

**PT96014**

**Development of a quality assured  
production & marketing system for the  
potato industry**

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QDPI, QHI**



*Know-how for Horticulture™*

**PT96014**

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**Partnership in  
horticulture**

# Final Report

## Horticultural Research and Development Corporation

Development of a quality assured production and marketing  
system for the fresh potato industry

Project No. PT 96014



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Department of  
Primary Industries, Queensland  
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March, 2000

**Publishing Note**

**Appendix 1 Australian Potato Industry Quality Assurance Guide for Potato Farmers and Appendix 2 Farm Chemical Storage Guide** have not been included in the published version of this report.

Both publications were produced by the Queensland Department of Primary Industries and can be obtained from:

DPI Publications  
Department of Primary Industries, Queensland  
GPO Box 46  
Brisbane QLD 4001

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## **Foreword**

The delivery of this project has provided valuable information on the use of a pilot group of growers as a tool for developing industry knowledge. The issues dealt with by the pilot group in this project were evolving as the project work was taking place and meant that the project outcomes had to be matched to the industry needs at the time. More traditional scientific research projects in areas such as, plant breeding, nutrition, pests and diseases, often have a clear end objective. This project however had loosely defined objectives with the scope of these objectives only becoming clear as the project unfolded. A firm direction for the project could be developed only as industry-wide changes in issues like quality assurance (QA), food safety and marketing evolved.

The growers who worked on this project have helped to shape the direction of their industry. By using a pilot group, assumptions about issues could be tested rapidly and feed back given to growers within the life of the project. This was particularly so for the QA and food safety issues. The growers involved in this project risked losing their current markets and endured the scorn of their peers but did so in the belief that they were doing the right thing for their industry. Now four years on, their decision to work on this project has been vindicated with the results of their work now available to the Australian potato industry nationally.

Through this work growers nationally have been provided an insight to the workings of the potato marketing chain and have access to up-to-date knowledge of where potatoes go, and why there is such a marked difference between farm-gate price and retail. With this knowledge hopefully growers in our industry can now make informed decisions on their marketing options in the future, instead of decisions based on hearsay and industry myths.

During the delivery of this project the Industry Development Officer (IDO) was able to develop a vast network across Australia's potato industry that growers, agents, merchants, retailers, government and other service providers used to obtain information on industry issues regularly. Unfortunately due to the nature of industry funding arrangements for research projects there is a lack of continuity in positions especially for IDO's, therefore the officer involved in this project no longer works nationally for the potato industry. Although the industry had significant outcomes from this project work, the investment in people skills and industry knowledge has been lost. Having researchers/IDO's with broad industry knowledge and linkages is by far one of the most important issues the Australian Potato Industry must overcome. This industry has annual turnover of more than \$400 million but does not have the ability to invest in researchers, marketers and professional people to work across the industry with any continuity. A serious concern therefore must be how, under current funding arrangements, can trained staff be retained and a better return on investment be achieved.

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## 1.0 Introduction

This report is the result of a national project funded by the Horticultural Research and Development Corporation (HRDC) called *Development of a quality assured production and marketing system for the fresh potato industry*. This project was funded through the national potato levy and aimed to provide the potato industry, particularly growers, with information and guidance on changes in the potato industry, focussing particularly on marketing issues.

The specific objectives of the project were to:

- Develop a model for production handling and marketing systems.
- To improve profitability of fresh market production.
- Develop a greater market focus for a pilot group of potato growers.
- Employ the techniques used in quality management to present a better quality product to the market.
- Identify producer–customer relationships to optimise best returns for both parties.

This project was a social project not a pure research project and data has not been gathered in the traditional sense using replicated experiments. The outcomes of this project were delivered by taking growers through a process they were unfamiliar with and empowering them to make decisions about their future. This experience was then used to guide other growers around Australia and help them to deal with rapid changes in the marketplace.

The pilot group approach used was invaluable in the development of good manufacturing practices for horticulture. Access to on farm situations combined with real life market trials, added credibility and provided a practical environment to test assumptions. Taking a group of growers on a journey like this has truly stimulated other growers around them and has demonstrated the benefits of using model groups as a way of getting growers to take a look over the back fence at what is going on around them.

## 2.0 Background

Work on this project was initiated by Craig Wilson a potato grower from Queensland. Craig held the position of chairman on the *Heavy Produce committee of Queensland Fruit and Vegetable Grower association (QFVG)*. This position entitled Craig to represent Queensland potato growers on the national potato R&D committee. Dr Ken Jackson and Craig Henderson both research scientists from the Department of Primary Industries Queensland (DPI) worked with Craig Wilson to develop the project on behalf of growers nationally. Dr Ken Jackson then submitted the final project proposal to the potato research and development committee at the end of 1995.

Craig Wilson was prompted to develop this research project due to the frustration of many growers (himself included) who were experiencing significantly reduced returns, while seeing relatively high supermarket prices for potatoes. This frustration was further compounded by research (Marketshare 1994) that identified growers as passive, isolationist and lacking unity. Furthermore, in 1994 Ian Lewis published national market research funded by HRDC, that identified a poor perception of quality in the marketplace and falling consumption levels in the face of strong competition from other foods such as pasta and rice.

After two years of lobbying at a national level the project was approved as *PT96014 Development of a quality assured production and marketing system for the fresh potato industry*. By the time the project commenced in June 1996 and a suitable Industry Development Officer (I.D.O) was employed, new market access restrictions due to food safety concerns had emerged and were added to the scope of the project on commencement.

Shortly after the project commenced a group of growers (Pilot Group) were assembled in the Lockyer Valley, a traditional potato production area in Queensland. The main reason this project was conducted in conjunction with actual growers was to make this research as near as possible to a real life situation. Previous research (Lewis 1994) had provided valuable data on the industry position, but to resolve many of the questions faced by the industry a detailed, hands-on evaluation of the marketing processes in the potato supply chain was required.

The grower group under the guidance of the industry development officer set about developing a traditional marketing chain via a merchant and a major retailer and conducted three marketing trials over a 2-year period.

### **3.0 Media Summary**

A Horticultural Research and Development Corporation (HRDC) project funded by the national potato levy, *PT 96014 Development of a quality assured production and marketing system for the fresh potato industry*, has lead the horticulture sector in developing new on-farm QA guidelines and improving potato quality.

There are a number of important findings and outcomes from this project that are aimed at helping potato growers around Australia improve their product consistency and guarantee food safety. This work was initiated, funded and worked on by growers using a researcher from the Department of Primary Industries, Queensland (DPI) to facilitate and manage the project.

