries?

CoPs create value for businesses, industries and other stakeholders in the commercial performance/ international competitiveness of firms. These include:

Groups of people or organisations who:

- have identified a high priority topic or issue and are wondering 'how' to best ensure a successful outcome; or
- have already implemented initiatives and have run into implementation problems or challenges, or where

On-going activity is necessary because the outcomes sought from 'one-off' solutions are likely to be undermined by rapid change arising from the dynamic and systemic nature of the external operating environment.

How do you set one up?

Individuals, firms, value chains and industry organisations with a strong interest in achieving outcomes relating to a specific issue or opportunity agree to form a *CoP* to create, steward and apply knowledge about that issue/opportunity.

New knowledge is shared amongst members. Managing new knowledge and communication between members, needs to be supported by *an electronic platform* to enable businesses and other stakeholders to easily access shared knowledge, contacts and expertise.

Leadership of CoPs is provided by a person who has energy and enthusiasm for a particular opportunity/ issue/topic (i.e. each CoP is lead by a '*Champion*' selected by its members).

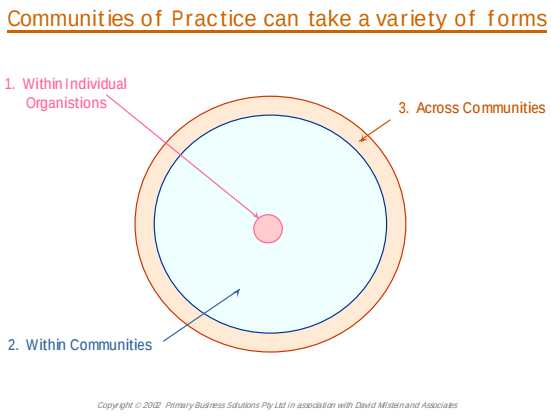
Members of CoPs make use of *CoP Support Resources* that include guidelines and check lists to:

- Facilitate the operation of CoPs as integrated and interdependent systems for creating and sharing knowledge; and
- Obviate a wasteful and frustrating 'trial-and-error' approach by each CoP in developing the generic approaches, systems and processes needed for stewarding their specific knowledge domain.

What form do they take?

CoPs have been created within individual organisations or businesses, across organisations or businesses, within communities or industries and across communities or industries. They may operate independently of one another, form ad hoc networks of communities, or link together within a systemic framework. This is illustrated in Diagram 1 below.

Diagram 1



Irrespective of the form taken by CoPs or the general field of interest (e.g. business and industry development, community economic development, social policy etc), each has three key elements in common - a ***domain*** of knowledge which defines a set of issues; a ***community*** of people who care about this domain and share a common sense of purpose; and shared ***practice***, i.e. the specific knowledge and resources developed, shared and maintained.

The design and implementation of group-based approaches for creating and sharing knowledge (e.g. CoPs) is not easy and requires careful consideration and rigorous design informed by the successes and failures of others. The key elements are:

1. Start at the beginning – anticipate change

As indicated on page 1, increasingly rapid change is reshaping the economic and social landscape of businesses. It is therefore important that the knowledge creation process and strategies described above be informed by *strategic foresight*. This requires skills and processes for anticipating future change and thinking from the future.

2. Create an appropriate environment for shared learning

Shared learning is a complex activity that does not take place automatically. It is therefore essential to create an environment that facilitates it. This requires implementation frameworks, tools and processes for transforming knowledge into successful BID outcomes.

Experience with collaborative learning initiatives highlights the fact that, irrespective of the BID opportunity, issue or topic which businesses or industries are addressing, the change process involves human behaviour and relationships. *It is therefore important to use the services of a skilled facilitator to guide the process.*

Build from the experience of others

Generic design principles and critical success factors are emerging from the creation and performance of CoPs in different sectors and different countries. It is therefore possible to rigorously design the architecture and processes for shared learning networks by 'standing on the shoulders' of others and 'profiting from their experience'.

Ensure a diversity of membership

It is important that *CoP membership be drawn from a diversity of experience* that reflects the three key drivers of excellence in BID – namely, research, capability and application.

'Netweaving' Communities of Practice

"There are few more urgent tasks than to design social infrastructures that foster learning." [2]

What is 'netweaving'?

The term 'netweaving' refers to the strategic alignment of, and the sharing of learnings between, individual CoPs. It is intended to conjure up an image of interlinkages and interdependency within a system for achieving significant outcomes. In essence, a desired outcome from the netweaving of CoPs is the creation of a sustainable *community of learning communities*.

A Netweaved CoP (NCoP) is a cluster of individual/interlinked CoPs, e.g. within a value chain, or across a number of value chains. NCoPs operate within an overall framework that is designed to enable a systems approach and the sharing of experience amongst industry participants and stakeholders.

It should be noted that NCoPs are designed to encourage the sharing of knowledge and experience about excellence in business and industry development, NOT detailed commercial-in-confidence information.

Why is it necessary?

Most BID groups consist of volunteers working with limited financial or other resources. Their time and other resources are, therefore, precious and need to be deployed wisely to achieve preferred outcomes that require access to much more than they traditionally have available to them.

How does it help businesses and industries?

Netweaving offers individual and/or isolated groups tackling issues the means of communicating with others who have "gone before", thereby significantly improving their efficiency and effectiveness. The netweaving of CoPs provides them with a mechanism for sharing knowledge, learning and experience with others within their industries, and with other industries if desired.

How does it work?

NCoP Strategies for BID have been designed to enable an environment to be created that nurtures and supports the sharing of experience and continuous learning and improvement, facilitates capability building and ensures that action takes place within and across value chains and industries. Considerable emphasis is placed, however, on providing participants with maximum flexibility to meet their needs/create value for themselves in designing and implementing NCoPs.

The Strategies for NCoP establishment and operation are:

- *Community Cohesiveness – The Configuration Strategy:* The focus of this Strategy is on the necessary and sufficient conditions for giving operational effect to the knowledge creation and governance structures outlined above.
- *Fostering Innovation – The Learning Strategy*: The Learning Strategy ensures that NCoP activities are deliberately driven by processes that facilitate shared learning, i.e. the strategies and processes necessary for creating a learning environment that leads to the acquisition of knowledge (both social and human capital) and changes in behaviour (capacity building).
- *Evolution and Growth – The Continuous Improvement Strategy*: Continuous performance assessment and review are integral components of the operation of NCoPs. The focus is on achieving excellence in the delivery of strategic outcomes (desired results) and operational effectiveness (processes/practices) for all NCoP activities.
- *Facilitating Interaction - The Communication Platform Strategy*: A web-based platform is necessary to underpin NCoP activities by providing a resource for interaction and the sharing of experience**.**

The *Governance and Stewardship* functions necessary for effective NCoP operation are delivered by an *NCoP Community Hub* comprising:

- A small *Leadership Group*, made up of CoP Champions and individuals selected from industry organisations, businesses and other key stakeholder groups with a passion for BID;
- the Leadership Group assists with the implementation and initial operation of NCoPs;
- A *CoP Facilitators Network*, focused on improving the practice of shared learning within NCoPs;
- *Support Services* to assist with coordination of NCoP activities - including knowledge management, organisation of events, communication platform maintenance, resource management, and operational governance issues; and
- *System Support Resources*, comprising a *Charter, Membership Declaration, Guidelines* and *Check Lists*. See, for example, the System Support Resources prepared for the Australian Government's Food Chain Alliance (Primary Business Solutions [4]).

Where can I find out more?

The material on which this paper is based is available directly from the authors, from the Agriculture, Fisheries and Forestry – Australia web site[3], or (early in 2003) on a CD produced by the 2001-02 CED

Learning Circles Project undertaken by Dr Paul Wildman, International Management Centre, Brisbane, and Ms Helen Schwenke, Inner Brisbane Community Learning Association.

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[4] Primary Business Solutions. (2002), *Food Chain Alliance: The Supply Chain Management Learning Network component of the National Food Industry Strategy*, Overview, Project Report, Strategies, and Support Resources, http://www.affa.gov.au/content/publications.cfm?category=Food&ObjectID=A6A37B32-1857-43B0-BC3FD3CA4488785B

Agrifood Globalisation and Asia:Food Retailing and Foodservice The End of the Line for Asian Food Retail and Foodservice Players?

Judith Laffan, Principal Analyst, Agrifood Research, Office of Trade Negotiations, DFAT

Agrifood Globalisation and Asia

The End of the Line for Asian Food Retail and Foodservice Players?

Australian Agribusiness Congress & Forum,
Sydney, 12-13 November 2002

Judith Laffan/ Subsistence to Supermarket II Project
[//www.dfat.gov.au/publications/agrifoodasia]

Office of Trade Negotiations
Department of Foreign Affairs and Trade

Department of Foreign Affairs and Trade

Subsistence to Supermarket II : Agrifood Globalisation and Asia

- Asian agrifood markets remain Australia's most important export destinations

- take over 50% of total agrifood exports worth over A$12 billion pa
- any changes in Asian markets have direct impact on Australia
- therefore essential to be aware of changes and trends

- SSII Series (Agrifood Globalisation and Asia) tracks the various elements contributing to continuing transformation of Asian agrifood systems - from subsistence agriculture to modern agribusiness
- Volume I (Agrifood MNCs in Asia, Dec 2001) focuses on leading North America/ European agrifood MNCs, global strategies, increasing participation in Asia
- Volume II (Changing Agrifood Distribution in Asia, Aug 2002) examines globalisation of food retailing and foodservice, plus state of play in Asia
- Volume IV (Asia and the Agrifood Trade Framework, Aug 2002) is one-stop guide to market entry conditions and trade rules for agrifood into Asian markets
- Other Volumes coming out over next few months:
  - Vol III (Asia's Agrifood Demand Trends & Outlook 2001-2010)
  - Vol V (Asia's Agrifood Supply Trends and Asian Agrifood Companies)
  - Vol VI (Australia's Outlook & Opportunities as an Agrifood Supplier to Asia)

Leading Agrifood MNCs
- North American/European Companies Dominate - Why?

- largest agrifood MNCs originate in world's largest markets
- continued movement towards economic integration in Europe, so more pan-European companies, all looking for growth
- continued growth in scale of North American companies, with more US regional companies becoming national and looking for growth
- slowing population growth & slowing per capita consumption growth of food & beverages in North America and Europe → need to find new markets
- large home markets → large-scale players within competition policy
- strong competition among listed companies in North America/ Europe to attract capital by corporate performance and growth
  - exacerbated in 1999-2000 by "new" vs "old" economy stocks

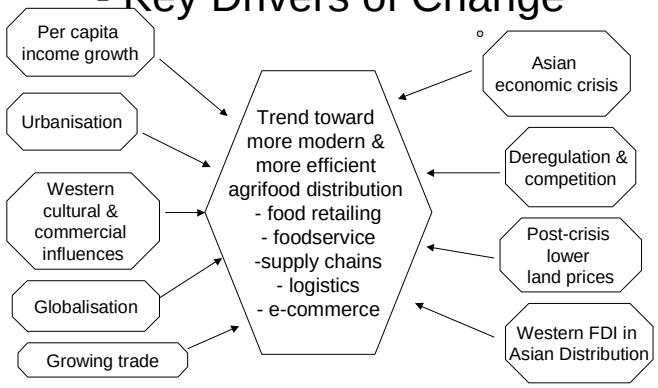
Leading MNC Food & Beverage Retailers
(CY2001 food & beverage sales turnover US$m; *some figures CY2000)

- **Royal Ahold** (Neth) cUS$55,420m c9,000 outlets (in 28 countries)
- **Carrefour** (France) cUS$46,634m c9,000 (30)
- **Wal-Mart** (USA) cUS$43,560m c4,414 (10 + 1)
- **Tesco** (UK) cUS$32,357m c979 (9)
- **Safeway Inc** (USA) cUS$29,156m c1,870 (3)
- **Metro** (Germany) cUS$26,589m c1,124 (22)
- **J Sainsbury** (UK) cUS$23,530m* c638 (2)*
- **Rewe Zentrale** (Germany)* cUS$21,287m c11,680 (12)
- **Edeka Zentrale** (Germany)* cUS$20,150m c10,700 (5)
- **Intermarché** (France)* cUS$18,360m c8,550 (8)
- **Costco** (USA) cUS$17,399m c366 (7)
- **Tengelmann** (Germany)* cUS$16,016m 5,880 (7)
- **Delhaize** (Belgium) cUS$16,274m 2,130 (10)*
- **Casino** (France) cUS$15,738m 5,930 (11)*
- **ALDI** (Germany) cUS$15,000m c6,400m (12)
- **Auchan** (France) cUS$11,723m c854 (14)

Key Effects of Globalisation of Food Retailing

- massive increase in purchasing power of global food retailers
- marked reduction in number of suppliers used by fewer, larger global chains
- movement by food retailers towards less local sourcing, and more regional and global sourcing
- increasing use of house brands/ private labels by food retailers
- significant shift in weight of agrifood industry power away from agrifood processors towards food retailers

Agrifood Distribution in Asia - Key Drivers of Change



Leading MNC Food Retailers - Presence in Asia, 2001/2002

Royal Ahold c104 stores (Malaysia, Thailand, Indonesia)
Carrefour c110 stores (Japan, China, Taiwan, ROK, Singapore, Malaysia, Thailand, Indonesia)
Wal-Mart 30 + c208 stores (China, ROK + Japan)
Tesco 56 + 4 stores (Taiwan, ROK, Thailand, Malaysia + plan for Japan & China)
Metro 8 stores (China, Vietnam + plan for Japan, India)
Costco 10 stores (Japan, Taiwan, ROK)
Delhaize 86 stores (Singapore, Thailand, Indonesia)
Casino 41 stores (Taiwan, Thailand)
Auchan 35 stores (China, Taiwan)
SHV Makro 57 stores (China, Taiwan, Malaysia, Thailand, Indonesia, Philippines)
PriceSmart 6 stores (China, Philippines)

MNC Retailers in Asia - increasing presence but not yet dominant

- Leading MNC retail players ***are*** increasing presence and marketshare in certain Asian markets
  - especially in Thailand, China, Taiwan, Malaysia, Korea
  - but less so in Japan, Singapore, Hong Kong, Indonesia, Philippines, Vietnam, India
  - none are dominant across all Asian markets
  - most have focused on just a few markets eg Wal-Mart on China, Korea, and now Japan
  - also, several MNCs have withdrawn from one or more Asian markets

  eg Royal Ahold from China, Singapore, Carrefour from Hong Kong
- But key effect has been start of irreversible change
  - new formats (hypermarkets, supermarkets) replacing old (single stores, wetmarkets) and larger scale of operations
  - new benchmarks of performance and competitiveness in Asian food retailing and distribution

Many Asian Food Retailers - still in the game, lifting their game

- Due to Asian crisis, ***some*** Asian players have ceded food retailing ventures to foreign players

  eg Thailand's Central Retail Group gave up majority shareholdings in three JVs to Western partners (Royal Ahold, Carrefour, Casino) over 1998-99
- But many Asian food retailers remain in the game

