

# Impact of Global Trends in Chain Management on Grains R&D

REPORT SUMMARY PREPARED FOR GRAINS R&D CORPORATION

MAY 2001

## A Collaborative Effort in Chains

This report was commissioned by the Grains Research and Development Corporation (GRDC) to explore the implications of a changing environment for the Australian grains R&D program. It includes a brief literature review of chains, some case studies of chains in several industries, and a summary of the results of a survey amongst domestic and international industry representatives. A tentative R&D planning framework has been developed in association with officers of the GRDC.

### Through-Chain R&D Support

The levy-funded R&D model used by Australian agriculture has in the past proved very successful with funding focused on improving on-farm performance. With increased globalisation, agricultural production and business systems around the world are rapidly changing. Drivers of change include shifting customer expectations, a changing global regulatory environment within which agricultural trade operates, and increasing collaboration and rationalisation in global ventures or chains.

The Australian agricultural industry must become an active participant in the change process or risk missing market opportunities. Some R&D funding bodies already successfully support a through-chain approach. Results show that such collective funding very much benefits growers. Any activity which limits the effectiveness or efficiency of the chain's operation, and which reflects back onto the producers' profitability, should be viewed as a fair target for the R&D process.

### The Changing Environment

There is nothing new about chains in agriculture. The term simply refers to the sequence of events, which results in the production and delivery of a product to the consumer. In the most restricted sense, "supply chain management" really means "logistics management". In the agricultural context, this fails to recognise all of the



**Figure 1.** *With increased globalisation, agricultural production and business systems are changing rapidly.*

factors that contribute to the chain's competitiveness and success. The definition is here broader and includes, for example, the effectiveness of the genetic improvement program in delivering varieties that align with the chain's commercial objectives, or the way in which the regulatory framework supports or inhibits the chain.

What is new is the changing commercial, regulatory, consumer and information environment in which modern agricultural chains function, and the way that these changes have facilitated the development of large, borderless "global" chains. This has at the same time spawned smaller "niche" chains, based on limited production of high value products. The influences include:

- Increasing consumer power, chains responding to consumer demands for food quality, safety, variety, convenience, social and environmental responsibility. Producers and R&D providers are increasingly servants and not masters of the chains.
- The drive for chain efficiency, the fight to compete in a borderless international environment in which best value will win, regardless of geography or history.
- A changing regulatory environment, particularly concerning GM technology and food safety, regulated marketing, and the influence of agreements and conventions through GATT, WTO and NAFTA.
- The view of chains as "value drivers", and a shifting focus from food and feed to industrial and manufacturing enterprises building value "up the chain".
- The value proposition is facilitated by the borderless information environment provided by the internet.

## INSIDE THIS REPORT SUMMARY

- 1 A Collaborative Effort in Chains
- 2 Features of Successful Chains
- 3 Case Studies of Success
- 4 Views on Current and Future Chain Activities
- 6 Strategic R&D Planning Framework

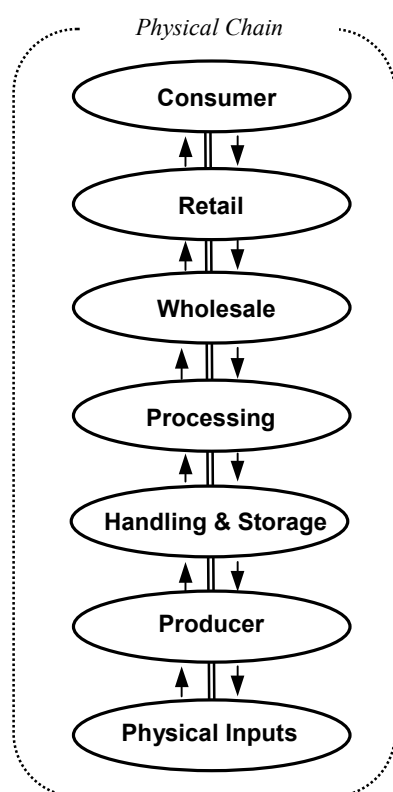
## Features of Successful Chains

There are many types of chain operating in contemporary agri-business. At one extreme are the large, transnational chains, which count amongst their partners large international companies like Du Pont, Monsanto, Continental, Cargill, Novartis etc. Those chains have undergone enormous structural and functional change to take advantage of developing technologies, and value creation opportunity. These are truly international chains, which are driven by economic pragmatism and have no respect for regional boundaries.