A pilot group of growers has worked along the potato supply chain right through to the consumer. This has enabled them to develop on-farm quality requirements and develop food safety protocols for the industry nationally. Potato farmers now have available to them an on-farm QA guide, a chemical storage guide, a potato defect poster to improve grading and a comprehensive package of documents to record actions taken when controlling quality and food safety hazards in growing, harvesting, packaging, storage and transport of potatoes.

Trials performed in the market place have shown a definite consumer preference for sound consistent potatoes with price not the primary decision that affects a consumer's choice to purchase. Deficiencies in the market chain were also identified where product is often handled many times by many people resulting in increased levels of damage and poor stock rotation.

By applying principles of quality assurance such as traceability, quality control and using written specifications, potatoes could be followed through the market chain with growers taking a proactive role in providing consumers with the level of quality and consistency they require.

A major recommendation of the project is for all the stakeholders in the supply chain to develop a strong consumer orientation. Trials undertaken as part of the project identified areas for improvement in consumer focus such as, improved potato handling systems, consistency by working to written specifications and improving management of retail displays.

## 4.0 Recommendations

**For the Australian potato industry to prosper in the next decade our growers, agents, merchants, retailers and marketers need to focus on the consumer.**

The only real threat the potato faces is from the imitators, after all this is the genuine original source of carbohydrate in Australia. To reclaim this ground the key stakeholders need to stop relying on the potato's reputation as a staple and start rebuilding its position in the market as a safe, nutritious fashionable food. The imitators in our market have built their market share on fashion and flair and the best the potato industry so far has had to offer is a product covered in a different coloured dirt.

The industry must first address the things consumers expect like product consistency, then satisfy their needs for things like nutrition. After that their desires and aspirations then have to be exceeded. This change is not about the content of the potato or its variety, but the perception of the product in the minds of the consumers. The potato is no longer the fuel source that spawned the population explosion of the Irish people and a poor man's food. The potato needs to be a fashionable item that enhances people's moods and makes them feel part of a fashionable new millennium. We must sell a message to consumers that by eating potatoes you will not only feel satisfied from hunger, and have your nutritional requirements meet but you will be doing something fashionable.

To rebuild the market presence of potatoes required to improve the returns and viability of potato growers there are a number of key recommendations that can be made.

The Australian fresh potato industry needs to:

- Focus on delivering what the consumer wants
- Reduce steps in the supply chain that do not add value
- Reduce handling steps to deliver fresher product with less damage
- Everyone in the supply chain needs to take responsibility for quality and measure it objectively
- The key stakeholder groups need to work together on marketing improvements in display and presentation
- Growers, merchants, agents and retailers must remember that the consumer is the final customer
- Growers need to take greater ownership of their product post the farm-gate
- Potatoes need to be treated as a fresh product not a hard product and handled accordingly
- Potatoes need to be reinvented in the marketplace.

These recommendations will only become reality if:

- The key stakeholders overcome the popular marketing myths and focus on the consumer
- Research is conducted that identifies the social and environmental factors that influence people's decisions when buying food.
- Communication in the industry is improved
- Growers are profitable

## 5.0 Technology Transfer

There were two distinct technology transfer objectives for this project:

1. **To incorporate technology transfer activities into the research and development phase of the project.**
2. **To carry this work forward into a continuing project to implement the findings.**

Because of the timing of the project and the importance to the industry of QA and food safety issues a larger emphasis than originally intended was placed on technology transfer during the life of the project. The technology transfer activities were carried out between each market trial and acted as a method of updating industry on the findings of the project as they were made. The aim of this was to stimulate the adoption of change in the industry, by providing feedback on what was happening in the industry as it was happening. To gain the best results from this information-transfer process a technology transfer strategy was developed in conjunction with Leigh Walters, the technology transfer IDO from South Australia.

Development of a further project to carry the work forward by targeting industry adoption activities such as training was undertaken however this application was unsuccessful due to a shortage of research funds in the 1998 funding round. A further project was submitted in the 1999 funding round but the potato research and development committee once again rejected the proposal.

### 5.1 Technology transfer strategy

Quality Assurance especially as a market access issue had an enormous potential to reduce growers profitability and many considered it no more than an additional job imposed on them by the supermarket chains.

In order to get farmers interested in QA, interest had to be stimulated in a timely manner, ie. during the life of the project. The approach taken to achieve this was to first focus on the things closest to the hearts of the growers. A number of recurring issues were identified in the initial round of grower meetings performed as part of the project and were close to exactly the same as those identified by the pilot group in their initial training sessions. The information-transfer strategy was based around addressing these issues. This approach then helped to shape the direction taken by the market trials and also provide growers with ownership.

## **Concerns of many farmers**

The following is a list of concerns that appeared common to most grower groups and formed a basis for the information-transfer strategy.

- No control over price
- No control over produce once it leaves the farm
- Everyone else “stuffs up” the produce
- No control over the weather
- Don’t get paid what they thought they were getting
- Chain stores only want premium product therefore they will have to throw the rest away
- Stores only display poor produce. Where does all the good stuff go? (like mine)
- The difference between farm-gate price and retail is huge and they have been told retailers are making all the money, therefore the retailers are number one enemy.

*The issues that were the most emotive and perceived to be of the highest importance to all grower groups were those that they lacked control over.*

By using issues such as quality assurance as a means to perhaps not control, but to maybe influence some of these things provided an immediate starting point for targeting the project outputs and to deliver outcomes that growers valued. A technology transfer plan was then developed to address the needs of the target groups in the supply chain, within the scope of the objectives of the technology transfer strategy.

The objectives of the technology transfer strategy were to:

- Generate interest in the QA concept
- Develop a conceptual framework for establishing QA and market focused groups
- Produce good quality information that would assist industry to adopt QA
- Bring farmers closer to customers by helping farmers to identify and meet customer needs
- Use groups to drive the education process
- Facilitate effective industry-wide education/training/implementation by working with QA service providers

*To achieve these objectives the different stakeholders were divided into target audience groups, objectives and strategies were developed to address the issues these groups were concerned about.*

## **5.2 Technology Transfer Plan**

To focus the delivery of the technology transfer strategy a plan was developed. This plan divided the potato supply chain into key stakeholder groups. This approach was taken to make sure the specific issues of the different stakeholders were considered. These specific issues were addressed with objectives to be achieved and then related to specific actions needed for the particular stakeholder group to overcome the issues identified.

## **Farmers**

*Farmers growing potatoes for the ware (fresh) market.*

**Issue:** Farmers need better tools to implement QA and a better understanding of the process and benefits.

### **Objectives**

- ⇒ Develop a conceptual framework to assist in the implementation of QA on farms.
- ⇒ Facilitate the formation of QA groups.
- ⇒ Improve awareness of QA project.
- ⇒ Develop tools to assist farmers to adopt QA more easily.
- ⇒ Provide support to group facilitators.