  - in Japan, five major chains each with annual food & beverage sales of over US$4 billion, plus another dozen over US$1 billion pa

  - Japan's Ito-Yokado, with turnover over US$28 billion pa, owns world's largest conveience store chain (7-Eleven), with 23,000 stores worldwide

  - in most other Asian markets, still several significant local players in each, such as ParkNShop in Hong Kong, NTUC Fairprice in Singapore, Hero and Matahari supermarket chains in Indonesia

Leading Asian Food Retailers - Japan

(food & beverage sales JFY2001, ending Feb 2002)

- **Ito-Yokado/ Seven Eleven** cUS$11.2 billion /c40%
- **Aeon/ Jusco** cUS$9.4 billion / c40%
- **Daiei** cUS$7.9 billion / c40%
- **UNY** cUS$4.7 billion / c50%
- **Seiyu** cUS$4.4 billion / c50%
- **Life** cUS$2.2 billion /c73%
- **Maruetsu** cUS$2.2 billion /c85%
- **Kasumi** cUS$1.7 billion /c89%
- **Lawson** cUS$1.6 billion /c80%
- **Heiwado** cUS$1.5 billion /c53%
- **Izumiya** cUS$1.3 billion /c48%
- **Inageya** cUS$1.4 billion / c80%

Japanese Convenience Store Chains - Systemwide sales in Japan, JFY2000

(both food & non-food sales)

- **IY/ Seven-Eleven** (c9,063 stores) US$18.6 billion
- **Mitsubishi/ Lawson** (7,734 stores) US$11.6 billion
- **Itochu/ FamilyMart** (5,856 stores) US$9.4 billion
- **UNY/ Circle K** (2,983 stores) US$3.5 billion
- **UNY/ Sunkus** (3,359 stores) US$3.1 billion
- **Daily Yamazaki** (2,281 stores) US$2.6 billion
- **Aeon/ Ministop** (1,538 stores) US$2.0 billion

Other Leading Asian Food Retailers
(food & non food sales 2001)

- **Dairy Farm International** US$4.9 billion
- **Lotte Shopping** US$4.6 billion

(1,001 7-Eleven + 25 Magnet Mart discount stores)

- **Shinsegae** (46 E-Marts) US$4.2 billion
- **Park N Shop** (c236 supermarkets) cUS$2 billion
- **President Chain Store** (2,960 7-Eleven) US$1.9 billion
- **Daesang** (502 Ministop) US$1.2 billion
- **Far Eastern** (12 hyper, 7 super) US$961 million
- **LG Mart** (c500 LG25, 60 LG Super) US$789 million
- **China Resources Supermarket** US$737 million

(391 supermarkets)

- **NTUC Fairprice** (68 super, 32 CVS) US$626 million
- **CP Group** (1,722 7-Eleven) US$518 million

Asian food retailers - lifting competitiveness

- Observing and learning from Western players
- Improving retailing practices
  - more efficient sourcing, bulk purchasing, house brands
  - tightening supply chains for efficiency, food safety
  - improving inventory tracking & management
  - lifting efficiency of distribution across chain (including through outsourcing of distribution)
  - use of discounting and sales to increase turnover
  - introducing IT across all corporate functions
  - reducing operating costs and reducing debt levels
  - more attention to corporate strategies, points of differentiation from competitors
- Regional Asian players are emerging eg President Chain Store

Globalisation of Fast Food/ Foodservice/ Institutional Catering

- in developed country markets, continuing trend towards more eating-away-from-home and home delivery of prepared meals
  - more women in workforce
  - mainly nuclear families and single households
  - increasing working hours for many people
  - higher expectations of use of leisuretime for leisure
  - higher demand for convenience, time-saving & energy-saving
  - demographic change → higher proportion of older people
  - more use of foodservice facilities at clubs (eg sports clubs)
  - increasing travel for work & pleasure, and more meals taken at hotels and on aircraft, trains, ships
  - more use of professional food catering for public & private institutions (eg hospitals, military forces)
  - more use of professional food catering for large corporate sites
- in response, emergence of large-scale foodservice enterprises

Leading Fast Food MNCs: Global Networks
(CY2001 systemwide sales US$m +global outlets)

- **McDonald's** US$40,630m 30,093 outlets (121 countries)
- **Yum! Brands** US$22,328m 32,500 outlets (104 countries)
  (KFC, Pizza Hut, Taco Bell, A&W, Long John Silver's)
- **Burger King** US$11,200m 11,400 outlets (59 countries)
- **Wendy's** US$8,287m 7,770 outlets (28 countries)
  (Wendy's, Tim Horton's)
- **Subway** US$5,170m 16,050 outlets (74 countries)
- **Domino's** US$3,543m 7,100 outlets (61 countries)
- **Starbucks** US$3,000m 5,600 outlets (22 countries)

Leading Institutional Foodservice MNCs
CY2001 foodservice sales US$m

- **Royal Ahold** US$13.1 billion
- **Compass Group** US$12.6 billion
- **Sodexho Alliance** US$10.6 billion
- **Aramark Corporation** US$5.9 billion
- **Nestle** cUS$3.9 billion
- **Autogrill** US$2.9 billion
- **Elior** US$1.9 billion
- **Accor** US$0.7 billion

Effects of Globalisation of Fast Food/ Foodservice

- more centralised purchasing of major raw materials and inputs on global or regional basis
- some key suppliers follow fast food chains/ foodservice companies into key markets
- major emphasis on cost competitive and efficient supply chain
- fierce competition in developed and developing countries
- for fast food chains, crucial to attain a certain scale in a market to be competitive
- major franchisees become significant companies themselves

Asian Foodservice Sector

- Long tradition of eating away from home
  - but except in Japan, local cuisine generally not transformed into organised industry
  - rest of Asia, mostly single restaurants, vendors/ hawkers, though some exceptions (eg Jollibee)
- Leading MNC fast food chains have growing presence, though few like McDonald's; many smaller chains also
  - operate via single master franchisee in each market
  - master franchisees become significant businesses, and some focus on stable of Western fast food brands
  - more Asian companies seeing opportunities in local cuisine + developing own brands (eg CP/Chester's Grill)
- Most of institutional/ contract foodservice remains self-operated – professional catering likely to grow

Japanese Foodservice Sector - most organised in Asia

- From c1960s, growth of concept of restaurant "chain" and organised foodservice in Japan
- McDonald's arrival in early 1970s, and rapid growth
  - top ranking for sales for past 20 years
  - major influence on Japan's foodservice industry
- Today, hundreds of Japanese foodservice companies with branded restaurant chains of various types (Japanese, Western, Chinese, Korean, etc)
  - over 100 with sales over US$100m pa (JFY2001) and several hundred outlets each
  - none compare in scale with McDonald's, Yum! Brands
  - but c20 with sales of US$500m or more
- Annual sales cUS$250 billion

Leading Japanese Foodservice Companies JFY2001 (US$m)

- **Skylark Group** US$2,266m/US$3,017m
- **Hokkahokkatei Sohonbu** US$1,484m
- **Monte Rosa** US$1,205m
- **Royal Co** US$1,083m/ US$872m
- **Duskin Corp** US$1,037m/ US$1,903m
- **Honke Kamadoya** US$982m
- **Nissin Healthcare Foodservice** US$939m
- **MOS Food Services** US$879m/ US$576m
- **Yoshinoya** US$816m/ US$1,193m
- **Shidax Foodservice** US$771m/ US$1,121m

Japanese Foodservice Sector - major changes underway

- Most Japanese foodservice companies focus on Japanese market
  - under pressure from sluggish economic conditions, fierce competition, price wars led by McDonald's, BSE
- In response, companies are
  - seeking greater scale (minimum cUS$800m sales, c1,000 outlets), so consolidation underway
  - building up stable of brands, several chains
  (eg Skylark has Western + Chinese + Japanese)
  - reducing operating and material costs, including by sub-contracting supply of inputs, building closer relations with overseas suppliers, establishing "offshore kitchens", etc, to offer competitive prices
  - starting to expand more abroad (eg Yoshinoya *gyudon* chain in USA plus 5 Asian markets)

Changing Asian food retailing & foodservice - Conclusions

- Asian food retailing and foodservice changing fast
  - Western players are main drivers of change
  - but Asian players adapting and lifting their game
- Not inevitable that Western players will predominate (though Wal-Mart could become top player), rather that Western-style retailing & foodservice systems will prevail
  - some Western players may not survive in all markets
  - global mergers & acquisitions will have an effect
- Many significant Asian food retailers remain, and improving competitiveness to stay in game
  - more Asian regional players likely to emerge
  - also some Asian cross-border M&As
- Early days in modernisation and consolidation of Asian foodservice sector – Western presence increasing, but significant Asian players likely to remain in game and grow

"Economic Issues for Plant Breeding – Public Funding and Private Ownership"

Professor Bob Lindner
The University of Western Australia.

Introduction

Economic outcomes in the "plant breeding industry" are being driven by interactions between advances in scientific knowledge, changes in the legal framework for intellectual property rights, and competitive forces in the market. While extended property rights have created the foundation for new markets, the opportunities arising from scientific discoveries have provided powerful incentives for firms to enter these markets and invest in plant breeding. The competitive forces unleashed by these developments are likely to transform the production of new plant varieties.

This potential for modern plant breeding to create value in the supply chain is one of the driving forces behind the increasing privatisation of plant breeding. In conjunction with an enhanced ability for plant breeding organisations .to appropriate a sizeable share of the benefits from improved varieties; it is inevitable that crop breeding in Australia faces a transition from a system dominated by public plant breeding programs to one in which private plant breeding plays a much more important role. Moreover, even if public and/or grower funded plant breeding programs survive for some crops , they also will be under pressure to operate more commercially and at least recover the costs of the breeding program (as distinct from costs of seed multiplication)by charging growers more for newly released varieties.

As a result, there will be increasing commercialization of breeding programs, and much more widespread application of intellectual property rights to both germplasm and to breeding technologies. These changes are discussed in more detail below, including the underlying reasons and the policy issues that need to be addressed to ensure that the potential benefits to society are realised.

The Trend to Privatisation

Historically most plant breeding in Australia was conducted by "public" research organisations that were financed mainly from government revenue. The supporting research in agronomy, plant pathology, entomology, biometry, plant nutrition, plant physiology, and other cognate disciplines also was publicly financed. Improved varieties were freely released to producers at nominal costs that at best only partially recovered the costs of breeding, let alone making any contribution to funding the cost of supporting research.

While there has been a gradual substitution of collective industry derived funding for government funding for several decades, until recently plant breeding has continued to be conducted mainly in state government Departments of Agriculture, with selected universities and CSIRO also playing a role in some areas.

There are now clear indications of a growing trend in Australia to privatisation of plant breeding for many crops. Many public systems are rapidly being overshadowed by private alternatives in which both new enabling technologies and improved cultivars are routinely protected by intellectual property rights.

In this paper, the term privatised plant breeding is used to include any plant breeding program that is conducted on a "for profit" basis, or even on a "full cost recovery" basis. It includes plant breeding by profit making firms as well as other organisations that seek to finance the plant breeding operations by selling seed, or otherwise appropriating some of the benefits generated from growing improved varieties. Such appropriation methods include charging seed royalties, technology use fees, "end point royalties", and "Closed Loop Marketing Agreements" (CLMA).

Public plant breeding includes most other types of program, including publicly funded plant breeding conducted by universities or government agencies, or even contracted out to private institutions. It also includes plant breeding programs funded collectively by industry so long as new cultivars from the breeding program are available to all farmers, and so long as there is no significant charge for the intellectual capital embodied in these varieties.

Evidence for Emerging Trends in Plant Breeding

In a number of other countries, there has been a stronger tradition of private plant breeding for many years. For instance, in Europe private companies played an important role in the development of modern plant breeding. There also has been a strong private plant breeding sector in the U.S. since at least the development of hybrid corn. Furthermore, as noted by Heisey, Srinivasan, and Thirtle (2002), it continues to expand at the expense of the public system:

"*Real inflation-adjusted investment in public-sector plant breeding in the U.S. rose until the 1980s but began to stagnate during the mid-1990s, followed by a decline. In contrast, from the mid- 1960s to the mid-1990s, real private-sector investment in plant breeding grew at a remarkable 7 percent annually. Comprising only one-sixth of the public-sector total in the 1960s, private-sector plant breeding surpassed public investment by the mid-1990s.*"

"the area of the U.S. planted to field corn is dominated by hybrids developed in the private sector. Private sector hybrids also dominate in the Union and in Canada."

The rapid privatisation of canola breeding in Canada provides a further indicator of the possible future for other public plant breeding programs, and has been comprehensively documented and analysed by Phillips (1999). The following brief overview of selected highlights was summarised from his recent report.

As recently as 1982, there were only six canola cultivars actively grown in the world, and all were bred by public sector institutions in Canada. The plant breeding program used largely non-proprietary technologies, and all seeds produced and sold were in the public domain. The rate of development of new varieties was also relatively slow, with an average of one new variety every two years, and the average lifespan of a cultivar was about 10 years.

In the mid 1980's, four key factors led to the infusion of private money. First, health research and market development efforts throughout the 1980s opened the market for expanded production. Second, breakthroughs in breeding methodologies improved the economics of private sector breeding. Third, financial deregulation in the early 1980s in North America led to a large pool of capital seeking new investment opportunities, which coincided with the budget crunch in universities and public institutes and new pressures to commercialize new technologies for profit. The fourth and perhaps most crucial factor was the introduction of intellectual property rights for biological inventions.

Between 1982 and 1997, a number of new proprietary technologies replaced the publicly developed breeding methods and more than 125 new varieties were introduced. By 1996, private companies developed more than 75% of the new varieties, while public institutions only developed about one quarter of the seed sold in Canada. The average active lifespan of a cultivar declined to about three years by 1997.

In Australia, the situation differs from crop to crop. For some crops such as lupins, there is virtually no private sector involvement in plant breeding, and little evidence of any interest in future investment. Plant breeding for Canola is an example of a mixed system with both public and private plant breeders, and with a trend to more private plant breeding and fewer public plant breeding programs.

Wheat breeding is heading in the same direction. Currently there are at least two private plant breeding firms, namely Grain Biotechnology Australia, and a joint venture between AWB Ltd. and Syngenta that has wheat breeding programs in UK, France, US, Canada and NZ. This new company reportedly will invest $14m in wheat breeding over the next 5 years[5]. At the same time, GRDC has signalled its intent to consolidate and to corporatise the wheat breeding programs that it supports. Specifically, GRDC will replace its support for Australia's eight existing and mainly state-based breeding programs with support for three new commercially focussed wheat breeding programs. These will be Sunprime, Australian Grain Technologies, and a joint venture between GRDC, the WA Department of Agriculture, NSW Agriculture and the Queensland Department of Primary Industries to be known temporarily as the National Wheat Breeding Program (NWBP).