At the other extreme are the smaller chains, designed to meet some niche opportunity, usually to provide closer links between a customer with a particular need that cannot be met by the megaliths, and producers wishing to improve their economic performance by involvement in up-stream activities. A simple example would be where growers enter production contracts with processors, reaping rewards for both quality and service. The key characteristic of these chains is the shift, often on the parts of all participants, from independence to interdependence, which is a significant cultural shift that not all producers make willingly.

### Chains as Value Drivers

It is important to understand that chains develop to create value for the participants. Some of the chain activities that help meet grower expectations include reduced costs through higher yielding varieties, better agronomic practices or financial management, reduced freight and marketing costs, price premiums through their capacity to



**Figure 2.** Vertical integration in chains to create increased value shared among all participants.

value-add, or by processing and packaging for retail sale. It could also be their direct participation in marketing their produce. The challenge, especially for small producers like Australia, is to find accommodation within the global chains to maximise market access, in the full knowledge that they have no respect for national boundaries and will always concentrate around areas of best value. If this is not possible, alternative new chains need to be identified that can successfully coexist alongside the global enterprises.

It is a clear challenge for R&D to explore and define likely future opportunities and to provide the research and development to help industries capitalise on these opportunities. A rethinking of the role of collaborative research in the new commercial environment is necessary. This should lead to redistribution in research funding regarding collective good research (e.g. sustainability), to commercial production and process research, and a changing view of producers' role in the chain.

### Successful Chains

Chains can be quantified and described in a number of ways, but the most meaningful relate to their effectiveness in achieving the expectations of the various participants. "Success" means different things to different people. Growers would define a successful chain as one that maximises their returns over the life of the enterprise. Processors and marketers would consider reliability of raw material supply, price and high market penetration amongst their criteria. The chain must reflect consumer expectations of quality, safety, variety and price. A successful chain is one that meets the expectations of all participants to the best extent possible.

One study listed 11 factors contributing to chain success and then subjectively scored them in an attempt to quantify the likely relative success of individual chains:

- *Awareness*, the importance of a shared knowledge and vision throughout the chain
- *Trust*, which facilitates chain transparency and information flow
- *Business integration*, the way in which the various activities within the chain are coordinated
- *Efficiency*, which contributes to chain competitiveness
- *Customer focus*, chains which focus on the customers' needs are inherently more effective and efficient than those which are production-driven
- *Transparency*, i.e. all participants have through-chain understanding
- *Rewards*, the obvious incentives
- *Leadership*, provides clear chain focus and direction
- *Planning*, a key management function
- *Relationships*, the way in which various elements of the chain interact
- *Optimisation strategies*, to achieve efficiency and competitiveness.

## Case Studies of Success

*Case studies from the literature demonstrate that whole-of-chain profitability can be shared with growers*

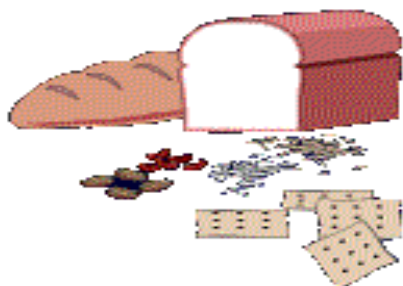
Ten case studies were reviewed from the literature to explore the variety of chain management approaches in agrifood industries. They demonstrate that leadership can come from anywhere in the chain and that premiums may or may not be shared equally among chain members.

For growers in commodity markets it is very easy to focus on least cost production alone and forget diversification to maximise the value proposition. The following case studies indicate the opportunities around for an innovative approach.

### Information Increases the Value of Wheat Chains

*Beneficial product traits identified through research and utilised for a value-added opportunities.*

The case of a British baker, Warburtons, demonstrated that a premium generated by high quality bread selling at more than twice the price of a normal loaf could be distributed along the chain. It reached all the way back to growers in Canada who received an additional \$20-30 per tonne for their wheat.



**Figure 3.** Warburtons make bread for the high-quality market, which it sells for more than twice the price of a regular loaf.