### **Actions**

- ⇒ Produce an introductory booklet on QA for farmer.
- ⇒ Identify currently active farmer groups using Technology Transfer database and update through personal inquiry.
- ⇒ Facilitate establishment of QA groups and help them to develop a market focus by working through consultants, government advisers and other industry people.
- ⇒ Develop QA tool kit containing the following:
  - Crop sheets
  - How to set up a property map
  - Calibration record
  - Packaging record
  - Information on traceability (labelling)
  - Photo-guide to assist in addressing QA problems identified by pilot group
  - Food Safety checklist
  - Training guide for group facilitators
- ⇒ Identify through facilitators whether they need training workshops and run if required.
- ⇒ Produce articles in *Eyes on Potatoes* and *Potato Australia* to raise awareness and understanding of QA issues.

## **Government and private advisers**

*Extension officers and consultants involved in working to improve farm management.*

### **Issue**

- ⇒ Advisers need information and tools to use with their farmer clients to facilitate adoption of QA.

### **Objective**

- ⇒ Improve awareness of QA developments and tools available for use with farmers.

### **Actions**

- ⇒ Identify adviser network using Technology Transfer database.
- ⇒ Send out regular information updates highlighting developments and tools available for use by farmers.

## **Industry Leaders**

*APIC, AUSVEG, State Farmer Associations and State Department Industry Managers.*

### **Issue**

- ⇒ Industry Leaders need to be aware of developments so that industry, state government and QA project programs remain complimentary.

**Objective**

- ⇒ Maintain dialogue with industry leaders and keep them informed of developments.

**Actions**

- ⇒ Identify industry leader network using Technology Transfer database.
- ⇒ Send out regular information updates highlighting developments and tools available for use by farmers.
- ⇒ Talk to industry leaders to ensure they understand the objectives and benefits of the project and to determine opportunities for collaboration.

## **QA Consultants**

*Consultants providing QA training to industry groups.*

**Issue**

- ⇒ Address many of the practical problems faced by farmers trying to adopt QA.

**Objectives**

- ⇒ Raise awareness of what is being done in the QA project.
- ⇒ Assist QA Consultants in providing more “farmer friendly” training.

**Actions**

- ⇒ Identify QA Consultant network using Technology Transfer database and personal inquiry.
- ⇒ Send out regular information updates highlighting developments and tools available for use by farmers.
- ⇒ Investigate need for a training workshop for QA Consultants in the second quarter of 1999.
- ⇒ Provide technical information for use in QA implementation.
- ⇒ Provide details of resources available.

## **Merchants**

*Businesses trading in potatoes for the ware market.*

**Issue**

- ⇒ Feel they have no role to play in the process. If they feel that it is threatening their future viability they will not support its successful introduction.

**Objective**

- ⇒ Promote importance of farmer–merchant partnership to achieve QA objectives.
- ⇒ Encourage merchant feedback to farmers.
- ⇒ Improve awareness of current consumer needs through existing market research.
- ⇒ Improve their understanding of QA developments.

**Actions**

- ⇒ Identify Merchant network by using Technology Transfer database and by talking with Potato Merchants of Australia.
- ⇒ Seek time at a PMA meeting to talk about the QA project and the merchant’s role in QA.
- ⇒ Send letter to merchants highlighting the importance of the merchant–farmer relationship and the reasoning behind the adoption of QA and what it means to them.
- ⇒ Prepare a national press release focusing on merchants working with farmers to achieve QA achievements.

- ⇒ Send letter to merchants talking about the importance of agreed specifications.
- ⇒ Attend merchant meetings such as PMA where possible to present the case for QA.
- ⇒ Send out regular information updates highlighting developments.

## **Retailers**

*Key buyers and marketing people in the supermarket chains.*

### **Issue**

- ⇒ Retailers have put pressure on the potato industry to adopt Food Safety/QA programs.

### **Objective**

- ⇒ Improve awareness of QA project and the implications for the supermarkets.
- ⇒ Inform supermarkets of work in developing product descriptions.
- ⇒ Establish feedback loops for farmers.

### **Actions**

- ⇒ Identify Supermarket network using Technology Transfer database and personal inquiry through QFVG and state supermarket offices.
- ⇒ Send out regular information updates highlighting developments.
- ⇒ Identify information that can be fed back to farmers to better identify consumer needs.
- ⇒ Send letters to key people about what is happening in the project.
- ⇒ Carry out awareness sessions at supermarkets if there is a need with buyers.
- ⇒ Send out regular information updates highlighting developments.

## **General**

*Other people in the potato industry.*

### **Issue**

- ⇒ important to raise general awareness to facilitate greater acceptance of QA. Otherwise ignorance will result in people undermining the QA effort.

### **Objective**

- ⇒ Keep people aware of developments in QA.

### **Actions**

- ⇒ Provide articles on QA developments to Eyes on Potatoes and Potato Australia.
- ⇒ Provide support to groups as required.

## **5.3 Effectiveness of Technology Transfer Strategy**

The information transfer strategy was used for the life of the project and helped provide a framework for the development of outputs from the project such as the:

- Australian Potato Industry Quality Assurance Guide for Potato Farmers (appendix 1),
- On farm Chemical Storage Guide (appendix 2)
- Potato Farming Practices Checklist (appendix 3)
- Potato Grading Chart
- Potato Document Toolkit (appendix 4)

- Project updates and various publications in *Potato Australia*, *Eyes on Potatoes* and other newspapers and magazines.

There was also a large emphasis in the plan on direct communication with grower groups, peak industry bodies, merchants, agents, retailers, government advisers and QA consultants. This communication was done by the IDO in person, ie. as facilitated group activities, targeted one on one discussion with key decision-makers (particularly at retail level). Other activities that helped to provide the information outlined in the technology transfer plan were a pilot group visit to other major production regions, and a member of the pilot group presenting a paper at the On-farm QA Conference in Tasmania in 1999.

The major area of the strategy that was not addressed in the project was the development of the industry-specific training. After the strategy was developed there were significant developments in horticulture towards an Approved Supplier Program (a concept put forward as part of this project as early as February 1997) developed by the DPI quality management training group. In consultation with industry leaders a decision was made to support this program and not to create an industry specific program. The IDO attended and conducted a number of potato specific Approved Supplier Requirements training courses and used this experience in compilation of the Australian Potato Industry Quality Assurance Guide for Potato Farmers.

By segmenting the supply chain, information and resources could be developed that were applicable across the boundaries that existed and would be of value to the entire industry. This approach ensured continuity from the consumer to the grower and was aimed at improving communication between retailers, merchants, agents and growers. An example of this is the input provided from members of the various stakeholder groups who provided input on the Australian Potato Industry Quality Assurance Guide for Potato Farmers (appendix 1). In the development of this document growers, merchants, agents, retailers, government representatives and consultants made contributions.