Reasons for Privatisation of Plant Breeding

Plant breeding can be conceptualised as an investment that develops improved varieties with the potential to generate future benefits in the form of improved crop productivity, reduced costs of production, and/or higher returns. Potential value from improved cultivars will be realised only if and when farmers adopt these cultivars in their cropping systems, AND when consumers willingly purchase the food or other crop products in a competitive market. Growers will only adopt these new varieties if they provide real financial benefits that exceed the costs of adoption, including any additional costs of acquiring the improved variety. Similarly, consumers will only knowingly purchase food from these new varieties if by so doing they derive a net benefit in the form of enhanced attributes and/or lower prices relative to available alternatives. In common with other forms of investment, the rate of return will depend on the discounted value of the flow of future benefits net of present value of all costs necessary to generate such benefits.

Arguably the most important reason for the growing trend to privatisation of plant breeding has been significant changes in the ability of plant breeders to appropriate at least some of the benefits from improved grain varieties that otherwise would be captured by growers. Specifically, the incentive for firms to invest in

[5] The Australian, 9/3/2002 –

plant breeding depends on the ability to exclude grain growers, and often competing plant breeders as well, from commercial exploitation of a breeder's varieties unless they pay to do so.

For some crops such as corn, the development of hybrid technology provided genetic copy protection that enabled plant breeders to capture much of the value from heterosis as well as other superior traits. For other crops, it has been the expanding scope of intellectual property rights that has enabled the capture of some of the value created by plant breeding.

So while it has been the application of modern science to plant breeding that has generated much of the potential for value creation in the grain supply chain, it has been extensions to the legal framework for intellectual property rights that have made possible private capture of enough of the value created by plant breeding to provide the private sector with an incentive to invest more in plant breeding. The most significant of these intellectual property rights are patents and Plant Breeder's Rights. In recent decades, both court decisions and legislative changes have expanded the scope and impact of these two types of intellectual property right appreciably.

Complementing these developments in the institutional framework have been scientific discoveries that led to greater potential for value creation by improvements in plant breeding methods. Apart from hybrid technology, other recent advances include new technologies that improve the efficiency of all plant breeding, including both conventional and transgenic plant breeding. Such techniques include double haploidy, plant regeneration systems, molecular based hybrid technologies, and marker assisted selection. Use of these techniques in conventional plant breeding is already reducing the time lags from initial crosses to release of new varieties. Potentially beneficial outcomes from the application of these technologies to plant breeding include one or more of the following:

- cheaper[6] development of improved crop varieties.
- faster/earlier development of improved crop varieties.
- development of superior[7] improved crop varieties, that are more productive, produce better quality grain, or both.

In addition, there has been the more controversial development of transgenic technologies used to produce GMO's. Potential beneficial outcomes from transgenic technologies include:

- development of improved crop cultivars with novel[8] agronomic/input traits that enable lower average costs of production.
- development of improved crop cultivars with novel quality-enhanced traits for which consumers are willing to pay a price premium.

On the other side of the coin, publicly funded rural research has been under pressure for at least the last two decades. In part, this been due to a growing perception that grain growers have been the primary beneficiaries of the traditional plant breeding programs. Historically these programs have been funded mainly from consolidated revenue. To some extent, this concern has been addressed by the relatively recent evolution of the GRDC and similar bodies that rely heavily on collective industry funding to support much of their investments, but the fact remains that a significant part of plant breeding programs is still publicly funded.

Governments also now demand greater accountability at the same time that they reduce funding for agricultural research and extension. As a result, many "public" institutions are under pressure to become at least partially self-funding, and are starting to charge for selected goods and services. Public research institutions also seek to patent and/or commercialise discoveries made in the course of government funded research, or pursue opportunities to license technologies to the private sector.

[6] i.e. relative to varieties with equivalent characteristics to those currently being produced by conventional plant breeding methods.
[7] i.e. In this context, these are varieties that have superior performance to those that could be bred economically by conventional plant breeding methods.
[8] i.e. traits that could not have been incorporated economically into improved varieties by conventional plant breeding methods.

Public plant breeding programs have not been immune to government pressure to generate revenue from their activities. Like private business, their capacity to capture a high proportion of the net benefits of new varieties depends on:

- a legal basis to establish ownership of the intellectual property embodied in the variety,
- the capacity to exclude potential users who are not willing to pay the nominated price,
- the costs of monitoring and enforcing compliance,
- the capacity for price discrimination.

Pricing practice by public institutions is still evolving. If they start charging significant fees at levels approaching full cost recovery, and exclude farmers unwilling to pay these fees from access to new varieties, then they cease to be public plant breeding organisations within the meaning of the term in this paper.

Finally, agronomic practice by grain growers has become increasingly sophisticated and much more tactical. In particular, many growers now make decisions about which varieties to grow each season on the basis of the latest possible information about the climatic outlook and other seasonal indicators, such as soil moisture levels as well as weed and disease threats. Consequently they are less likely to use seed saved from the previous harvest, and more likely to purchase new seed of the desired variety from a seed merchant. This change in farming practice will increase the size of the seed market, and improve the economics of private plant breeding.

Value Creation and Capture Issues

It is inevitable that the growing privatisation and commercialisation of plant breeding in the Australian grains industry will lead to increased competition between plant breeders. While this trend is seen as threatening by some people, there are compelling grounds for viewing this change as an opportunity to create more value for the industry and the nation provided that certain conditions are met. First though the way in which plant breeding creates value is discussed.

In a market economy, the ultimate determinant of the aggregate value of all activities in the food supply chain is the amount that consumers are willing to pay for the end-products that they consume. Hence, value creation occurs when there is an improvement at any step in the supply chain that increases aggregate value in consumption. Market forces, mediated by the institutional and policy framework, including intellectual property rights, will determine the extent to which value is captured at various stages along the supply chain.

In the grains industry, new varieties produced by plant breeding potentially can create value, either by lowering the cost of producing and delivering grain and grain products to consumers, or by enabling the production of superior grain products that better satisfy the needs of consumers, who as a result are willing to pay more for such products. The potential for value creation will be realised when new varieties from the breeding program are released and adopted by grain growers, and the resulting products are purchased and consumed by end-users.

The application of modern science to plant breeding has dramatically increased the potential to create extra value in the grain supply chain. As noted above, new plant breeding methods such as di-haploidy, embryo rescue, and rapid breeding cycles have sped up the development of new varieties and reduced breeding costs. Furthermore, molecular marker technology enables breeders to be much more selective and effective at identifying desirable traits in germplasm collections and incorporating these traits into elite lines. Transformation technologies have significantly expanded the range of traits that plant breeders can access.

Greater value will be created if plant breeders can produce more and better varieties faster and cheaper. To fully realise this potential for value creation, more rather than less investment in plant breeding is needed, and plant breeders need to take a more selective and strategic approach to plant breeding decisions.

For reasons already discussed, less rather than more public funds are likely to be available for investment in plant breeding. Therefore the new investment required will need to be privately funded, and funds will only be forthcoming if prospective rates of return from private plant breeding are sufficiently attractive. The extent to which it is realised will depend on maintaining sufficient incentives to invest in new plant breeding methods. In turn, this will depend on market forces and on the way that they are mediated by the institutional and policy framework, including especially the legal regime for intellectual property rights.

Innovation involving changes to established practice in plant breeding is essential to take full advantage of the availability of the new breeding technologies. Sometimes organisations are able to achieve such a transformation in the absence of competitive pressures, but often they cannot. For both public sector organisations and private firms, competition commonly provides the necessary impetus to drive change and risk taking.

Notwithstanding the potential benefits from privatisation, some people perceive threats to the interests of grain growers and/or to the national interest. Some threats are more imagined than real. Other threats are real enough for some individuals or groups, but are outweighed by broader community benefits. There also are some legitimate grounds for concern about institutional arrangements that could limit the efficiency gains from a more competitive plant breeding system.

One possible outcome of greater privatisation of plant breeding is the crowding-out of all other competition by a very small number of large multi-national firms, who might then exploit their market power to capture almost all of the value created by plant breeding. Pricing practices by these large life science companies also might threaten future competitiveness of sectors of the farming industry, as well as limiting widespread value creation.

The commercialisation of Bt cotton by Monsanto in the USA and in Australia provides one such example. Bt cotton was commercially introduced in the USA in early 1996, and later the same year in Australia in time for the 1996/97 growing season. Monsanto Corporation is the patent holder for the Bt technology, and sought to appropriate the benefits generated by its intellectual property through a technology fee. In the USA, the initial level of the technology fee charged to cotton growers was US $32/ acre. In Australia, Monsanto set the technology fee at A$245/ha, which at then current exchange rates translated to about US $70/acre, or approximately double the level set in the USA. Even though Monsanto subsequently introduced some concessions in response to pressure from the domestic industry, Australian cotton growers still ended up paying a considerably higher technology fee than their US counterparts.

The considerable monopoly power that the large life science companies possess over key proprietary enabling technologies for plant breeding also is a possible threat to continued technology development in a country such as Australia. Arguably a major threat to long run value creation from transgenic technologies will come from legal disputes over intellectual property rights that block widespread utilisation and/or further development of the technology. Concerns have been expressed about possible patent gridlock, excessive secrecy and duplication of inventive effort, excessive transaction costs to license patented technology, prisoner dilemma type impasses, and/or the “tragedy of the anti-commons”. Such supply side problems might tie up the technology in the courts and block commercial implementation for years, if not decades. It also may threaten the *freedom to operate* for public and local industry research and plant breeding programmes.

Given examples such as this, it is not surprising that Australian grain growers have already demonstrated a willingness to fund local plant breeding firms to forestall such a threat, and to ensure ongoing access on reasonable terms to locally bred varieties that maintain Australia’s competitive advantage in international grain markets.

Finally, there are real concerns relating to the provision and utilisation of key “*collective”* inputs to the plant breeding process. Examples of these “*collective”* inputs include germplasm collections of land-race and elite breeding lines, and results of pre-breeding research such as agronomy; biometry; entomology; genetic mapping and molecular marker development; germplasm collection and conservation; information and database systems; molecular biology research; plant pathology; plant physiology; plant quarantine; product chemistry; and quantitative genetics.

These key inputs provide the foundation for ongoing long-term variety improvement and consequent productivity gains. They also share a key attribute with public goods in so far as use by any one plant breeder does not diminish the value of the input to other plant breeders. For this reason, they also are sometimes referred to as quasi public goods.

Traditionally, such inputs were non-proprietary, provision was publicly funded, and access by public plant breeding programs was free and open. In return, no attempt was made to recover the costs of the breeding program (as distinct from costs of seed multiplication) by charging growers for the intellectual property embodied in newly released varieties.

In a world of privatised plant breeding, one risk is that government and/or grower funding to produce these “*collective”* inputs will decline. If there is little or no compensating investment by the private sector, eventually returns to private investment in plant breeding may stall as a result. Alternatively there may be wasteful duplication of effort to produce such inputs as commercial plant breeders strive for competitive advantage in the market place.

Either of these two scenarios is inefficient. The obvious solution is for cooperative behaviour to provide such inputs. This may involve joint funding by private plant breeders, but given the history of funding of plant breeding is more likely to involve continued collective funding by industry through a body such as GRDC. In either case, there will be a lack of competition in the provision of these “*collective”* inputs. may not be feasible in some parts of infrastructure and

While adequate provision is one cause for concern, efficient utilisation is another, which for quasi public goods involves the much maligned concept of the "level playing field". Economists' interest in this concept stems from the simple observation that competition may not generate desirable outcomes if the playing field is not level in the sense that the institutional, policy, and legal framework confers an artificial economic advantages on some firms relative to other firms. As the favoured firms may not be the most efficient, the lack of a "level playing field" may result in inefficient producers out-competing their more efficient counterparts. Conversely, if all firms compete on a "level playing field", then the *Law of the Jungle* should ensure that only the most efficient survive.

There are obvious parallels here to National Competition Policy (NCP) principles governing access to essential infrastructure. Note that the concern of National Competition Policy (NCP) is to ensure that competition between suppliers of goods and services result in lower prices, a wider range of products, and/or better service for consumers. The underlying notion is that *manage*d, rather than untrammelled, competition can create incentives for improved economic performance. That is, the aim of NCP is not only to facilitate effective competition to promote economic efficiency, but also to accommodate situations where competition does not have that effect, or where it conflicts with social objectives.

In industries such as telecommunications, air and rail transport, and electricity transmission, NCP recognises that competition may not be feasible or desirable in the provision of some essential infrastructure, and that the shared use of such 'bottleneck' or 'essential' infrastructure facilities may be necessary to facilitate efficient competition in markets that use such infrastructure. Access regulation that aim to promote competition in markets that use the services of 'essential' infrastructure while preserving incentives to develop and maintain those facilities have been developed to address concerns about denial of access and/or monopoly pricing of access. As plant breeding for the Australian grains industry becomes increasingly privatised, equivalent access regimes will need to be developed so that the potential benefits from scientific discoveries underpinning modern plant breeding are fully realised.

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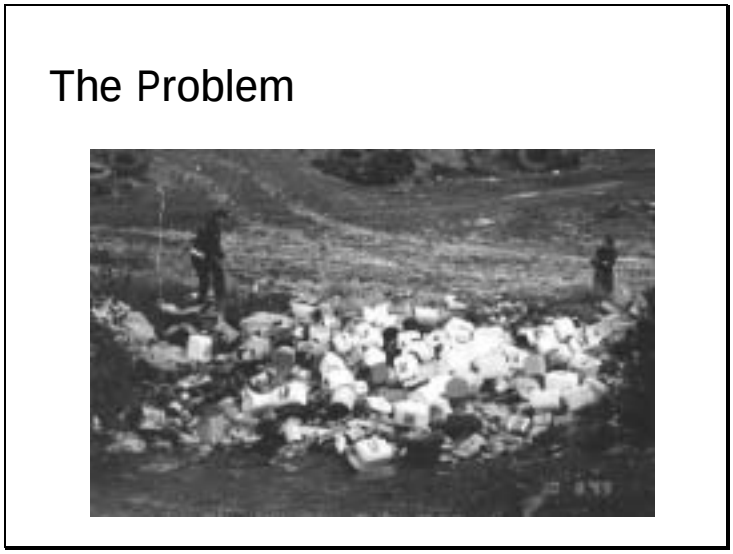
drumMUSTER Stewardship Success - The Collection and Recycling of Farm Chemical Containers

Sam Ponder - General Manager - Agsafe Limited



This is the reason the program was developed.

Here we have a dump of chemical containers at a Council landfill site or it could also well be on a farmers property- a mixture of plastic and steel drums, probably many contaminated drums, some may have once be clean but would not be cross contaminated - pile of hazardous waste.

An estimated 4 million non returnable farm chemical containers are sold to Australia's farmers each year.

The disposal of these empty containers have presented a problem for farmers, the chemical industry and government for many years.

The physical volume and potential contamination risk of chemical containers generates significant problems for their safe and effective disposal by traditional land-fill methods.

Industry Waste Reduction Agreement (IWRA) - Aims

- To reduce the amount of packaging at source
- To have a defined route for disposal that is socially, economically and environmentally acceptable = ***drumMUSTER***

To help resolve this problem, what is know as the Industry Waste Reduction Scheme was developed.