General Mills, the manufacturer of the breakfast cereal “Wheaties”, found that consumer’s preferred curly flakes over flat because they didn’t crumble as much and were tastier. The curly flakes were derived from a particular variety, which was previously pooled to give mixed flakes in the box. By contracting growers for that variety consumer satisfaction was improved and coincidentally General Mills discovered that curly flakes filled the box better. Again, the premium achieved was distributed as far back as wheat growers and handlers.

Pendleton, a US flour miller, established a batch-testing procedure for wheat entering its own handling and trading operation. It can thus source wheat with specific qualities for its niche flours without closed-loop contracts and export the remaining pooled wheat.

A similar approach was taken by Farmland Industries, a grain handler and marketer, in conducting an inventory of its stored grain to determine what quality attributes



**Figure 4.** Curliness of breakfast cereal preferred by consumers and an advantage also to the processor

were inherent in existing geographic locations. The goal was to source and segregate grain with specific attributes which could be sold at a premium to millers and bakers. This approach can be more cost-effective and return premiums sooner than conventional breeding or GM technologies.

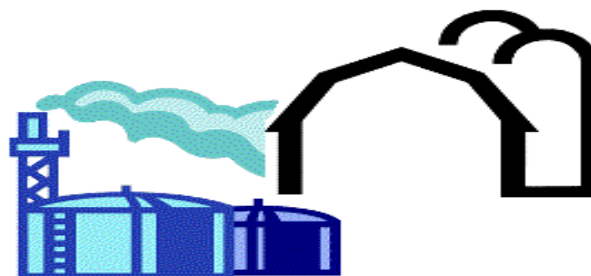
### Innovation Lead to Diversification

*Vertical integration and new products can add value to traditional chains.*

PTI, a manufacturer of soy protein, took on a leadership role of an entire chain to take advantage of the demand for non-GM soy products. Scottish grain producers in the 1990s found that food safety QA was the only way for their chain to survive when they could not compete on price. This is a good example of the best value maxim. Similar examples could be drawn from Australian grain exports to Japan, thriving on factors other than price alone.

One Canadian farmer cooperative expanded into a feedlot and later a fuel ethanol facility, each venture providing a secure market for by or co-products of grains.

An Australian grower cooperative expanded into marketing to take advantage of the relationships built up among its growers and boards. Two examples from meat industries were used to illustrate some important chain concepts of relevance to the Australian grains industry.



**Figure 5.** Canadian grain growers diversify into feedlotting and ethanol production.

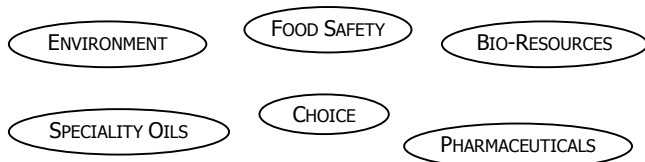
## Views on Current and Future Chain Activities

A survey was designed to obtain a cross section of attitudes and views of people from the public and private sectors, including farmers, seed growers, academics, and commercial firms in Australia, Canada, USA, Europe and Argentina. The following seven areas were addressed:

### Product features

*Factors driving change in product features and adaptation of chains to facilitate product development.*

The products of the future will target renewable bio-industrial grains for fuel and novel biopolymers, and to a lesser extent, pharmaceuticals, and health and well-being products. Organic production is already “main stream” in the industries surveyed. The consumer will play an important part in dictating GM-compliance, food safety, production efficiency, and environmental and social responsibility in farming and manufacturing systems.

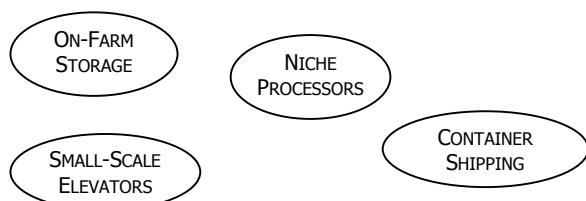


Commodity chains will continue the drive for lowest cost through varieties, which are selected for their processing efficiency attributes. The breeding balance is shifting from “input traits” (e.g. agronomic attributes) towards “output traits” such as end-use and processing characteristics, particularly in the biotechnology programs. An increasingly sceptical attitude towards the role of biotechnology was evident from many responses.