## **6.0 Evaluation and Measurement of Outcomes**

No formal evaluation process was built into the original project proposal. However in this section an evaluation of some of the project's outcomes has been performed in relation to their impact on key stakeholders identified in the technology transfer plan. Although the IDO has no full-time linkage with the national potato industry a formal evaluation is now being performed on the stages that different groups go through in order to evaluate the dynamics of the QA pilot group. A student from the rural extension centre from the University of Queensland is performing this evaluation.

### **6.1 Outputs**

Issues like QA and marketing are quite intangible, therefore the outputs formulated and delivered to growers and other stakeholders were seen as an essential part of the implementation and adoption of the technology.

During the early stages of the project when meetings were held in grower regions around Australia discussions with growers revealed a need for information and direction on QA, food safety and marketing issues.

*There was a perception held by growers that they had seen little return from their levy.*

In response to this feedback a number of documents were produced to meet the need growers had for this information. At the time of writing this report approximately 2500 QA and chemical guides had been provided to potato growers with a further 750 being distributed to merchants, agents, retailers, advisers and consultants.

The outputs from this project include the following:

- Australian Potato Industry Quality assurance guide for Potato farmers (appendix 1)
- On farm Chemical storage Guide (appendix 2)
- Potato Farming Practices Checklist (appendix 3)
- Potato document Toolkit (appendix 4)
- Generic Potato Industry HACCP plan (appendix 5).

The scope of this project also allowed the IDO to have collaborative input in the development of the:

- Potato Grading Chart
- The Potato Quality Descriptor manual
- Potato production areas poster
- Developing an Approved Supplier Program For Fresh Produce.

## **6.2 Outcomes**

Before considering the outcomes of this project it is useful to think about what was happening in the potato industry particularly at grower level in 1996. Understanding of the need for QA and food safety systems was low and in fact was something feared by growers. Marketing was still seen as selling and the majority of growers thought retailers purchased 50 kg bags of potatoes from the markets and made enormous profits.

Now QA and food safety is rapidly becoming a part of farming and growers are getting on with the task of implementing what is required to maintain or improve their market access. Grower understanding of marketing is much improved and a lot of growers now understand that often the product they have harvested needs to be graded and packed in suitable size packs in a specialist facility to provide the consumer the level of consistency they require. It is hard to know what impact this project has had on this change in attitude but we do know that the Australian Potato industry has one of the most comprehensive on-farm QA packages available for any horticultural crop in Australia. Some of the outcome areas in which the project has arguably had the most impact are:

- Development of industry specific Good Manufacturing Practices or GMP's (appendix 1,2,3,4 & 5)
- Uniform implementation of on-farm QA
- Creation of linkages between growers and consumers
- Improved grower understanding of market access issues like QA and food safety
- Greater awareness of poor product consistency on potato sales
- Industry understanding of market issues
- Validation of previous market research findings

### **Development of industry specific Good Manufacturing Practices (GMP's)**

Before this project, growers of potatoes were faced with very little industry-specific information on food safety and what constituted a hazard. Farmers that were attempting to implement hazard analysis and critical control plans (HACCP) also had no precedent to guide them, making this an onerous task. Through this project a number of pre-requisite GMP's have been identified and documented. These include: chemical storage protocols, traceability systems and a number of industry specific food safety hazards. These GMP's have been identified in a generic industry-specific HACCP plan (appendix 5) and are now used as part of potato industry quality systems across Australia.

### **Uniform implementation of on-farm QA**

Working along the supply chain and improving awareness and understanding of key stakeholders has provided the industry with clear options with regard to implementation of on-farm QA systems. A large number of growers, merchants and agents around Australia have implemented project

Outcomes, in the form of improved chemical storage, food safety checklists and on farm documents for recording critical operations. The use of the generic HACCP assessment model and the use of food safety checklists like the Potato Farming Practices Checklist (appendix 3) to document GMP's is now being adopted in other horticultural products such as bananas (Mumford 1999).

### **Creation of linkages between growers and consumers**

Using a pilot group of growers to supply potatoes through a number of different supply chains and communication of the results to growers has removed uncertainty in the wider grower community of where their produce is going and the difference between farm-gate price and retail ticket price. By opening communication channels particularly with retailers, has created for the first time ability for growers to better understand what consumers want and access information on how potatoes are handled in the supply chain.

### **Improved grower understanding of market access issues like QA and food safety**

Before this project QA and food safety requirements were viewed by a large majority of growers as just another 'big stick' approach being used by retailers to make growers' lives difficult. Continually providing updates to growers on these consumer driven issues and backing the theory with practical application of the principles of QA and food safety has provided growers with the awareness and understanding needed to accept these changes.

### **Greater awareness of poor product consistency on potato sales**

Previous research on potato quality (Henderson 1996) had shown major problems with the level of defects in potatoes. The pilot trial work of this project has clearly demonstrated that poor product consistency has a negative impact on sales. This message has been clearly communicated to growers, merchants, and retailers around Australia and is a major outcome for the potato industry.

### **Industry understanding of market issues**

A number of marketing myths have now clearly been exposed by this project. By compiling and uncovering these myths, awareness of the most important issues can now be focussed on by all the stakeholder groups in the potato supply chain. Work in this project has demonstrated that improving quality can improve sales, however, having quality and quantity of potatoes does not always ensure market access. The marketing of potatoes is no longer a straightforward supply and demand issue. Other factors such as competition (from pasta and rice), QA, food safety and

understanding both customers and consumers are now key issues growers need to consider to market potatoes.

## **Validation of previous market research findings**

Previous market research has been a compilation of consumer attitudes (Lewis 1994) and quantitative assessment of product quality (Henderson 1996). These research assumptions have now been tested in the marketplace by linking actual improvements in sales of potatoes to improved product consistency.

## **6.3 Methods for Developing GMP's and uniform QA**

The pilot group concept was used to evaluate, trial and compile the first set of industry-specific guidelines for the horticulture industry in Australia. Before discussing the role of the pilot group in the development of these guidelines there are a number of topics that need to be addressed that relate to quality, food safety, and market access.

When the project commenced in 1996 there were a limited number of potato packers in Australia with third party accredited QA systems in place. There were almost no growers with QA systems in place. The implementation of QA was a new phenomenon and was gaining momentum after a major retail chain had decided they were legally very exposed to potential food safety litigation. This move towards QA/food safety systems was heightened by food poisoning scares and media scrutiny of the potential for food contamination in pre-prepared salad bars. It was at this point that some of the major retailers first encountered or even contemplated the potential for food borne illness as a result of their fresh produce trading. After closely scrutinising the salad bars the question was posed, what about the fresh produce? The rest is history. Fortunately with the project commencing around this time, the industry has been well positioned to respond to these changes and provide information and answers to growers' questions in a timely manner.