The scheme has 2 main objectives :

The first being:

To reduce the amount of packaging at source which results in less containers requiring disposal

and this is being done by encouraging manufacturers to adopt alternative containers such as bulk or re-fillable packs, developing new packaging technology such as water soluble sachets, and introducing new formulations such as gel packs and granules which are packaged in cardboard containers.

The second objective is :

To ensure non-returnable farm chemical containers have a defined route for disposal that is socially, economically and environmentally acceptable = **drumMUSTER** has been designed for this purpose.

IWRA - Targets

- Reduce the weight of chemical container packaging by 32%
- Recover 66% of clean, empty, chemical containers
- Reduce weight of chemical container waste going to landfill by 68%

The scheme is endorsed by the Australian and New Zealand Environment and Conservation Council and the progress of the program has to be reported to them.

So several targets for the scheme have been established - these targets are for the end of 2001 :

To reduce the weight of chemical container packaging by 32%

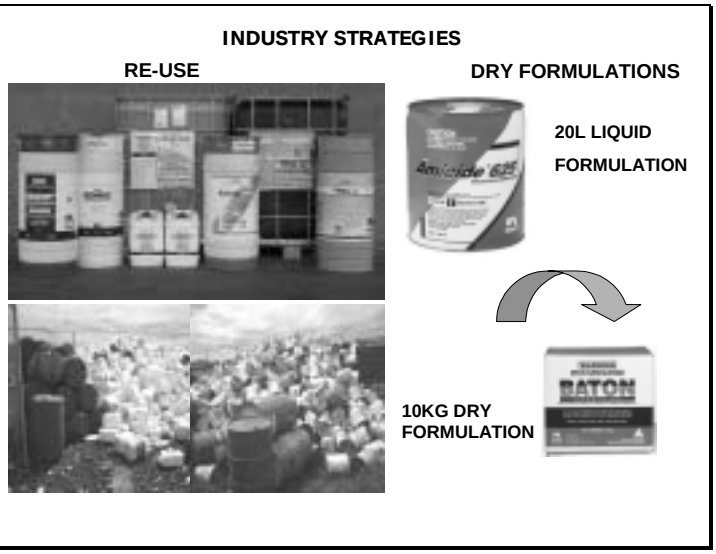
Recover 66% of clean, empty, rinsed chemical containers

and to overall reduce weight of chemical container waste going to landfill by 68%

What is *drumMUSTER*?

drum*MUSTER* is the national program for the collection and recycling of empty, cleaned, non-returnable crop production and on-farm animal health chemical containers.

drumMUSTER is a part of the scheme and is described as the national program for the collection and recycling of empty, clean, crop protection and on-farm animal health chemical containers.



Represents difference types of refillable containers adopted by the chemical industry - 110L Enviro drums, and 1000L Enviro tanks or minibulks, also 20L re-use drums which are reconditioned and then reused.

These have replaced many non-returnable 20 and 200L plastic and steel drums shown below.

Liquid vs. dry formulations: 13% but growing (1999)

ENVIRODRUMS: Around 200,000 – 250,000 envirodrums in the market place, with 100,000 coming from Nufarm (Nufarm)

Number of 20L drums that have been replaced by ENVIRODRUM: 2 million have been replaced (Nufarm figures)

Total volume: 145,855

Total liquid volume (kL): 127,354

Total dry volume (tonne): 18,501

Picture shot:

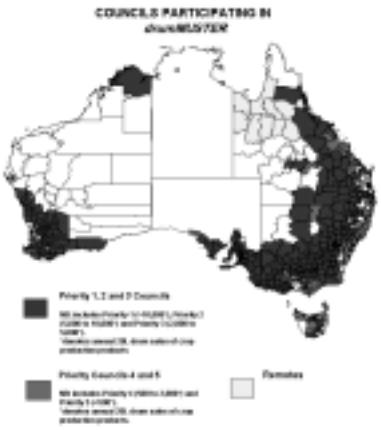
A Nufarm *Amicide 625* 20L drum, and its dry form *BATON* in a 10kg package.

Represents difference types of refillable containers adopted by the chemical industry - 110L Enviro drums, and 1000L Enviro tanks or minibulks, also 20L re-use drums which are reconditioned and then reused.

These have replaced many non-returnable 20 and 200L plastic and steel drums shown below.

drum*MUSTER* service

- 390 councils participating in the ***drum****MUSTER* program
  - 361 councils are signed
  - These service another 29
- Represents 97% of annual drum sales
- Provides for 2.9m of 3.0m of drums sold



Councils Participating

Priority	Number of Councils	Objective	Result % (Number)
1	88	100%	99% (87)
2	97	100%	98% (95)
3	125	90%	87% (109)
4	147	70%	58% (85)
5	76	Serviced	14% (11)
Urban	83	Serviced	4% (3)

Wollongong, Wingecarribee, Kiama and Shoalhaven are Priority 4s.

Shellharbour is a 5.

1,888 trained inspectors
611 compounds

Cleanliness Check

Compound

Drum Return Rate

- Currently 25 -30%
- 2003 Goal 40%
- Program Goal 66%
- US 30%, Canada 68%

Achievements:

2.8 million containers collected

2091 collections

4500 tonnes of waste collected

Since the first ***drum****MUSTER* collection at Gunnedah in May 1999 there have been:

PROCESSING - 19 approved processors

888,474 drums processed in 2001 (Jan-Dec)

17 approved ***drum****MUSTER* processors, operating on a national level

List of *drumMUSTER* approved processors: (Operating area in brackets)

Australian Plastics Recycling (WA)

Bob's Waste Management and Recycling (Central and Northern QLD and NSW)

Cape Divine (SA – Steel Only)

Challenge Recycling (North Western NSW)

Cleanaway – Northern QLD (Northern QLD)

Cleanaway Technical Services (Southwest Land Division of WA)

Cleanwaste (All of Australia)

Collex (Tasmania)

DSL Drum Services WA (WA for reuse and recycling)

DSL Drum Services (QLD, NSW, VIC, SA for reuse and recycling)

Independent Recyclers (Bundaberg) (QLD – Wide Bay and Burnett Region)

Narromine CDEP (Narromine Shire, NSW)

North Adelaide Waste Management Authority (Adelaide Region)

North Queensland Plastic Recyclers (North QLD)

Robertstown Agencies (SA)

Schill Recycling (WA and NT)

Teelings Recycling Centre (North Coast and Northern NSW)

RECYCLING

PLASTIC PIPING

SUPPORTS

STEEL POSTS

Recycled products include steel supports, plastic household 'wheelie' bins, piping, roadside reflectors, street signs and vineyard posts.

Approved ***drum****MUSTER* processors either bail, chip or granulate the material from the compounds.

Volumes processed by recyclers: all material collected in compounds except for non-returnables

Farmer Market Research

- High brand awareness
- Positive attitude, image of farming
- Rinsing a concern but not an impediment
- In low drum return areas barriers are:
  - inconvenience of venue and time
  - lack of notification eg flyers, local paper

The Partnership Works

- Multi-stakeholder commitment – IWRA
- Extended Producer Responsibility
- Reduction of Waste at Source
- Elimination of potentially hazardous waste
- All plastic material recovered is recycled
- Availability of recyclate is creating demand
- Sound and sustainable funding mechanism

Aesop on Australian Agriculture

Bruce Gardiner [9]

Introduction

Agriculture in Australia is 1% agri and 99% culture. The decision-making processes of farmers and the advice delivered by experts are predicated on myths and fables. The most prominent of these are that:

Australian farmers are the most efficient farmers in the world.

- Australian farmers are leaving their land in better condition than it was when they took it over.
- Increasing production increases profit.
- A low dollar is good for Australia's international trading performance.
- Subsidies in the USA and Europe are bad for Australian farmers.
- Rainfall is the most limiting factor to our agricultural production.

These messages are reinforced on a daily basis. The imputation is clear – Australian farmers are doing all they can but are continuously frustrated by factors beyond their control.

There is no objective data to support any of the above premises. This paper will dismantle the myths and fables that are preventing agriculture in Australia from becoming sustainable, environmentally and economically. Individual farmers hold the key to their own success. Data will be presented to identify the real winners and losers from current agricultural policy. Economic and scientific logic will be used to present an alternative policy direction that revitalises regional Australia while addressing environmental degradation on farmland.

The above myths provide the basis for our political pursuit of free trade and the drive to adopt technologies that improve the productive capacity of agriculture. If they are not true, then free trade, floating exchange rates, production focused research and development and National Competition Policy make less sense and a whole range of alternative options for national economic management become possible.

Mythology also provides the basis for the current debate in NSW about the effects of the Native Vegetation Conservation Act and water reforms. If we have the most efficient farmers in the world and, if increased production leads to increased income and profit then the only options that improve the lot of farmers are additional land clearing and/or irrigation. If there is scope for efficiency gains and increasing production doesn't improve the lot of farmers, we suddenly have more options available for managing natural resources.

These myths provide comforting scapegoats for our own poor economic management. At a national level, we can adopt the moral high ground about trade distortion. Our farmers are the victims of the restrictive trade policies of other governments. It is something that is beyond our control and can be used to explain policy failure in related areas.

For farmers and agri-politicians, draconian legislation that impinges on the "right to farm" is a convenient excuse for not delving too deeply into the management capabilities of farmers. "We're not making money because the government won't let us." The best efforts of Australian farmers are supposedly being thwarted, at every turn, by factors beyond their control.

The key to the long-term viability and sustainability of Australian farms can be found within Australian farms. All it requires is an understanding of the economic principles of diminishing marginal returns and maximising economic profit. These tenets are apparently poorly understood at all levels that provide information and advice to farmers.

Australian farmers and their advisers must develop robust management systems based on objective data rather than those based on the current plethora of myths, fables and unsubstantiated assumptions.

[9] Bruce Gardiner, Natural Resource Management Consultant, East Oaks, Uralla, NSW 2358

Theory and Philosophy

For more than 50 years, academics, bureaucrats and politicians have spoken of the cost-price squeeze or declining terms of trade to farmers as though it is an immutable law of nature or riven in stone and handed to Moses.

The cost-price squeeze is not the cause of anything. It is a symptom of a dysfunctional management system that fails to recognise the relationships between demand and supply in input and output markets.

Terms of trade simply measures the increasing, long-term disparity between the relative prices of inputs and outputs. Over the past 40 years, input price increases have kept pace with inflation while real output prices have declined by two thirds (terms of trade has declined by two thirds). This is caused by some combination of demand and supply conditions in input and output markets that leads to agricultural commodity price falls.

The real cause of financial hardship for Australian farmers is supply outstripping demand in output markets. Real prices are negatively correlated to the level of production. This is the nature of demand curves

Given this fact, the belief that productivity gains have kept farmers viable in the face of declining terms of trade also collapses. Technological advances and increasing productivity have led to supply outstripping demand, leading to lower real commodity prices and causing the cost-price squeeze.

The fact that productivity gains have not kept farmers viable is proven by the loss of 100 000 broad-acre farmers from the industry over the past 30 years (ABARE, Australian Commodity Statistics).

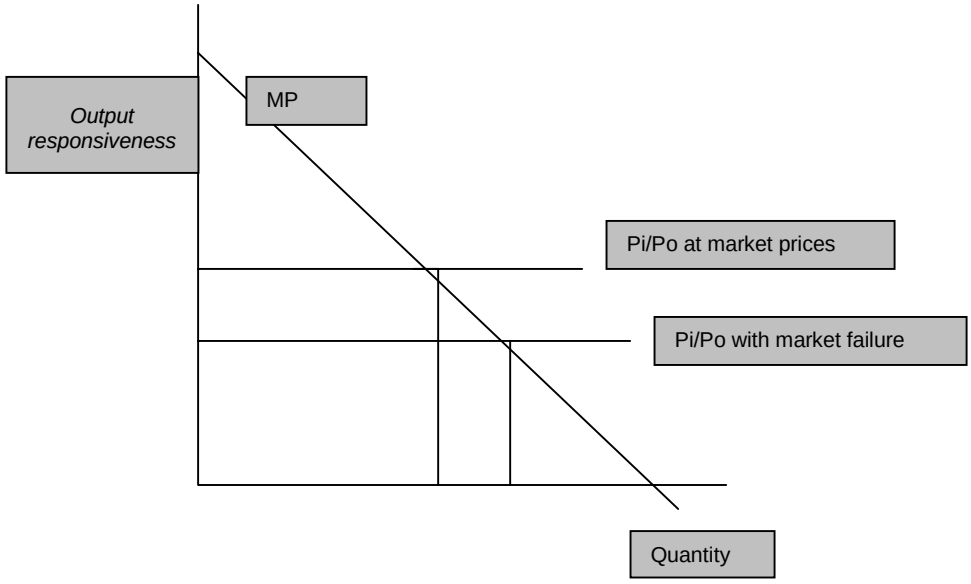
The reality is that four factors have kept farmers "viable" in the face of declining terms of trade. They are:

- Degrading the natural resource base.
- Devaluing labour inputs into the farm business or working off-farm.
- Depreciating capital and infrastructure and
- Increasing real debt.

The first three are classic cases of market failure but, because they lower the perceived cost of production, lead to over-production. Optimal economic output occurs at a point where marginal product (MP) equals the ratio of the price of inputs (Pi) to the price of output (Po) ie MP = Pi/Po.

Figure 1 shows that, if Pi is lower than reality because of market failure, optimal production occurs at a point with a lower MP or at a higher level of production.

Figure 1 Relationship Between Pi/Po and Production With and Without Market Failure.



At a national economy level, we are doing exactly the same thing. We are depleting our natural resource base, devaluing society, depreciating and gutting national infrastructure and increasing both national and international debt.

The last six years of growth in the Australian economy has come on the back of these. How sustainable is that?

The concept of economic profit provides the theoretical base for determining the performance of agriculture, both at the national industry and individual farm levels. Economic profit is maximised (or loss minimised) when marginal revenue (MR) equals marginal cost (MC).

Surrogate values for MR and MC, at an aggregate Australian agriculture level, can be calculated by comparing real time series data for the gross value of agricultural production (TR) and total cost of production (TC).

$MR_t = TR_t - TR_{t-1}$

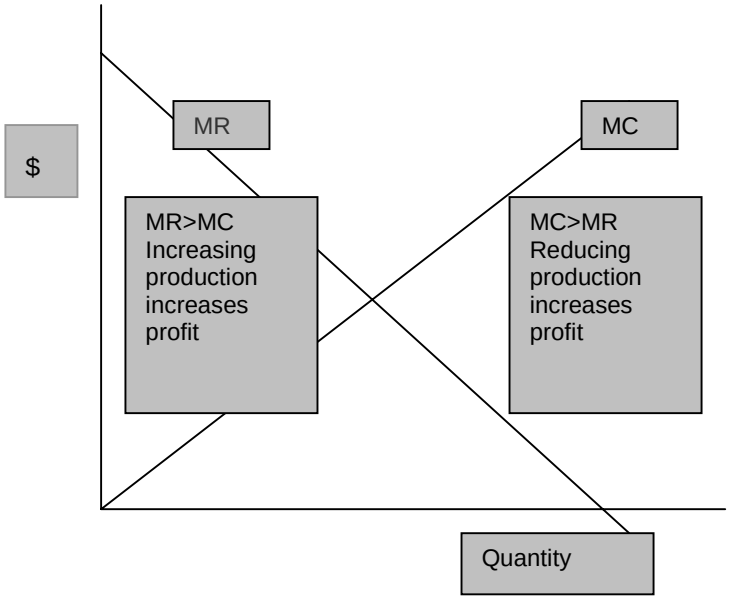
Where TR_t is real gross value of agricultural production in the current year,

TR_{t-1} is real gross value of agricultural production in the previous year and

MR_t is current real marginal revenue from all management change between the two time periods.