### Product segregation

*Product segregation and “Identity preservation” for satisfying consumer and processor needs.*

Product segregation and niche product marketing are already strategic tactics and R&D objectives of Canadian and US food processors. On-farm storage, small-scale elevators and small niche food processors were seen to be important elements in the creation of high-value demand chains. Many types of speciality crops – pulses, mustards, compressed hay, forage seed, etc – are already shipped from North America to customers in containers and smaller sizes, both in loose or packaged formats.



Around the world, grains are segregated for GM-compliance, food safety, organics or specialty end uses and qualities. The physical ability of handling systems to expand the number of segregations will depend on the availability of premiums consumers are prepared to pay. Future premiums will probably only compensate for the additional segregation costs without increasing producer rewards. However, even a cost-neutral proposition can protect future market access. There are also the more technical questions of through-chain product identification, certification, and quality management and information systems to comply with commercial and regulatory product standards.

### Price differentiation

*Identification of products and processes that will maintain price premiums into the future, and value distribution.*

Respondents believe that producer premiums will continue to apply for the production of new and specialty grains, and as a means of achieving grain quality. Premiums will also be paid for GM-compliance, organics and new crops, though on present evidence the premiums are unlikely to exceed the additional costs of production, at least in the longer term, but adherence to market demand will protect access. The trends in food safety show that what attracts a premium today may well be an unrewarded market access condition tomorrow.

The swing towards output traits suggests that up-chain premium generation will increase. The producer challenge is their ability to access these premiums.

### Production scale

*Impact of globalisation, chain dominance and changing production scales on the role of horizontal and vertical alliances.*

Major international chains will continue to expand and seek more efficient production bases to the possible detriment of some producers. Continued participation in these chains depends on an industry’s ability to remain competitive on value. Large chains are often unable to supply the consumer’s demands for variety and choice, or to address small specialist opportunities, so there are clear opportunities for niche chain development.

There is an increasing concentration of power at the retail level with a need for rapid response to adapt to changing market demands.

### Environmental impact

*How will consumer and community views and values influence both industry structures and R&D objectives?*

Consumer advocacy groups are continuing the pressure for environmental sustainability and social responsibility in the production of their food. It is clear that funding for research into environmental sustainability has increased. Organic grains are now “main stream” in Europe and North America and the call for GM-compliance is increasing in intensity. Energy efficiency is emerging as an important comparative attribute of foods.

## R&D effort

*The role of R&D in the changing global business environment and future research directions.*

Response capability is a key attribute of any modern chain. Whether the R&D is conducted in-house or through external resources, it must be capable of adapting to sometimes rapidly changing commercial directions. Typically, the R&D effort is a combination of corporate, contracted and public research.

There are many models for involvement of collaborative R&D in chains. R&D brokers, like GRDC, can direct funds to public researchers to operate at the pre-competitive level in developing science and technologies that can later be adapted by competing chains. The broker can simultaneously take on a commercial role and support research fully integrated into chains, either within a joint venture or strategic alliance model, or by simple contract, to assist the whole-of-chain process.

## Industry structure.

*Impact of new chain structures on performance and outcomes, future technology and knowledge needs.*

The larger chains are in a state of rapid change as new and somewhat experimental partnerships are formed, involving both traditional members such as grain handling and manufacturing companies, and non-traditional members, such as biotechnology companies. Specialist manufacturers are also starting to become visible in the chains to take advantage of the promises of some of the newer genetic technologies. Seed companies are no longer considered to be important chain members by many of the respondents.

Producers are becoming increasingly isolated from the main stream activities of the chain, and will be driven towards low cost/low price production. The overall impression presented by respondents was of monolithic commercial relationships with little regard for the impact of their activity beyond their own economic objectives. Countering this is a new trend of producer cooperatives, seen particularly in North America, strengthening the bargaining power and influence of the collective.