### **What level of QA**

The major issue for the potato industry and the whole horticultural industry has been and continues to be, what level of QA is required on farm? The pilot group approach was to work in a real life supply chain and develop systems/procedures that would meet the needs of the retailer with the most advanced requirements. At the commencement of the pilot group market trials the Woolworths Vendor Quality management System (WVQMS) was being finalised and other systems were gaining momentum especially SQF2000™. The issue that had been overlooked everywhere at the time was how does this relate to a farming situation and what really needs to happen on farms.

By performing market trials and following potatoes right through to the consumer, the pilot group was able to gain a first-hand understanding of the issues and start to develop the necessary records and procedures to provide a quality assured and safe product.

The market trials conducted by the pilot group were all based around a group of growers supplying via a Woolworths vendor (Woolworths supplier). The key issue for the pilot group was what a group of growers supplying a third party accredited direct supplier would need to have in place to provide safe quality food. The issue was never how can all these growers implement a third party system but what can be done to develop a set of guidelines that provide a basic level of consistency for the industry. By training the group in the principles of quality assurance and food safety the pilot group was then able to compile a generic HACCP plan for the Australian Potato Industry (appendix 5). This resulted in an industry based risk assessment which rated hazards on their severity in two ways;

- First if a farmer had no controls in place what was their significance *and*
- Second, if a GMP was in place would this still be considered a hazard?

These GMP's have now been documented in The Australian Potato Industry Quality Assurance Guide for Farmers and the Farm Chemical Storage Guide. When a grower has implemented these GMP's and the various records that support them the application of HACCP is then not only simpler but in the majority of cases not required to demonstrate food safety.

## **7.0 Discussion**

### **7.1 Group Formation**

When this project was developed a major issue for the proposing organisation was how best to demonstrate to the Industry on a national basis the results and outcomes of the work. The Australian potato industry involves approximately 2000 growers who produce around 1.2–1.3 million tonnes of potatoes annually. Although the target audience was fresh market growers (about half of the industry) all growers in Australia had contributed to this project and the outcomes were bound to have relevance to them.

To overcome this issue a decision was made to form a pilot group of growers to investigate, trial and demonstrate the intent of the project and hopefully create interest among other growers as they saw their peers involved first-hand in the workings of the project. This section describes the meta-process involved in actually forming this pilot group.

The formation of an effective pilot group was a 3-stage process and consisted of the following steps;

- 1. Finding interested growers**
- 2. Selecting growers**
- 3. Developing group dynamics**

#### **Finding interested growers**

In the process of finding the growers there were a number of objectives to meet:

- Generating enough interest
- Being honest about the task ahead
- Giving them a sample of the types of things they might learn
- Establishing a list of growers to form a group of growers who were representative of an entire production area (Lockyer Valley)
- Making sure growers understood the need to be committed for more than one season ie. 3 years (the life of the project)
- Forming a final group of 6-10 growers

When the project was funded, a public meeting was called in Gatton to gauge the level of interest in the project. At this meeting growers were advised of the project, what it was about and the interested ones were then asked to provide their names and addresses. At this point an IDO to drive

the project had not been employed and the interested growers were told they would be contacted in due course.

On appointment of the IDO potential collaborators in the supply chain ie. merchants and retailers were approached to also work in the project. A second meeting was then held where the merchants, retailers and the growers who initially showed interest were invited. The second meeting was once again made open to other growers in the district. The meeting was advertised in local newspapers and on radio. Timing of the meeting was also important as the meeting was planned as close as possible to the end of the potato season but not too late that it would take place when a lot of growers had gone on holidays. Traditionally in the Lockyer Valley once the spring harvest is finished, a number of farmers take advantage of the discount holiday packages still available before the Christmas rush. This point is made to clearly demonstrate the need for good local knowledge when preparing farmer meetings.

Inviting the merchants and retailers was a calculated risk given the level of distrust the majority of growers had for these people. However attendance by at least one merchant and one retailer was needed to give the whole project relevance to the target audience, in this case the growers.

***The aim was to demonstrate to growers that this project was going to be more than just talking about a problem.***

A presentation was given to growers on the reasons for the project and possibilities for involvement with retailers and merchants. Previous research (Lewis 1993) provided solid background on the plight of the industry. Falling consumption and a poor perception of quality were two issues that growers could identify with immediately. Growers did not have first hand knowledge of the research by Lewis and this was an ideal opportunity to introduce it. On the day, one merchant and one retailer attended. The retailer gave a brief presentation of where they were going and what they thought might come out of the project. This brief presentation was crucial, as this was the first time the majority of the growers in attendance had ever spoken to, or seen a "real live" retailer other than store staff.

Growers at the meeting were given 2 clear objectives at the start of the meeting. Firstly, the meeting was to give them an overview of the reasons for the project and secondly, the purpose of the meeting was for interested growers to signal their interest in participating. To obtain group members with high enough interest levels to maintain involvement, it was important to have some level of predisposition to change. It could be argued that this approach does not attract a wide enough cross-section of growers. However, if the selection process was too open there was a risk the group might not sustain or maintain involvement for the life of the project. It must be remembered that the project was seen by growers as a risky thing to be involved with, due to the potential of being seen to be alienating their traditional buyers by going around them.

Therefore to form the group under no illusions of what was ahead, prospective members were given the following as requirements for their participation:

- *The group had to consist of growers from various areas in the district*
- *The group had to consist of a range of different sized farming enterprises*
- *Coverage of as long a supply window as possible*
- *Strong commitment to market a set percentage of crop through a predetermined chain*
- *Desire to be involved in the project*
- *The group had to cover all aspects of current harvesting and packing options(handpick, harvester, shed grading and field grading)*

***There was a need at this time to be honest with growers about their commitments but yet not to frighten them away with too much talk of change.***

As it turned out there were a number of growers who had heard of QA and as the project had something to do with QA, this generated a lot of interest in attending the meeting.