Similarly, $MC_t = TC_t - TC_{t-1}$.

Figure 2 Relationship Between Level of Production and Profit



If MR is greater than MC then more profit can be made by increasing production. Conversely, if MC is greater than MR, it is more profitable to reduce production. The same analysis can be applied at the individual property level.

The results provide unambiguous information about the required direction of production change. It is important to note that income is maximised when MR is zero. Profit and income are only maximised at the same time if MC is zero.

As MC is always greater than zero, profit is always maximised before income. Similarly, production maximisation is only optimal when the price of all inputs is zero.

Study of aggregate data is instructive in that it is the sum of all those individual decisions that constitute Australian agriculture. Trends in aggregate data are likely to reflect trends in individual performance. It is not possible for agriculture as a whole to be declining while all individual farmers are experiencing improved conditions.

On the other hand, the fact that a number of farmers are experiencing increased profitability does not automatically mean that the agricultural industry is experiencing increased profitability.

Fitting trend lines to time series data of TR and TC is also instructive. If TC is rising faster than TR, MC will be greater than MR and profitability can be increased by reducing production. Profitability is seen as the most appropriate measure of farm performance because it is profit that funds natural resource enhancement on the farm and the diversity of goods and services in rural communities.

Currency value and farm profitability

Monetary theory suggests that, with floating exchange rates, the value of currencies will fluctuate until trade equilibrium is achieved. This is the case in the absence of market distortions that lead to comparative advantage where it otherwise would not exist.

Different countries have different environmental, waste disposal and labour market regulations that give them a competitive edge. Globalisation and free world trade tends to drive everyone towards the lowest common denominator. Countries like Australia will continue to be disadvantaged because of our small local market and barriers to cross-border flows of labour and capital.

If a low value of the $Au encourages exports and discourages imports, then a long term decline in the value of our dollar should lead to an improving balance of trade. For Australian farmers, the lower value of the dollar should make it easier to sell our products in the world market.

The National Farmers Federation has estimated that each one cent fall in the value of our currency is worth $150 million to Australian farmers. If this is true, real farm income and profitability should increase as the value of the dollar falls.

Efficiency of Australian farmers

Australian farmers are “the most efficient in the world” in terms of labour efficiency. On average, our farmers produce more than other farmers around the world. The real issue is whether this has any meaning. If labour is the only non-constant variable or the most limiting factor of production, labour efficiency is a meaningful measure of performance. If other factors, such as average farm size, also vary then labour efficiency is a pointless concept.

This is also the case when labour is not the most limiting factor of production. As an example, our steel industry is the most labour efficient in the world but our steel prices are not competitive. Looking at efficiency in this simplistic way may lead to missed opportunities for Australian farmers.

Australia has the most erratic rainfall on Earth. Yet, despite assertions to the contrary, rainfall is not the most limiting factor of production in Australian agriculture. If it were, most of the rain that falls would end up as an agricultural product. Based on water use efficiency (WUE) calculations from 500 farms, we convert between 5% and 30% of our rainfall into products.

The rest runs off, deep drains, evaporates or is pumped through inefficient plants not suited to our environment. The evidence of poor water use efficiency shows up as erosion, salinity, acidification and low groundcover. So, even if we are “the most efficient farmers in the world”, we still have plenty of scope for improvement. When our existing water use efficiency is so low and the environmental consequences of that are so devastating, why do we want to clear more land to manage it that badly?

Production, income and profit

Finally, at the macro-level, the relationship between price elasticity of demand and MR tends to be ignored. If the demand for a product is price elastic, MR will be positive and increased production will lead to increased income. If the demand for a product is price inelastic, MR will be negative and income can be increased by reducing production. If the demand for a product has unit price elasticity, MR is zero and income is maximised. As stated earlier, profit is maximised when MR = MC. Because MC is always positive, profit can only be maximised if the demand for the product is price elastic.

One of the common threads running through the literature concerning the malaise in agriculture in developed countries is the notion of price inelasticity of demand for farm output. This has remained unchallenged for at least fifty years.

Why, then, does policy, advice, extension and research and development in agriculture focus so strongly on increasing production. It is my belief that there are other factors to do with maximising economic growth which conspire to make profitable, sustainable agriculture an outcome that is neither in the national nor global interest. However, that is the basis for another paper.

Methodology

The chosen methodology is not complex and relies on visual impact. The most important features of the data being analysed are the direction and magnitude of trends.

ABARE publishes indices of volume of agricultural production, prices received and paid by farmers and the real net value of agricultural production (an approximation of real farm profitability). These are plotted against time and trend lines fitted to determine their relationships (See Figure 3). ABARE makes no attempt to value environmental degradation related to farm management practices or the real depreciation of capital and infrastructure. Labour is included at about half its realistic value for the number of hours worked. Hence, the real net value of agricultural production is the upper limit of farm profitability.

Data series for the gross value and total cost of agricultural production have been adjusted by the CPI to give series in 1998-99 dollars. The two series are plotted and a linear trend line fitted (See Figure 4). Simple algebra is then used to calculate MR and MC for Australian agriculture in aggregate. If MC is greater than MR, Australian agriculture will be better off reducing production.

The balance of trade on goods and services has been converted to real 1998-99 dollars. This series is compared with the index of the trade weighted value of the $Au to demonstrate the relationship between our trade performance and the value of our dollar (See Figure 5). If a low Australian dollar is good for our trade performance, then our balance of trade deficit should fall as the $Au falls or we should achieve more balance of trade surpluses.

Data from more than 500 farms spread across northern NSW have been analysed to determine water use efficiency (WUE) in both cropping, grazing and mixed farming situations. If rainfall is the most limiting factor of production, then the proportion of rainfall utilised for production should approach its maximum of about 75%. If it is significantly less than this, other factors are more limiting

Results

The available data shows that, since 1960, the volume of agricultural production has almost tripled, rising from 37in 1960-61 to 109.2 in 1999-00. There has also been a major shift in the enterprise base of Australian farms, the total crops index rising from 25.7 to 112.5 and livestock slaughterings from 32.6 to 104.6.

Over the same period, real prices received by farmers have fallen by almost the same amount, from 222.9 in 1960-61 to 94.2 in 1999-00. As a result, Figure 4 shows that the trend real gross value of agricultural production has risen by about $1.5 billion (6%) over the 40 year period. This gives a MR of $1.5 billion from all the management decisions and increases in production over a 40 year period or $37.5 million per year.

Prices paid by farmers for inputs have kept pace with inflation, rising from 100 in 1960-61 to 103.3 in 1999-00. Production increases have required increased volumes of inputs. Figure 4 shows that the trend real total cost of production has risen by $9 billion during the 40 year period or by $225 million per year. The extra cost (MC) of tripling production has been $9 billion. Profit maximisation requires MR to equal MC.

Economic theory (and logic) unambiguously demonstrates that profitability can be increased by reducing production if MC is greater than MR. From the above data, MR = $1.5 billion and MC = $9 billion. Therefore, increasing agricultural production in Australia will not increase farm profitability. There is also some evidence that the real gross value of agricultural production peaked between 1974 and 1980. Since 1980, the volume of production has doubled for no trend increase in the real gross value of production.

Reflecting the relevant changes in MR and MC, Figure 3 shows that the trend real net value of production has fallen by $7.8 billion, from $12.1 average for the fist 5 years of the 1960's to $4.3 billion in the last 5 years of the 1990's. Over the 40 years of this analysis, uneconomic production increases have cost farmers (and rural communities) $156 billion in cumulative profit (area of a triangle with a base of 40 years and height of $7.8 billion). Given a multiplier of 2.6, this translates into a cumulative net loss to regional Australia of $405.6 billion. Maybe this explains why businesses and services are leaving the bush!

The real trend value of Australian agricultural exports has been between $25 billion and $30 billion. This gives a distorted view of the importance of international trade to our farmers.

More than half of this is costs and value-adding between farm gate and port. Although we export about 70% of farm production by volume, this only accounts for 35%-40% of production by value at farm gate (Powell, 1999). Conversely, about 60% of inputs by value at farm gate are imported. This analysis would tend to confirm that farmers lose from a devaluing currency.

There is some interesting additional information in our aggregate trade statistics. As a nation, we have had a trade surplus in 9 of the past 42 years. We have only managed 1 current account surplus. Of the 9 trade surpluses, 4 occurred in the 1970s when the $Au was historically high (trade weighted index of about 100). Our only current account surplus was in 1972-73 when the trade weighted index was 104 (See Figure 5).

In real term, Australia has accumulated a $100 billion trade deficit over the past 40 years. About half of this occurred in the 1990s when our dollar was at its lowest value in 40 years. Conversely, during the decade of the 1970s, when the dollar was at its highest value for 40 years, our trade deficit grew by just $5 billion. Australia is a net importing nation. Given this, we will always be better off with a high exchange rate.

The debate about subsidies in Europe and the USA generates plenty of heat but not much light. Over the past 40 years, subsidies to overseas farmer have been gradually reduced.

During the 1960s and 1970s, Australian farmers operated profitably in a world that was more corrupted than today. It is highly unlikely that Australia will change the approach of Europe or the US to their farmers. We need to develop farm management strategies that allow us to prosper in a world of market distortion.

Australia subsidises its farmers as much as the US. We just use a different mechanism. About 70% of farm household expenditure in Australia and the US comes from off-farm sources. In the US it is direct government support. In Australia it is off-farm work. Every job that supports a farm is an addition to unemployment. The government picks up the tab through unemployment benefits.

Production data from over 500 farms has been analysed to determine the proportion of total rainfall converted into agricultural products. Water use efficiency (WUE) is measured as kilograms of product per mm of water per hectare (kg/mm/ha). Total mm of rainfall required for total farm production can be calculated using this methodology.

For the properties analysed, 21% of total rainfall was used for production. The balance ran off, deep drained or evaporated. About 51% of total rainfall was lost to evaporation. This has implications for environmental management as evaporation is an important causal factor in dryland salinity.

This proves that there are other factors of production that are more important than rainfall in limiting farm output. The most important of these are low groundcover, wind run, lack of litter and poor soil structure. The importance of all of these has been recognised for decades. The fact that they are not being adequately addressed implies either poor extension or a lack of appropriate management skills.

Low groundcover is also the main reason for average soil loss across Australia being at least 10 times greater than soil formation (The State of the Environment Report shows that average soil loss approaches 5 tonnes per hectare compared with average soil formation rates of 300 kgs per hectare).

The majority of land degradation happens in extreme events. The most common extreme event in Australia is drought broken by flooding rain. The real measure of the sustainability of agriculture is groundcover at the end of droughts.

Conclusion

Australian farmers have been lucky. Between 1788 and 1980 they only had to decide how to increase production. For almost two centuries, the decision to increase production was the right one. Unfortunately, this has led to a culture in farming that respects operational skills and hard, physical work at the expense of financial and environmental management skills.

In the absence of hard data, assumptions have replaced fact in the decision making process. This is true at policy, research, advisory and educatory levels, as well as on farms. Common usage has elevated mythology to the level of immutable fact. Tired clichés substitute for real evidence in debates about policy direction and the need for dramatic land management change.

We may be the most labour efficient farmers in the world but, in terms of using our existing rainfall, there is plenty of scope for improvement. By lifting WUE to what is possible under field conditions, we could achieve the same levels of production from 60% of existing farmed area. Why, then, are restrictions to land clearing seen as such a bad thing by many farmers?

Farmers are certainly not leaving their land in better condition than when they took it over. The State of the Environment report (2001) clearly shows that average soil loss across the major farming areas exceeds soil formation rates by a factor of ten and the areas affected by or at risk of salinisation continues to increase. Remnant woody vegetation across millions of hectares shows signs of terminal ill-health with serious consequences for future environmental management.

The continuous, long term negative relationship between production and farm profitability indicates that a serious re-think of agricultural policy objectives is required. This should also take most of the sting out of the vegetation and bio-diversity conservation and water reform debates. The data presented clearly show that farmers will profit from reducing production. Continuing to spend $8 to make $1 has only one outcome and that has nothing to do with long term viability and sustainability.

Similarly, the declining value of the dollar is only likely to put *additional* pressure on farmers to survive, decreasing levels of farm support overseas have *not* made Australian farmers more profitable and rainfall is *not* the most limiting factor of production for our farmers.

The declining profitability of Australian farms is the conscious decision of our farmers. Understanding the principles of MR and MC gives farmers a mechanism to determine the appropriate level of production for their farm business. This is independent of external factors. It provides hard data for making decisions.

Those involved with agriculture, at all levels, in Australia need to spend more time studying the facts and less time listening to the myths and fables that have become entrenched in our farming culture. Maybe then we can make the rational decisions that will see agriculture prosper in the future. Aesop RIP.