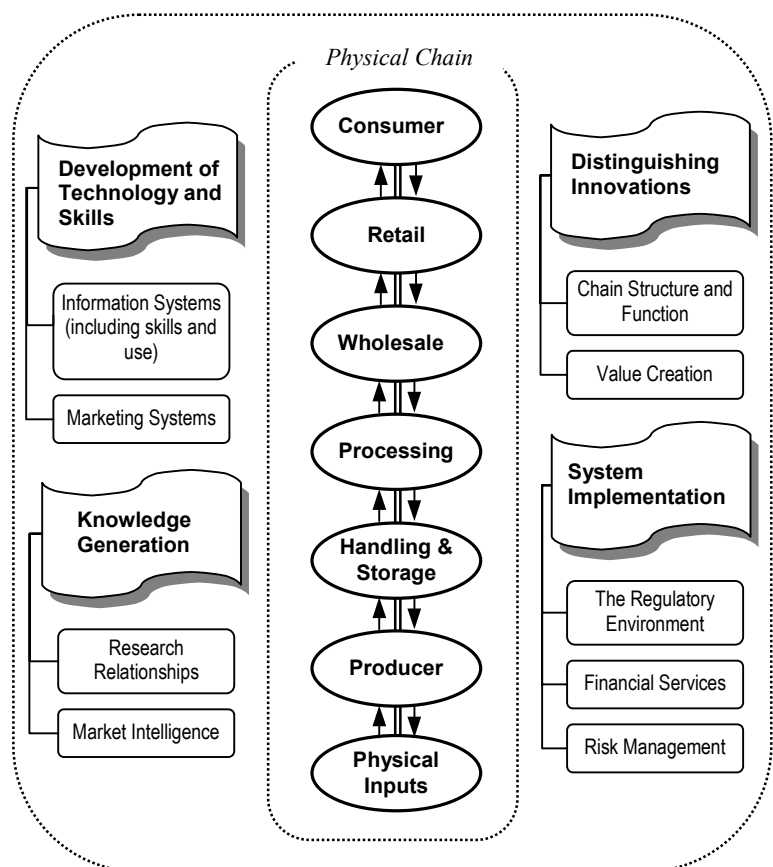
The term chain is constraining. We will see networks of relationships develop, rather than linear chains. New organisations, networks and relationships will emerge that focus on core competencies in specific market segments. Firms with long experience in agriculture know that crops are living organisms subject to variation. Global chains will manage the biological risk by contracting production of major speciality commodities in several countries and in both the northern and southern hemispheres.

## Strategic R&D Planning Framework

A principal purpose of this project was to produce an R&D planning framework for the grains industry to facilitate future chain collaboration. Horizontal and vertical chain collaboration is an essential requirement for the vitality, profitability and sustainability of agribusiness in the 21<sup>st</sup> century. However, such collaboration can be difficult to achieve from an organisational, cultural and financial point of view. It is much easier to just continue the “business as usual” model. Most businesses will not adopt radical change unless supported by external change agents leading the way. This process is already underway in some other countries, e.g. the Netherlands. It is a typical market failure scenario where GRDC could take on the role as change agent and facilitate the process. It is also important to prevent grower marginalisation and to take on a proactive role to defend grower positions in the chain.

R&D support, and the way R&D providers are integrated into, and aligned with chain objectives has important bearings on strategies for product and customer development. Using a wider view of the chain, a model has been developed to capture the common features of food chain influences. The model has two parts:

- The “physical chain” which illustrates the flow of pro



**Figure 7.** Conceptual grains industry chain and potential areas for whole-of-chain R&D.

duction inputs and grain in one direction, and cash in the other, from the producer, through the handling and processing stages to the consumer.

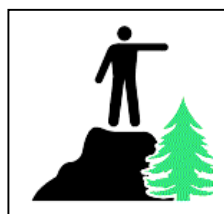
- The surrounding supporting network of processes, services and relationships which contribute to the effectiveness of the chain's outcomes, and ultimately to producer returns and profitability.

**Four Target Themes for R&D**

Industry success depends on the success of the whole chain, and any impediment to effective chain function, or any opportunity for improving chain effectiveness to the benefit of levy-paying industry members must be of relevance to the R&D planning process. In setting priorities for future chain collaboration, three major R&D target themes should be explored: knowledge generation; development of technology and skills; and distinguishing innovations. The three target themes overlap in the area of system implementation, which constitutes the fourth R&D target theme of trialing different supply chain models in practice. Chains are all about unique product features or service delivery provided by freely communicating network partners. In the context of chains, distinguishing innovations would mainly cover product and structural innovations, knowledge generation would be part of service delivery, and development of technology and skills would include, among other things, the development of communication networks.