## **Selecting growers**

To actually encourage growers to break the ice, interested parties were asked to fill out a survey form (appendix 6). This form was designed to gather feedback and make sure the criteria above were addressed. Of approximately 35 farming enterprises in attendance (35 out of approximately 100 in the surrounding district) 20 survey forms were returned completed. It was also explained at the meeting that people interested would then be approached on an individual basis to check their suitability. This approach was taken for the following reasons:

- To allow the IDO to reduce the group size if there was too much interest
- Allow growers to contemplate their involvement after all the hype of the meeting, (a cooling off period was thought necessary to make sure they were committed to participating)

The survey form (Appendix 6) was designed for initial information gathering. The IDO then interviewed each interested person individually at a later date. A grower questionnaire was then used to gather more detailed responses to the change issues the prospective members of the group may face as part of the project. The grower questionnaire (Appendix 7) was designed to gauge responses and rate the suitability of the potential members on a number of issues critical to the project. Some of these issues were;

- Change
- Teamwork
- Product commitment
- Traceability
- Food safety
- Training
- Type of equipment available

By the time the personal interviews were conducted in the 2 weeks following the meeting the level of interest had actually dropped. The cooling off period had taken affect and by interviewing the prospective members a number decided at the interview they could not commit. The number was then reduced to 10.

In group dynamics terms 10 is usually considered the upper limit, however there was an expectation of one or more dropping out of the group so 10 seemed a good number to start with.

## **Group dynamics**

Once the initial group selection process was complete the formal task of developing a cohesive group that would co-operate in marketing and delivering product to a major retail outlet began.

The goal of the group dynamics training was to:

- Breakdown barriers
- Build a cohesive team
- Improve awareness of market issues
- Develop understanding of market issues and the need for change
- Stimulate acceptance of market changes
- Demonstrate commitment to change
- Adoption of new practices required to respond to the changing marketplace

## **Developing a learning process**

What was the best approach for a group of farmers? By firstly considering the social and environmental factors such as age, level of formal education and traditional farming background, an appropriate method for delivery of specific learning outcomes could be developed. Was a formal classroom situation appropriate and if not what other methods could be used to bring such a disparate group together? The group definitely needed to learn new theories but in a way that was as practical as possible. To achieve this a number of training sessions were planned. The keys to these sessions were a strong linkage to practice continuing to review what had been learnt, and putting the theory into practice. The training program therefore included field trips, marketing trials and formally facilitated training sessions. The objective of this learning process was to overcome the barriers/walls that prevent change ie., create a leap of faith from the current point of view to a new position. The best way to do this was to take growers through the following stages:

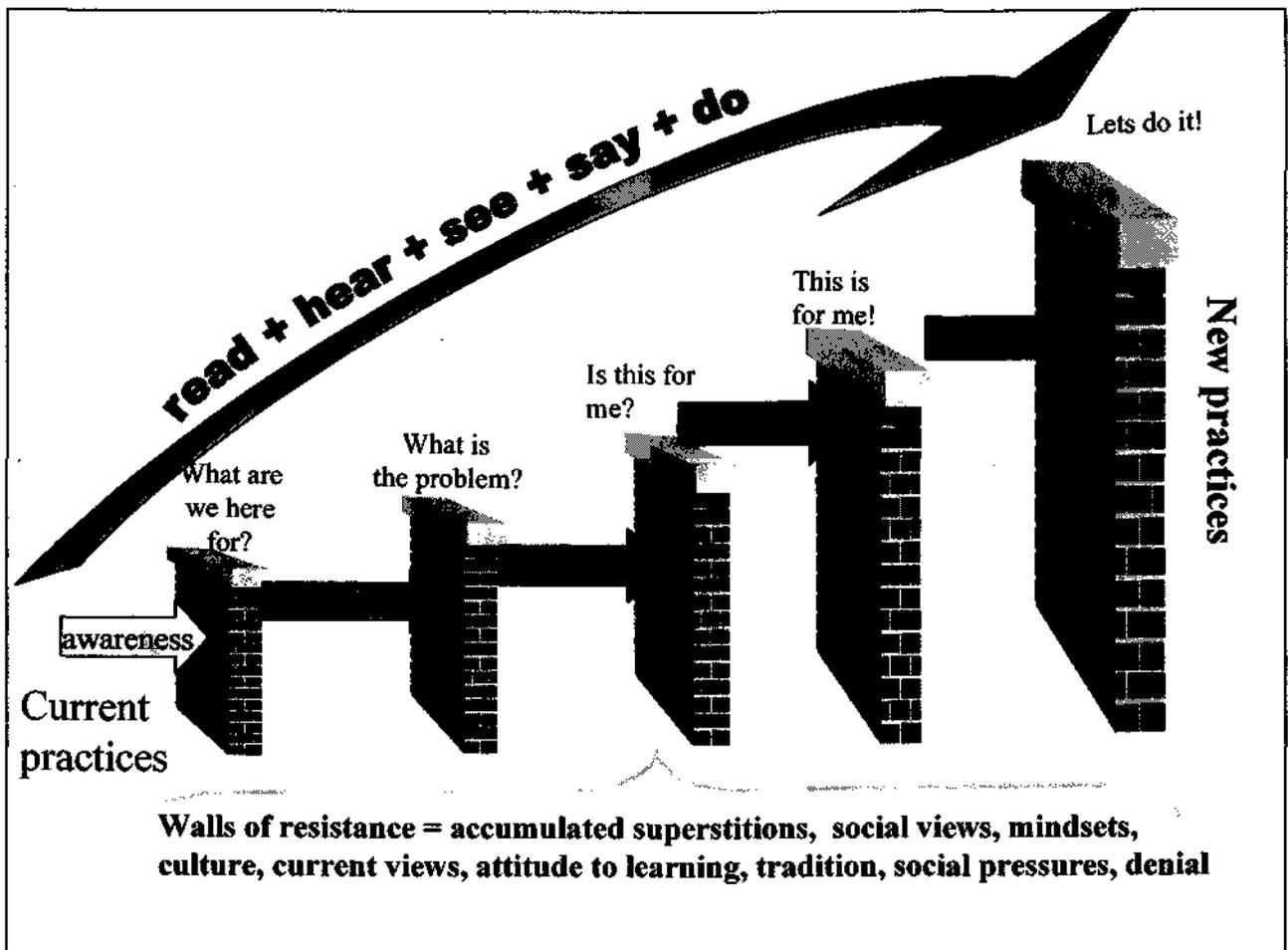
- awareness
- understanding
- acceptance
- commitment
- adoption.

The training sessions were designed to stimulate these factors through a learning process that capitalised on the doing, seeing and hearing approach.

We remember:

- 20% of what we read
- 30% of what we hear
- 40% of what we see
- 50% of what we say
- 60% of what we do
- 90% of what we hear, see, say and do.

A summary of these stages and the learning process used is shown in Figure 1.



**Figure 1. Learning and change stages for QA pilot group**

## **Delivery**

A number of training sessions were conducted that focussed on bringing the group together. These sessions were a mix of formal group training, field trips (plate 2), third party conducted training courses (plate 1) and hands-on negotiation with customers and consumers during market trials. Approaching the training in this way allowed participants the opportunity to learn the theory and then put the theory into practice. This style of delivery allowed a greater emphasis on task activities which stimulate all the senses and accelerate the learning process.