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Figure 3 Indices of Volume and Real Net Value of Agricultural Production

Data Source: ABARE, Australian commodity statistics, 2001

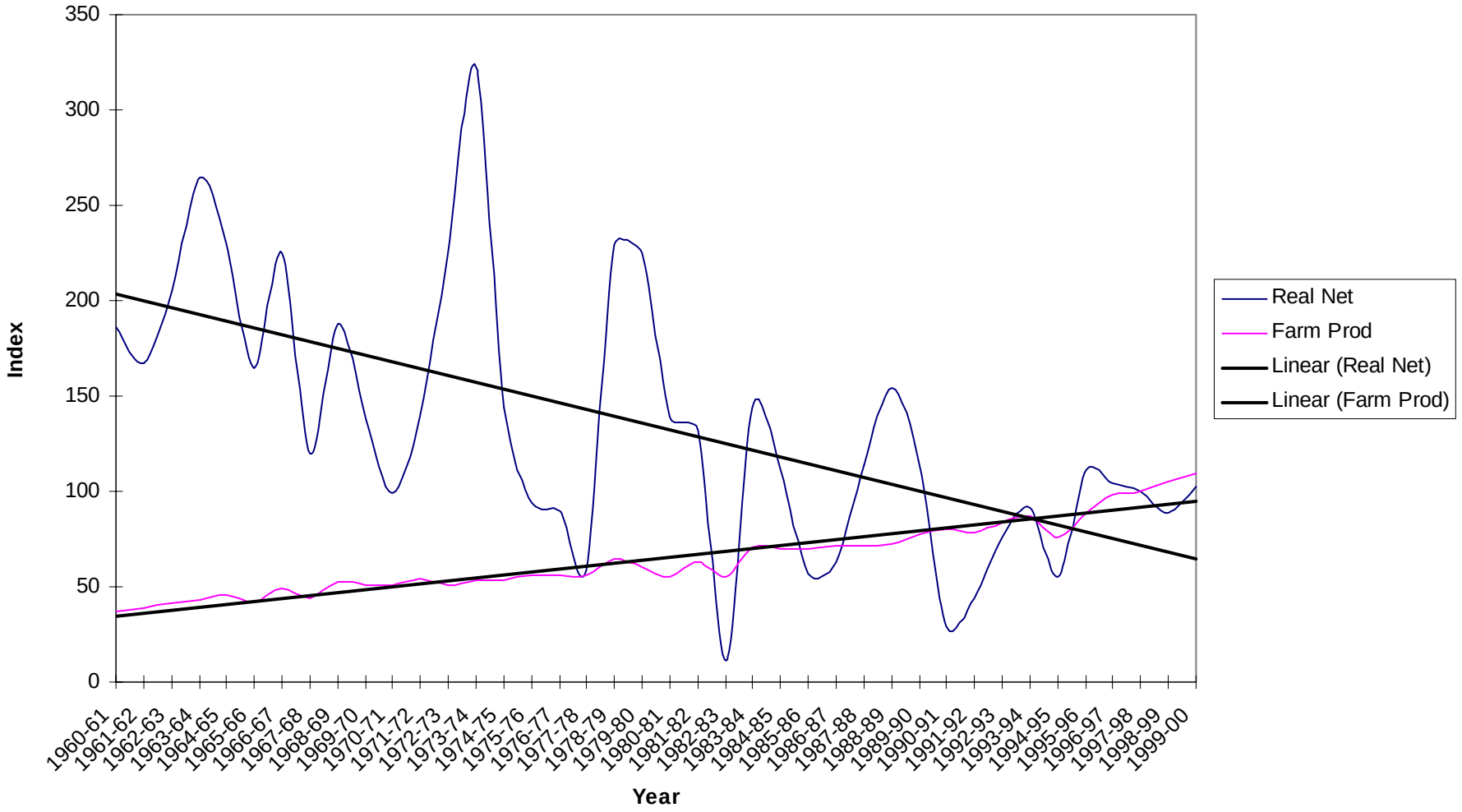


Figure 4 Trends in Real Gross Value and Cost of Agricultural Production

Data Source: ABARE Australian commodity ststistics, 2001

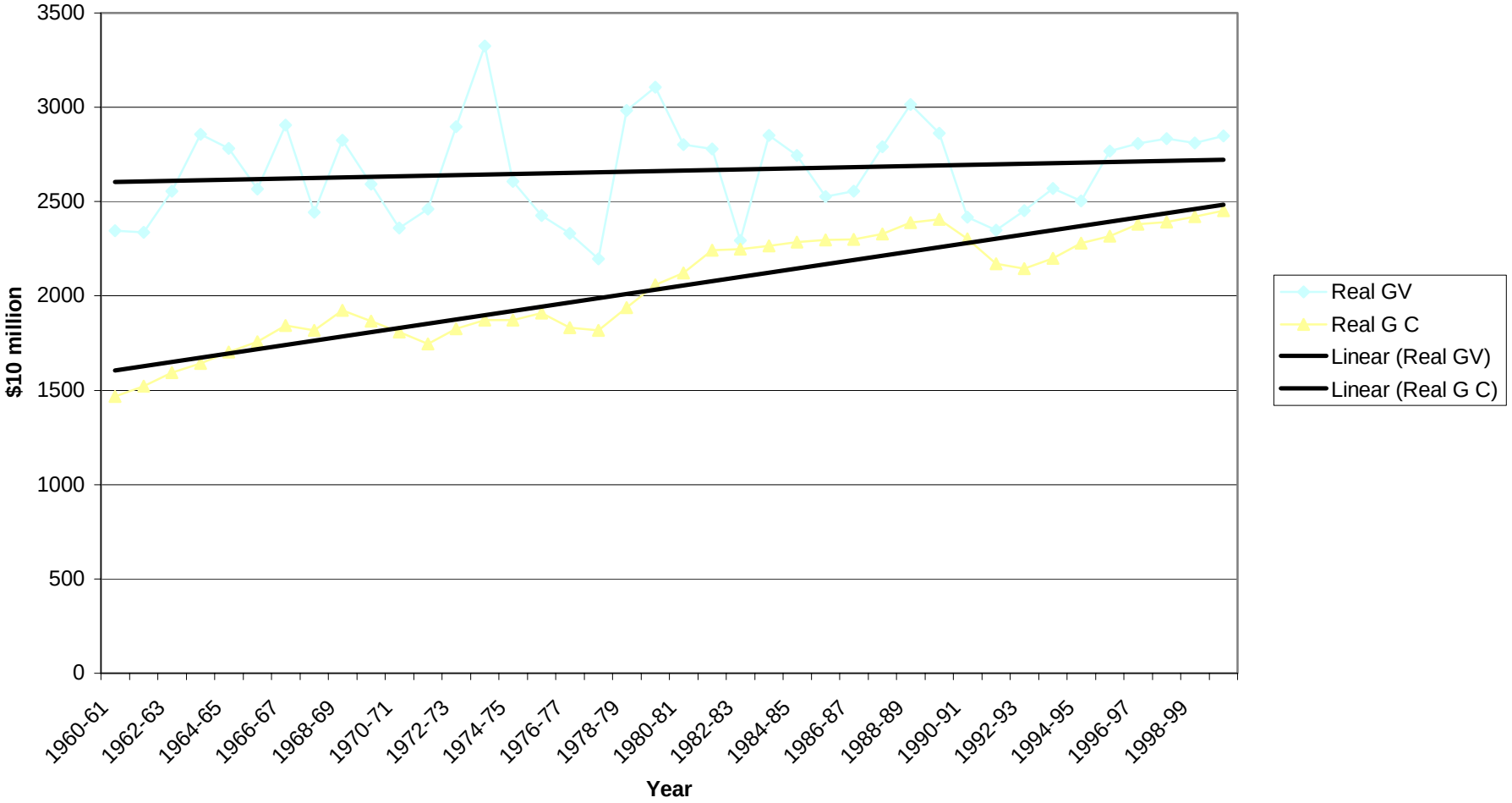
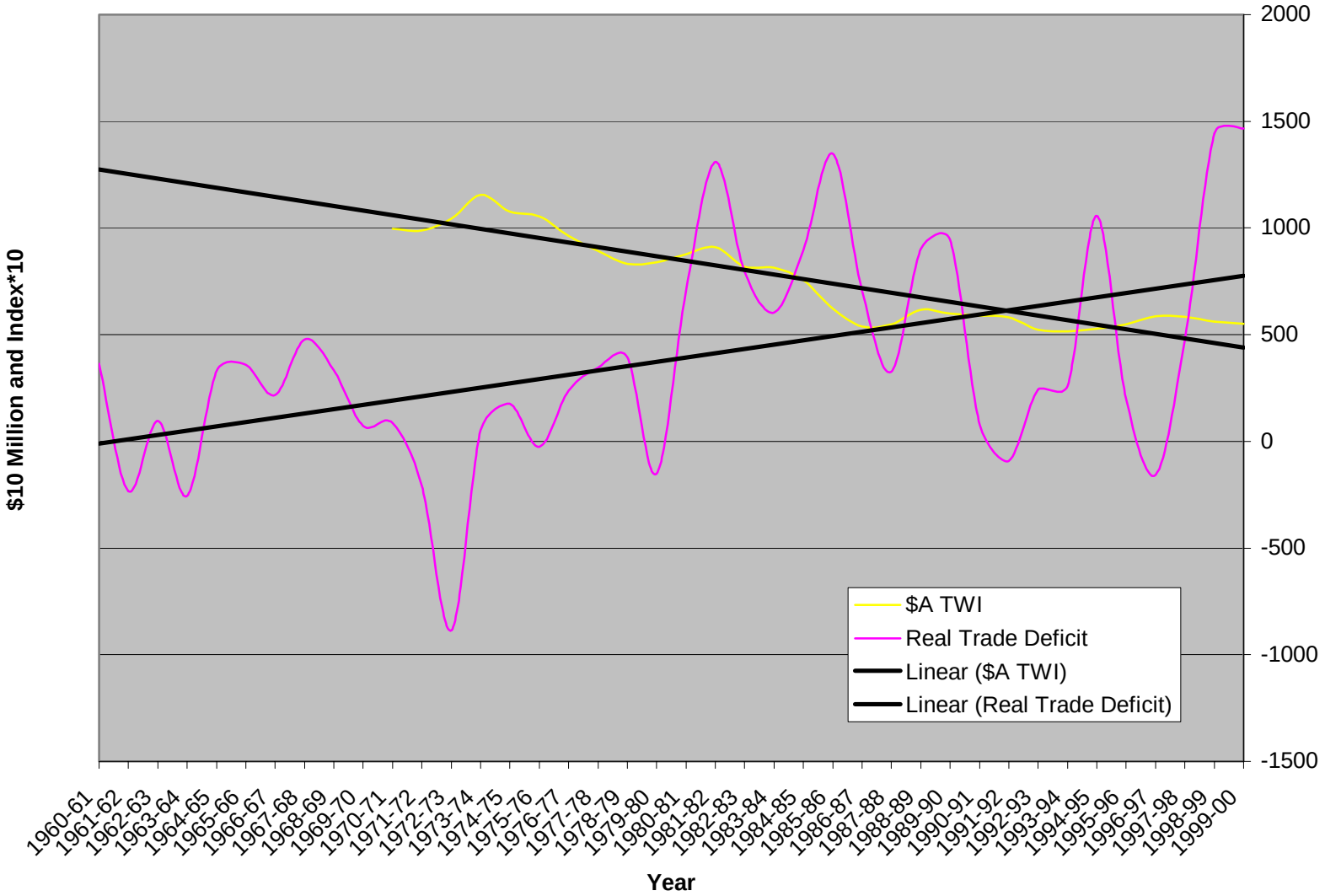


Figure 5 Relationship Between Real Trade Deficit and Trade Weighted Index $Au

Data Source: ABARE, Australian commodity statistics, 2001



GM Herbicide Tolerant Canola - Benefits in an Australian Rotational Cropping System
A Summary of Australian Roundup Ready® Canola Trials (1999 – 2001)

Sam Grieve
Commercial Manager, Canola Business, Monsanto Australia Ltd.

Introduction

Since 1996, Monsanto Australia has been developing Roundup Ready Canola in preparation for its introduction into the Australian canola market. In collaboration with its industry partners, this has involved 105 Roundup Ready Canola trials being established across Australia's canola growing regions. The focus of the Research and Development program for Roundup Ready Canola has been:

- Determination of the agronomic, economic and environmental benefits of Roundup Ready Canola technology to Australian canola growers.
- Development and breeding of Roundup Ready Canola varieties adapted to the Australian agricultural environment.
- Assessing the integration of the Roundup Ready Canola technology and production system into current farming practices.
- The development of Crop Management Plans and Resistance Management strategies for the sustainable adoption of Roundup Ready Canola.
- Generation of feedback from canola growers, agronomists and grains industry representatives visiting the trials, in relation to identification of technology benefits and the key issues related to the introduction of Roundup Ready Canola.

Throughout all stages of planning and preparation, Monsanto has worked collaboratively with the appropriate Federal and State regulatory bodies and with representatives from the canola industry supply chain and farmer organizations.

Prior to the introduction of Roundup Ready Canola into the Australian canola market, Monsanto must address five key areas of responsibility that are under the auspices of the following organizations:

1. Public Safety / Health & the Environment – Office of the Gene Technology Regulator (OGTR)
2. Food Safety and Labeling – Food Standards Australia New Zealand (FSANZ)
3. Pesticide Use & Herbicide Resistance Management Strategy - National Registration Authority (NRA)
4. Crop Management Plan – Plant Industries Committee (PIC) under the Primary Industries Standing Committee (PISC)
5. Supply Chain Management – Gene Technology Grains Committee (GTGC)

Each area requires the preparation and submission of information and research data to address a range of issues pertinent to that area of responsibility. These submissions may be based on legislative requirements, industry best practice or industry guidelines. Completion of Monsanto's responses to these requirements is often undertaken in parallel as specific information is collated and submitted.

Roundup Ready Canola Technology

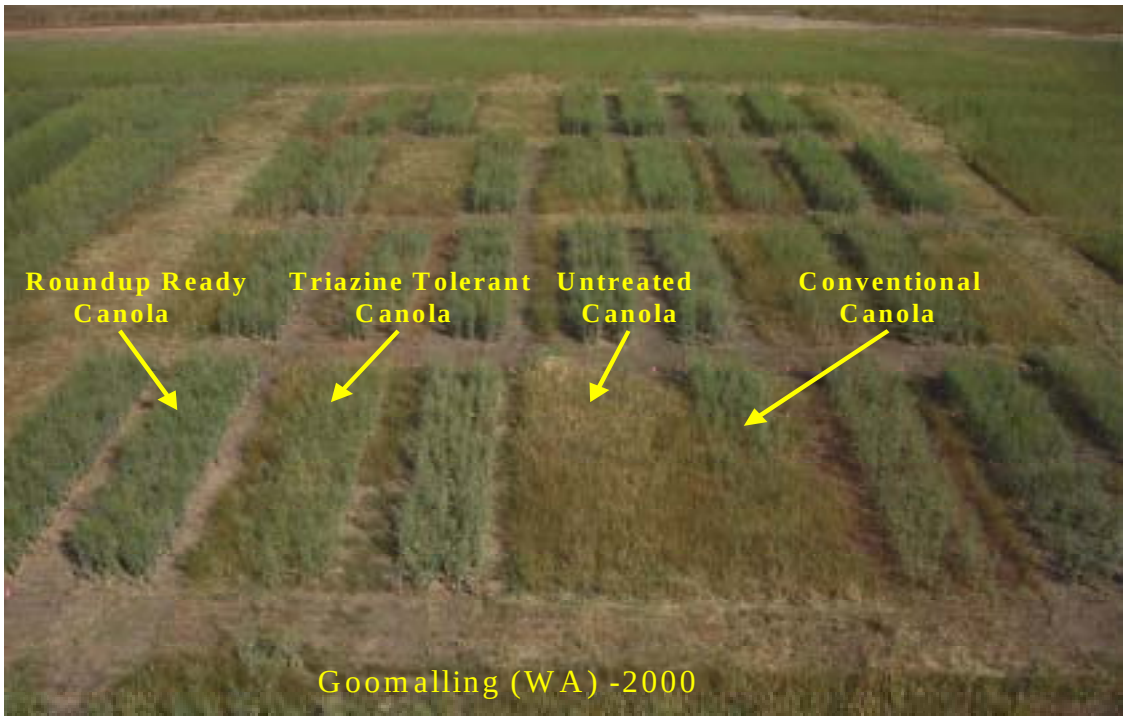
Roundup Ready Canola plants are like ordinary canola varieties in every way except one: a novel genetic trait has been identified and transferred into the canola planting seed that renders the emerged canola plant tolerant to in-crop, over-the-top glyphosate applications. This novel trait enables the canola plant to produce two enzymes, one of which protects it from the glyphosate and the other which degrades the glyphosate. This dual action allows the canola plant to function normally after being treated with glyphosate.