In the R&D framework, themes have been split further into project areas. These are avenues of research that are potentially fruitful for growers in the context of the entire chain. Projects are specified in relation to broad topics to be covered and examples of strategies that could be explored. The existing R&D planning processes in GRDC already cover the areas of production efficiency and sustainability and product quality, marketing and processing; this framework does not deal with these issues.

The framework does not seek to present an R&D plan for the Corporation. Its purpose is to highlight the issues, and raise the questions for consideration by Corporation officers and the Board. Neither does the framework attempt to prioritise the issues. Once accepted as possible candidates for R&D activity, each will need to be analysed for its potential contribution to the industry and to levy-paying producers, and in some cases at the individual industry level.



**Theme - Knowledge Generation**

**Project Area: Market Intelligence**

Knowledge of the customer's requirements and the market environment are fundamental to the functioning of the chain and must be communicated precisely and unambiguously to all participants. It is the basis of sound R&D planning and producer decision-making.

**Project Area: Research Relationships**

The research resource must be aligned with, and responsive to, chain objectives and able to add competitive advantage whilst preserving the capacity to fulfil public good, market failure and strategic research needs.



**Theme - Development of Technology and Skills**

**Project Area: Information Systems**

Appropriate information systems are necessary to support the traceability requirements of the IdP and QA systems, to provide technical, financial and market information to the producer and other chain members, and as a coordination mechanism for the chain's function.

**Project Area: Marketing Systems**

With the deregulation of the marketing and handling systems, producers have many options to generate value through their choice of marketing approaches and their marketing skills and knowledge.



**Theme - Distinguishing Innovations**

**Project Area: Value Creation and Capture**

Value takes many forms. It may include the development of new or better matched products, meeting a customer expectation for regulatory compliance, or the availability of information or services such as in product traceability. Value can be added anywhere along the chain and the challenge for producers is to identify opportunities to share value, which has been created higher up the chain.

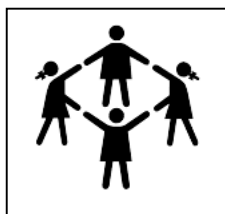
Competent identity preservation mechanisms and procedures are required for the satisfactory delivery to food safety (QA), GMO-compliance and end-use specifications. Features of an IdP system include a physical segregation capability and related technical and administrative arrangements for the certification of the product, and verification of the efficacy of the certification processes.

The consumer preference for foods which have been produced in accordance with environmentally, socially and ethically responsible production systems might be a saleable commodity, i.e. a source of additional premiums which has not been fully explored or captured.

#### **Project Area: Chain Structure and Function**

Global chains are in a state of change with the increasing involvement of biotechnology and manufacturing partners, and an altering view of chain objectives. Producers are becoming isolated and future opportunities for premium generation and producer access to premiums need to be identified and encouraged.

Business success depends on the business relationships in which the producer is involved. For example, horizontal relationships (alliances) with other producers create scale, increase their power in the market place, and provide access to dedicated commercial and technical expertise, while vertical alliances with “upstream” and “downstream” chain members increase opportunities for sharing chain value and cost control thus allowing a market cost advantage.



### **Theme - System Implementation**

#### **Project Area: Risk Management**

Risk well managed is an important element of commercial success. There is risk associated with the choice of enterprise, the production process, in the selection of chain partners and in the commercial transactions that determine the price and conditions of payment. Chains differ in the way they share risk, but typically it is borne disproportionately by the producers.

#### **Project Area: Financial Services**

The producers’ profitability depends on their ability to manage their physical production system, as well as their business. Their financial and asset management skills, coupled with their ability to access sound financial advice and finance are critically important elements of their overall economic success.

#### **Project Area: The Regulatory Environment**

An efficient regulatory framework is necessary to support chain objectives, but unnecessary or inefficient regulations or administrative systems add unnecessary costs to the chain.

This report summary has been created by Stefan Fabiansson and is an extract of the full report with the same name produced by the Food and Gene Technology Program, Bureau of Rural Sciences for the Grains Research and Development Corporation. Authors of the full report are D.C. Cunningham, J.R. Peterson and S.U. Fabiansson.

**Bureau of Rural Sciences**

**Address: P.O. Box E11, Kingston, ACT 2604, Australia - Phone: 02-6272 5328**