A diary of these training sessions has been compiled (appendix 11) and demonstrates the stages of the group learning. The focus on task oriented activities such as field trips and market trials helped to accelerate the adoption process and was clearly very important when creating understanding and building commitment.

As with any team development process, without a shared and common goal it is hard to focus individuals and form a team. A vision was developed in the first phase of the training by getting the growers to share the problems they were having as individuals. In no time at all they became aware

that they all had exactly the same problem, marketing. They could grow the crop and between them had numerous ways of doing this but they were all having problems with the selling/marketing end.

***They had traditionally sold produce at the mailbox and been quite successful, now however they had to go beyond the mailbox.***

The members of the team listed the following key goals for what they wanted to get out of producing potatoes in the next five years:

- Reliable return
- Higher return
- Buyer confidence to come back
- United front ie. less competition locally
- Lift and improve quality
- Recognition of product
- Understand customer through more face to face negotiations.



**Plates 1 and 2. Growers in two different learning environments. On the left a task oriented activity at the Adelaide markets and on the right a theory oriented activity (a HACCP training course).**

From this a shared vision an aim was developed:

***Improve grower viability and consumer confidence by gaining a better understanding of what our customers require.***

To achieve this the growers listed a number of things they had to do to realise this vision;

- Gain a better understanding of the markets they supplied including, prices and throughput
- As a team, talk to customers ie., the retailers, wholesalers and consumers
- Use product specifications as a way of measuring what customers require.

- Implement new management practices on farm such as spray records and Food Safety plans by using a QA system as a tool to do this



**Plate 3. Growers inspecting product they supplied to a retail store after adoption of new marketing practices**

### **Did the group perform**

By the end of the third market trial in December 1998, all but two of the original group were involved in group activities. The members of the group went through the awareness to adoption phases at different times and at different rates. Adoption of the new practices did not occur at the same rate for every grower and different growers reached different levels with regard to the various technologies/changes they encountered. Nine out of the ten growers supplied potatoes in accordance with a retail specification (plate 3). The only one that didn't could not supply due to weather conditions. Five out of ten growers had built new chemical storage facilities and six out of ten had implemented more than 50% of the components of the Australian Potato Industry QA Guide and were maintaining their commitment. In terms of marketing five members of the QA pilot group had moved on to join a grower marketing group with another twelve growers. At the time of writing this report these growers had exported potatoes to Indonesia and had commissioned their own market research and business planning activities with a view to marketing their product differently.

## 7.2 Market Trials

Before exploring the marketing section of this report it is essential to develop an understanding of the marketing trials performed by the pilot group. The market trials were seen as a critical success factor for the project as they provided the relevant experiences and information required, to develop the desired project outcomes.

Three market trials were performed and provided both qualitative and quantitative information. Quantitative information was collected on quality, defects, and changes in sales due to improved product consistency. Qualitative information was collected on consumer, retailer, merchant, and agent views, perceptions, strengths and weaknesses. Each market trial tested a different marketing channel allowing a qualitative evaluation of the different marketing options growers have. In every trial, comparisons were made in the percentage change in gross produce returns provided by the trial product. This change was calculated by comparing sales of the trial product line targeted before and during the trial. This approach was taken to gauge commercial impact, (if any) and is not in the true sense statistically valid data but observations of commercial impact. These trials are summarised below and full reports are attached as appendices 8, 9 & 10.

The overall objectives of the market trials were to:

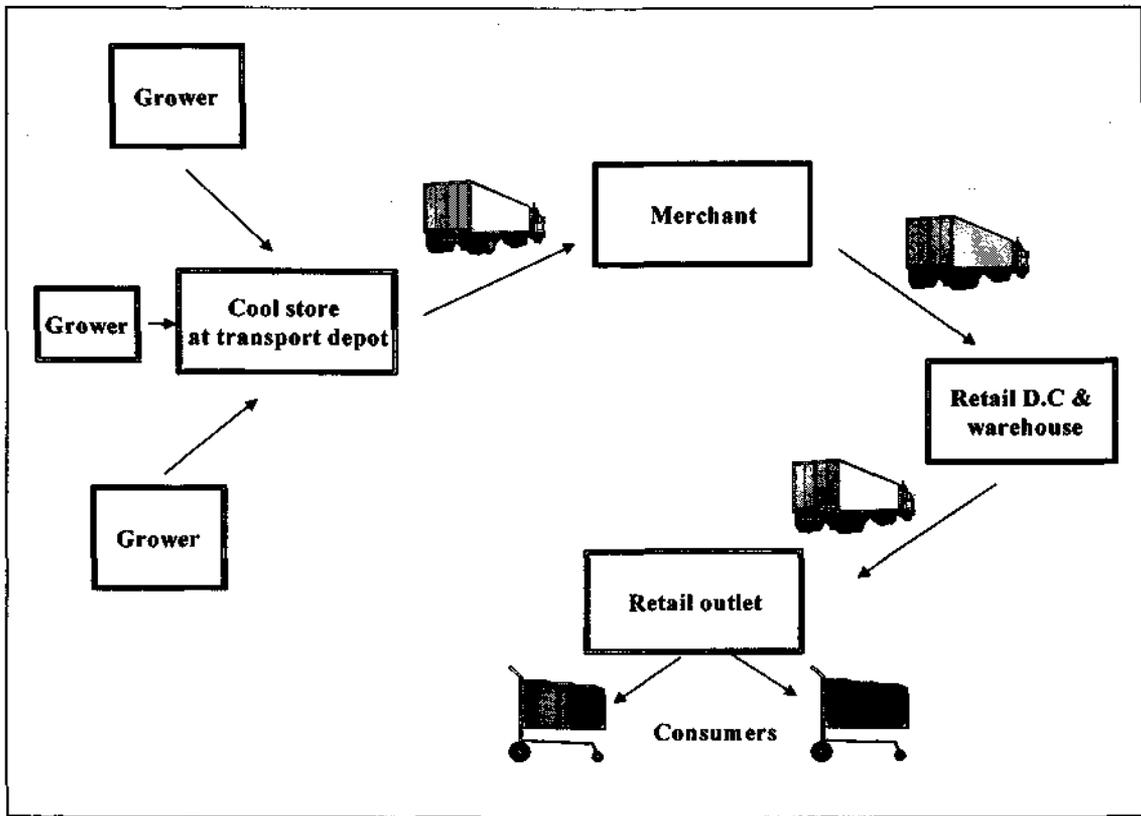
- **Provide a learning environment for the pilot group**
- **Gather information on the fresh potato marketing system**
- **Ascertain food safety and QA requirements for the Australian fresh potato industry**