All canola varieties containing the Roundup Ready technology must undergo stringent testing across Australia before they can be commercially released. The testing is required to demonstrate that the application of the glyphosate as a post-emergent herbicide over-the-top of Roundup Ready Canola does not impact on the agronomic performance of the variety (i.e. yield potential, oil content and blackleg disease resistance).

Benefits Of Roundup Ready Canola to Australian Farmers

Research undertaken by Monsanto, together with six years of Canadian canola grower experience demonstrates that the Roundup Ready Canola technology has the potential to provide a range of economic, agronomic and environmental benefits to Australian farmers. The benefits of Roundup Ready canola technology for Australian canola growers, together with some of the key issues are summarized in the following pages.

1 - Agronomic Benefits



Roundup Ready Canola Provides Outstanding Weed Control.

Throughout southern Australia the most significant agronomic threat to crops is the competition by weeds for available soil moisture, soil nutrients and sunlight. Weed control in any cropping system requires serious planning particularly where the potential for herbicide resistant weeds could occur or if herbicide resistant weeds already exist. Therefore, in any cropping system an integrated weed management strategy that is based on delivering effective weed control is critical for long term sustainable cropping rotations.

Glyphosate, the active ingredient in Roundup Ready herbicide is translocated throughout the entire plant when applied; as a result, glyphosate has become widely applied in Australian broad acre cropping systems. Following 20 years of practical farmer application in Conservation Tillage, the rates for control of a range of annual and perennial, grass and broadleaf weeds have been well established by farmers.

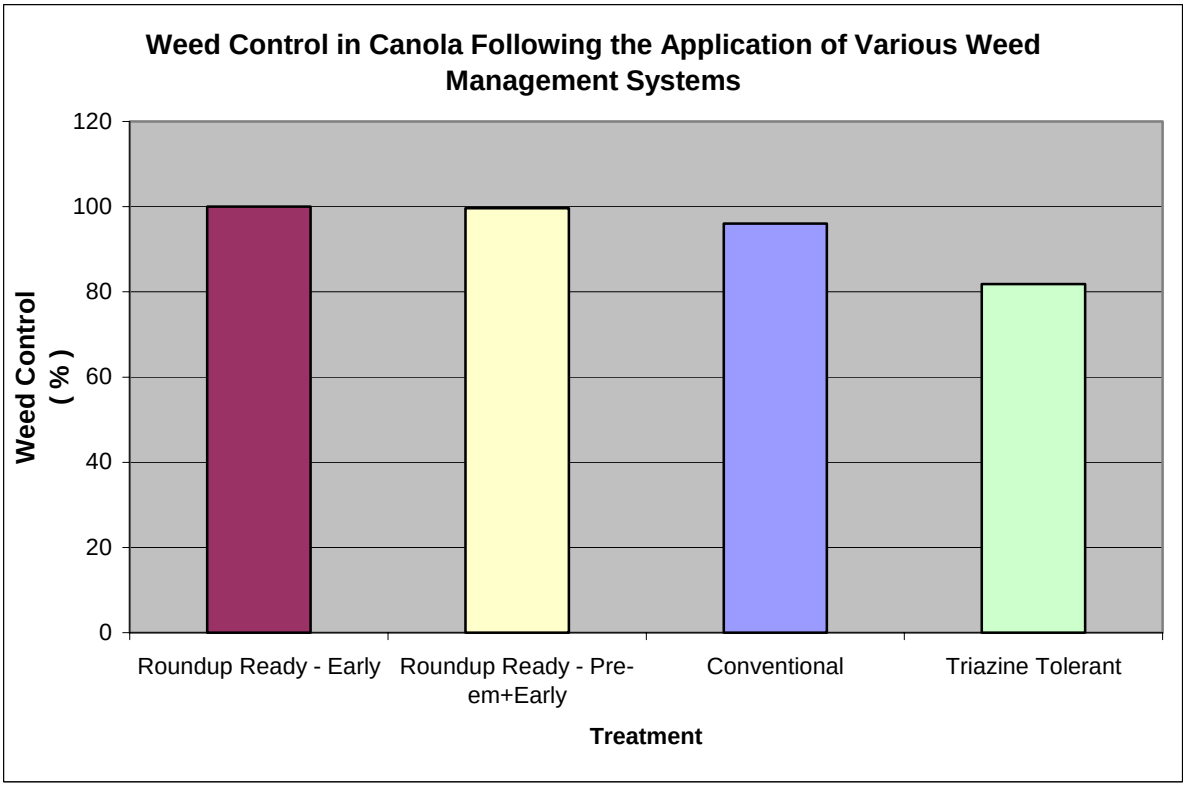
The introduction of the Roundup Ready canola crop production and weed management system allows farmers to apply glyphosate over the top of the canola plants to control emerging weeds within the crop.

During 1999, 2000 and 2001 a number of trials were established across Australia to investigate the effectiveness of the Roundup Ready canola crop production and weed management system. Comparisons were made with current canola weed management systems including Triazine Tolerant canola (TT) and conventional canola (CONV) throughout two years of a canola-wheat rotation.

The Roundup Ready canola system produced excellent weed control particularly in the presence of annual ryegrass populations showing herbicide resistance to current herbicide groups applied in the cereal and pulse phase of the crop rotation. Irrespective of the timing of application, the results were outstanding (Figure 1), either when applied:

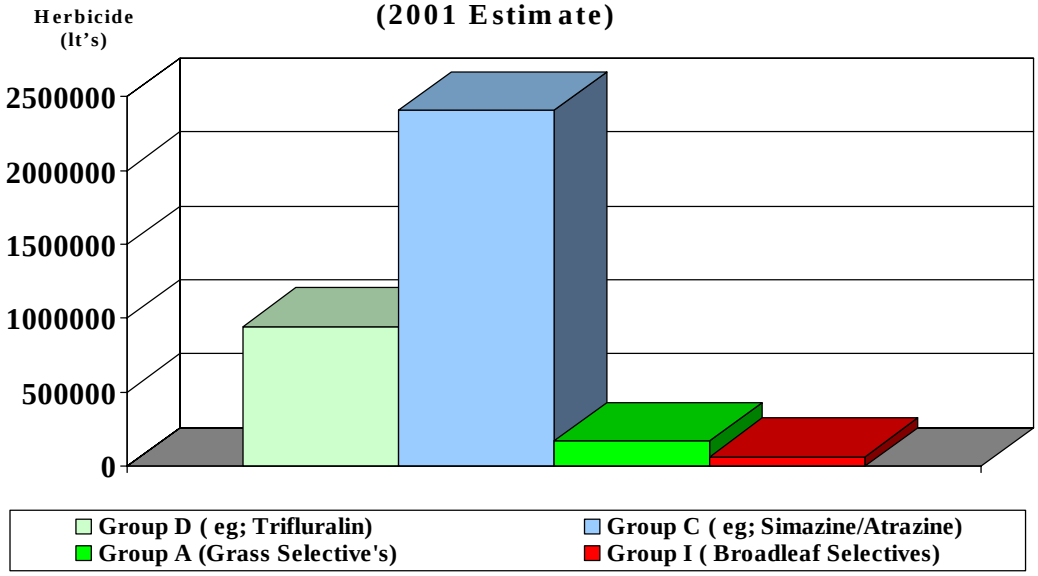
1. Alone at the 1-4 leaf stage of the Roundup Ready Canola crop - Early, or
2. Sequentially, following a Pre-emergent application of trifluralin, where herbicide resistant ryegrass was present in large populations – Pre-em+Early

Figure 1. Summary of Weed Control in Canola Comparing Various Weed Management Systems Trials (2000 Australian Trials)



The ability to control problem weeds in-crop, such as annual ryegrass and wild radish, with the broad spectrum herbicide glyphosate, will contribute positively to reducing the current reliance by farmers on the Group C's (eg: Triazine herbicides), Group D's (eg: Trifluralin) and Group A's (eg: Dim's & Fop's), which will result in extending the useful life of these herbicide groups in the cereal and pulse phases of the crop rotation.(Figure 2)

Figure 2. Weed Control Herbicide Groups Applied in Canola (2001 Estimate)

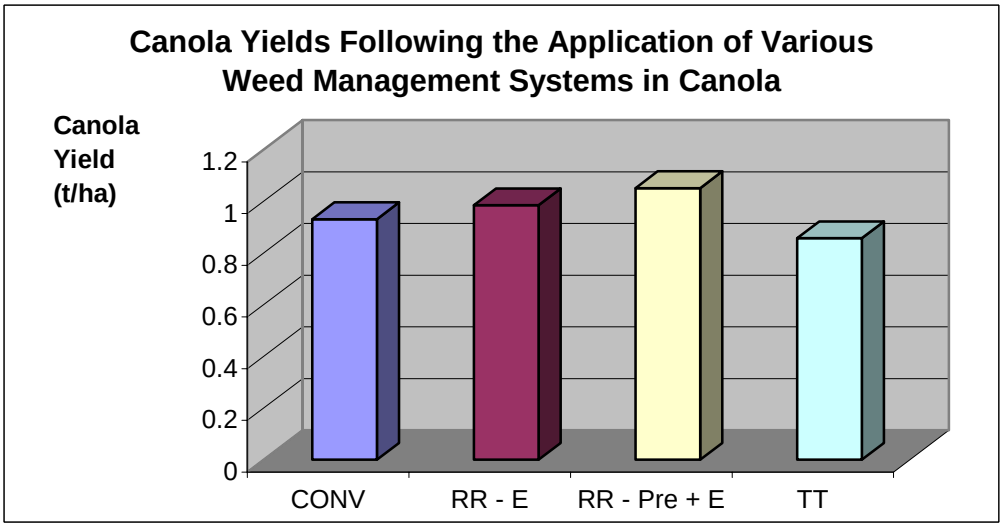


Roundup Ready Canola Improves Canola and Wheat Yields.

The effective weed control that resulted from the early application of glyphosate in Roundup Ready Canola led to the canola seedlings exhibiting strong early vigor, despite dry early season conditions in 2000. Ultimately, the Roundup Ready canola varieties outperformed (i.e. yield) both the conventional canola and triazine tolerant canola production systems (Figure 3).

The trial results from across Australia confirmed that where annual ryegrass dominated the in-crop weed spectrum, a pre-emergent application of trifluralin followed by the in-crop application of glyphosate herbicide further enhanced, not only the control of the annual ryegrass, but also the yield potential of the canola crop.

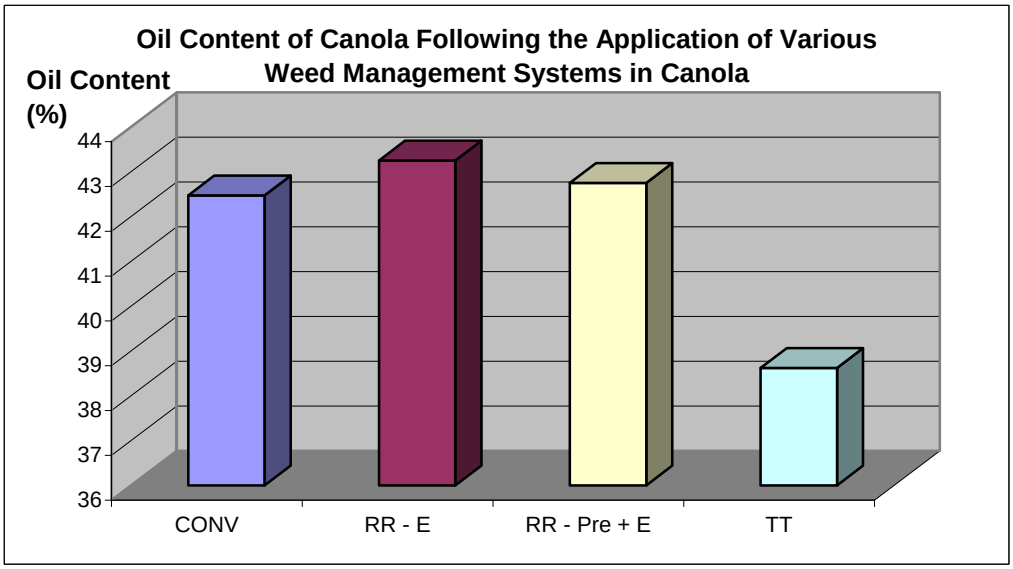
Figure 3. Summary of Canola Grain Yields Comparing Various Weed Management Systems in Canola (2000 Australian Trials)



In the crop rotation weed management systems trials undertaken, there was a consistent trend to higher oil percentage for the Roundup Ready canola treatments versus Triazine Tolerant canola (Figure 4). This result being a combination of:

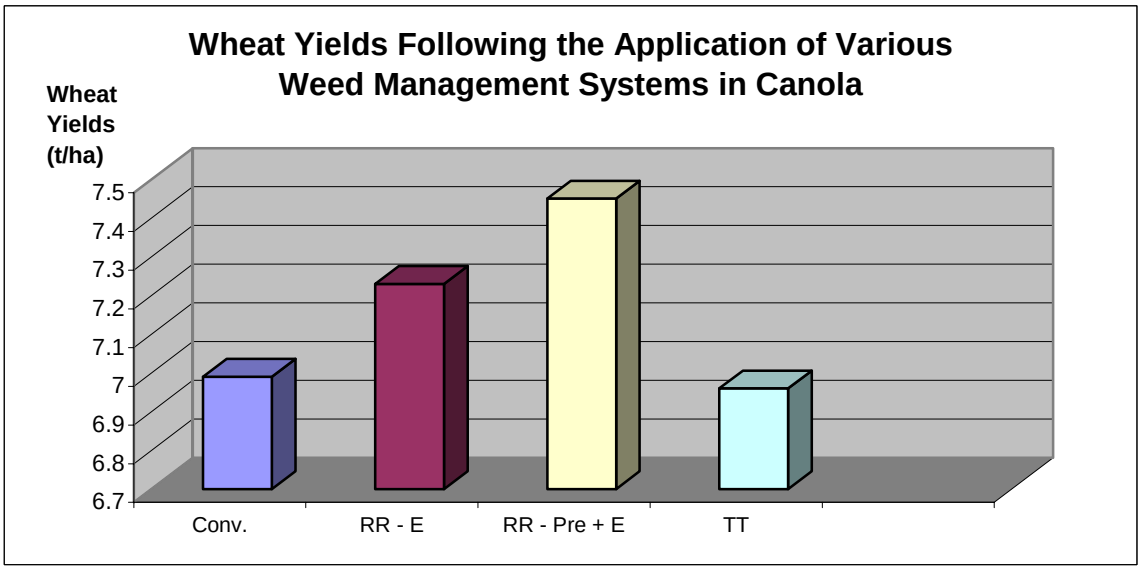
- An improved agronomic environment for the canola crops' early growth due to lower weed competition,
- The 'elite' varieties into which the Roundup Ready technology has been bred and introduced.

Figure 4. Summary of Oil Content from Canola Grain Comparing Various Weed Management Systems in Canola (Australian Trials 2000)



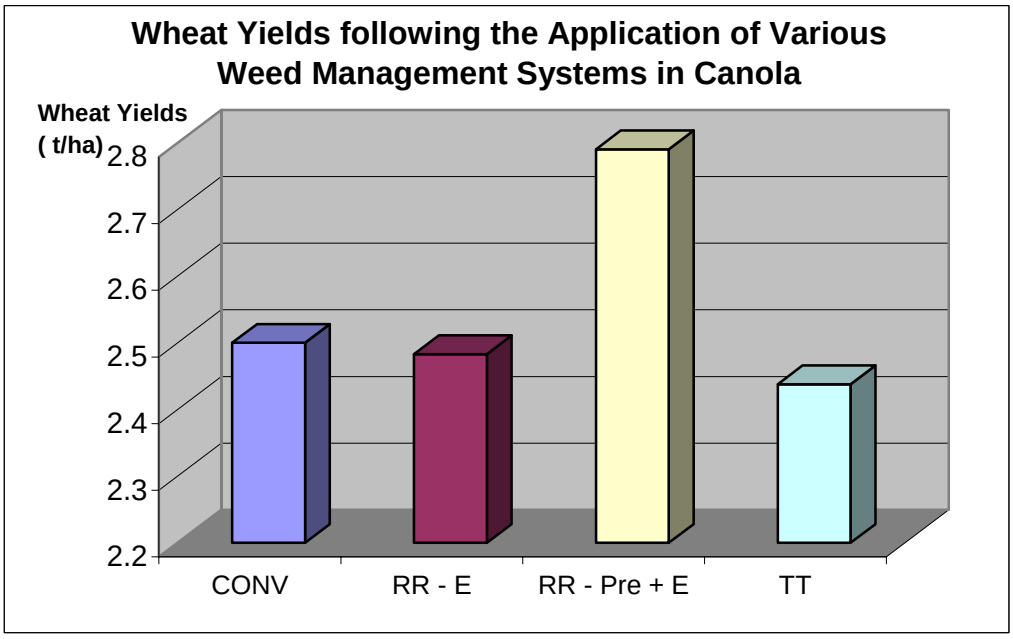
The impact on the following cereal crop in the rotation as a result of the various weed control management systems applied in the canola phase was investigated under high weed pressure populations in an intensive trial undertaken at Wagga Wagga (NSW) in 2000. The trial results indicated that canola yields and subsequent wheat yields trended higher under the Roundup Ready canola system (Figure 5).

Figure 5. Summary of Wheat Yields in the Year Following Various Weed Management Systems in Canola. (Wagga Wagga Trials 2000)



The value of applying glyphosate herbicide in-crop for effective weed control, particularly where annual ryegrass occurs, was further demonstrated when the 2000 canola trial sites were re-cropped with wheat in the 2001 season. The combination of Roundup Ready canola with a pre plant application of trifluralin together with an early in-crop glyphosate application in the year prior to planting wheat in the crop rotation, consistently improved wheat yields by greater than ten percent when compared to wheat yields from previous years' paddocks where either a conventional herbicide or a triazine herbicide weed control program had been applied (Figure 6).

Figure 6. Summary of Wheat Yields in the Year Following Various Weed Management Systems in Canola. (Australian Trials 2001)



2) Economic Benefits

Roundup Ready Canola and "The Bottom Line"

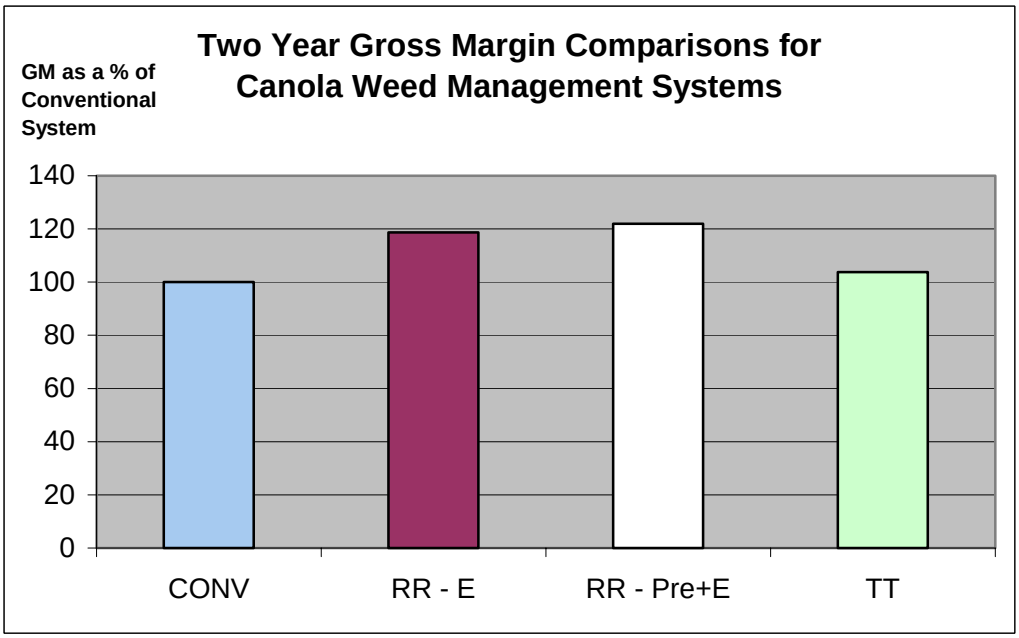
The successful long-term sustainable adoption of any management system for crop production is based on a combination of the agronomic, environmental and economic benefits delivered. Economic benefits are ultimately measurable by the effect on the bottom line profits for farmers.

In the farming systems trials undertaken, the data relating to the crop production (canola/wheat yields) and weed management (RR vs. Conv vs. TT) systems from the trials was analyzed and converted to a Gross Margin economic assessment. In establishing the Gross Margins for the comparative trials, notional values for the Roundup Ready Canola Technology were included in the analysis.

On average, all Roundup Ready canola weed management systems improved farmers' Gross Margin returns over a two year period (i.e. Canola – Wheat) when compared to either a conventional canola or a triazine tolerant canola weed management system.

The Gross Margin analysis provided does not include an allowance for oil content. If included, it is anticipated the Gross Margin for the Roundup Ready Canola treatments would reflect a further improvement versus both the conventional canola and triazine tolerant canola production systems (Figure 7).

Figure 7. Summary of Two Year Gross Margins Comparing Various Weed Management Systems in Canola. (Australia Trials 1999, 2000, 2001)



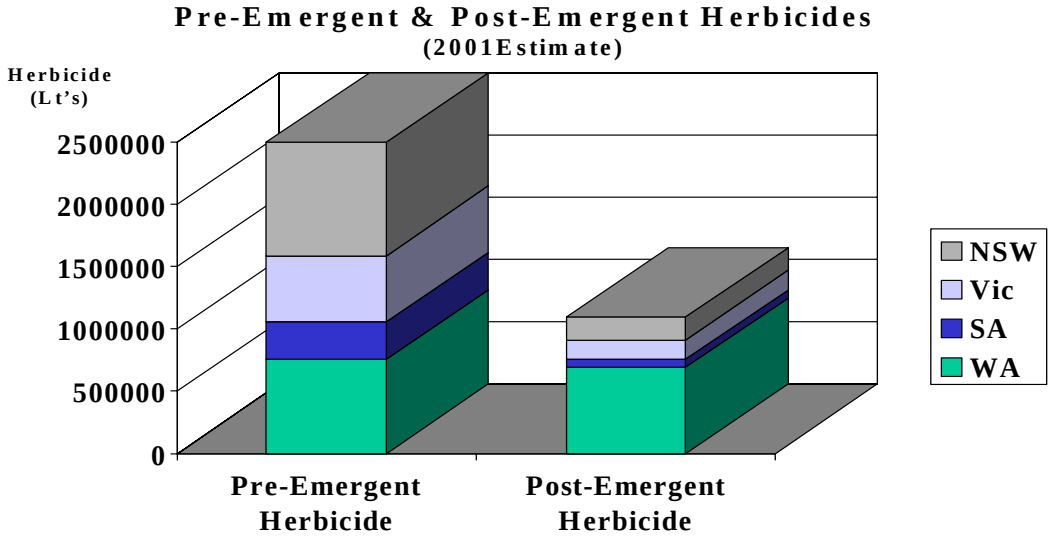
There was a trend for improved results with the earlier application of Roundup Ready herbicide either alone or in combination with a pre-emergent herbicide indicating early weed control retains moisture and removes critical competition.

3) Environmental Benefits

Roundup Ready Canola technology is a major component of current minimum tillage systems. The adoption of Roundup Ready Canola will lead to a reduction in soil cultivation for seedbed preparation and incorporation of soil residual herbicides, thus reducing the potential for soil erosion and lowering fuel inputs.

The strategic and planned use of environmentally friendly glyphosate, the active ingredient of Roundup Herbicide, will allow farmers to substitute a range of selective post-emergent herbicides and pre-emergent soil residual herbicides with a sustainable canola weed management system based around the Roundup Ready Canola technology. A significant proportion of the herbicides applied for pre-emergent or post-emergent control of weeds in current conventional and triazine tolerant canola weed management systems can be replaced by either a single application of glyphosate or the combination of glyphosate plus a co-herbicide (Figure 8).

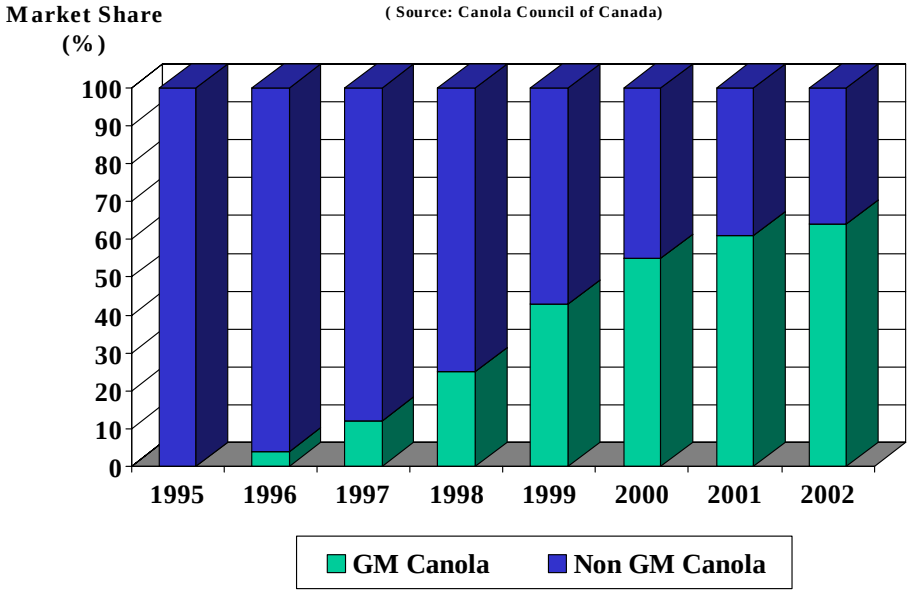
Figure 8. Weed Control Herbicide Use in Canola



Canadian Canola Industry Experience

GM Herbicide Tolerant canola was first introduced into the Canadian canola growing regions in 1996. Since that time there has been a steady increase in the adoption of GM canola production systems by Canadian canola farmers (Figure 9). By 2002, in excess of 30,000 Canadian canola farmers had grown Roundup Ready Canola as part of their canola production and weed management system.

Figure 9. GM Canola in Canada (1995 – 2002)
GM Canola vs Non- GM Canola
(Source: Canola Council of Canada)



In 2001, the Canola Council of Canada commissioned an independent study to assess the agronomic, environmental and economic impact of the introduction of GM canola into Canada's canola production system. In total, 650 farmers were interviewed with 13 of these farmers having their financial records between 1997 – 2000 applied to develop an economic model to assess the impact on overall gross margins for Canadian canola growers who had adopted GM canola production systems. A summary of the research results is presented in the following table:

Canadian GM Canola vs Non GM Canola Impact Study (1997 – 2000)
(Source: Canola Council of Canada)

Benefit	Evaluation Parameter
Herbicide Use	• 40 % reduction in herbicide costs • Reduction of 6,000 tonnes of herbicide applied in 2000
Reduced Cultivation	• Fewer cultivation passes, estimate of 50 % reduction • 1.05 Million hectares with fewer cultivation passes
Lower Fuel Use	• Reduction in total field operations, resulted in a reduction of 31.5 Million litres of fuel use in 2000 • Fuel Cost saving of $ 13.1 M ($Can) @ 42c/lt ($Can)
Improved Yield	•10 % increase in canola crop yield •1.5 % reduction in canola grain dockage
Improved Returns	• $14.36 / Ha ($Can) increase in net return (Yield x Price – Inputs, labour etc)

Roundup Ready Canola Commercial Evaluation Plans for 2003

In 2003, the commercial evaluation of Roundup Ready Canola in key canola growing regions in south-eastern Australia will be limited to between 3000 – 5000 hectares and will focus on:

- Demonstrating the compatibility of Roundup Ready Canola with current farming systems
- Demonstrating the management practices that will ensure sustainable use of the Roundup Ready Canola technology and glyphosate herbicides with current conservation tillage systems
- Demonstrating the environmental, agronomic and economic benefits that Roundup Ready Canola technology will offer Australian farmers
- Providing a practical platform for the delivery of information and education to stakeholders in GM canola (eg. farmers, advisors, consultants, supply chain)
- Providing a process for the introduction and adoption of the Gene Technology Grains Committee's (GTGC) Guidelines for Supply Chain Management of GM Canola as it applies to pre-farm, on-farm and post-farm gate management of GM canola seed and grain.

Summary

The1999, 2000 and 2001 Roundup Ready canola weed management and crop rotation systems trials undertaken across the Australian grain growing regions have consistently demonstrated superior performance versus current conventional canola and triazine tolerant canola production and weed management systems.

Results from these trials support the commercial experience of farmers in Canada where substantial savings on herbicides, fuel and time have resulted from the uptake of the technology. Most importantly Canadian canola farmers and the canola supply chain are clearly better off economically and have the resulting capacity to compete aggressively in supplying price sensitive global vegetable oil markets with canola.

Monsanto's proposed commercial evaluation of Roundup Ready Canola beginning in April 2003 will enable Australian farmers to assess the agronomic, environmental and economic benefits of the Roundup Ready Canola technology under Australian farming conditions.

The commercial evaluation will provide the opportunity to demonstrate the integrity of the Australian canola supply chain, whether it is delivering canola grain into a domestic or export market where there is a market specification for canola grain that has been produced either conventionally or through an enhanced biotechnology based production system.

Most importantly, the commercial evaluation of Roundup Ready canola in 2003 will give Australian farmers, for the very first time, commercial access to the same technology that has enabled their North American competitors to achieve superior performance. As with Australian cotton growers' rapid adoption of GM cotton over the past seven years, the introduction of Roundup Ready canola in 2003 gives Australian grain growers the opportunity to improve their profitability and to maintain their reputation at the forefront of world agriculture in an increasingly competitive global marketplace.