### Potato supply chain

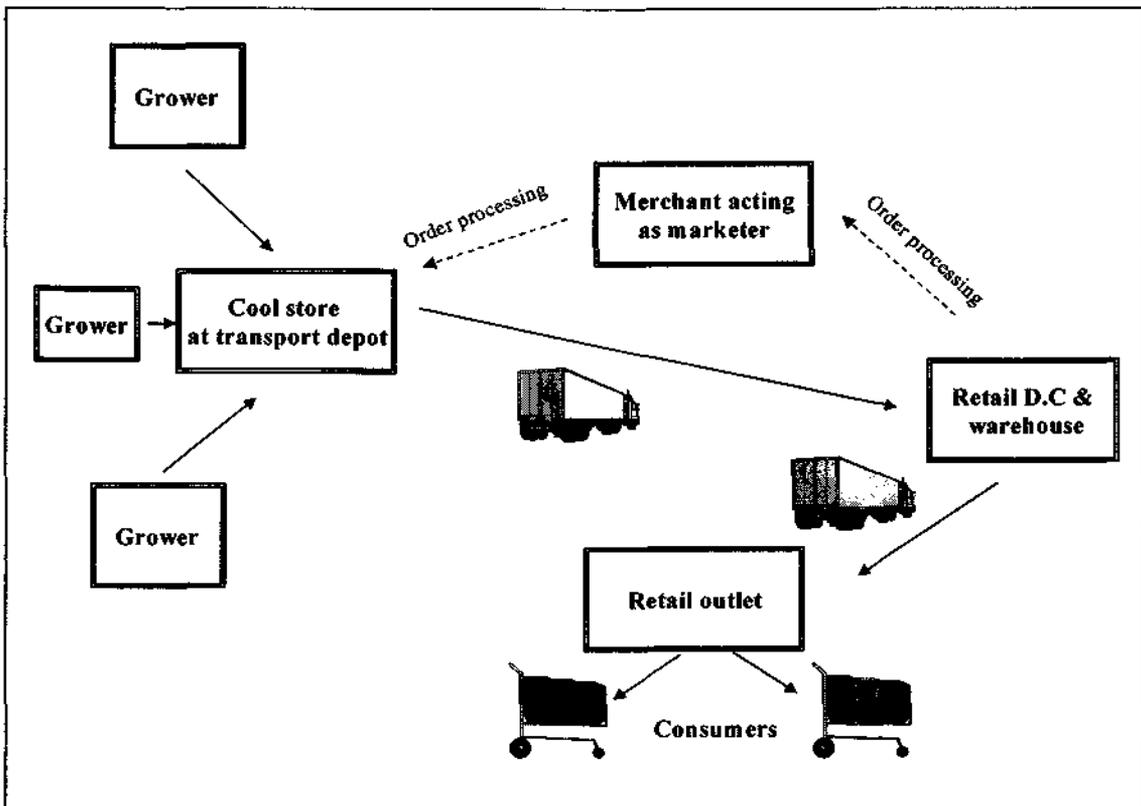
All three market trials used a different supply chain to deliver potatoes to the consumer. In the first (autumn 1997) trial a more traditional supply chain was used where potatoes were sent to the retailer via the central markets (figure 2). In the second and third trials of spring 1997 and 1998 the potatoes were not processed through the central markets but were dispatched direct to the retailers distribution centre (D.C)(figure 3).

Supplying potatoes directly to the retail distribution centre, without the extra step through the central markets reduced handling and the associated costs of extra transport/warehousing functions. By supplying directly to the retail D.C errors due to stock rotation and delivery times were greatly reduced. This resulted in the consumer receiving fresher produce. The reduction in age of stock with the shortened supply chain often saw consumers being presented with fresh potatoes less than 24 hours after packing. The potential for handling damage such as bruising was also reduced, however no evidence of this was noted in the quality checks performed in store.

The potatoes marketed in these trials were of course harvested, graded and packaged by the growers which meant all the value adding was done on farm. Doing this on farm is not necessarily a preferred option and is restricted by other factors that are discussed in detail in the market access section.



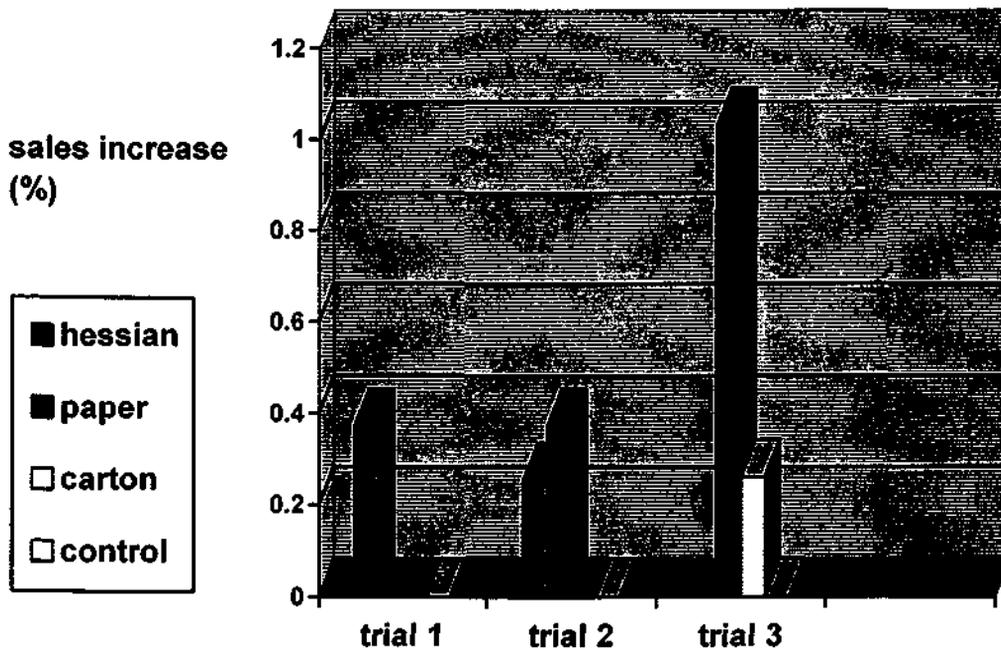
**Figure 2. Autumn 1997 Product flow using the central markets as a warehousing and distribution point**



**Figure 3. Spring 1997 and 1998 Product flow direct to the retail distribution centre.**

## Impact on sales

Changes in sales and gross returns were examined by calculating the percentage change in gross returns for the individual retail outlets that could be attributed to the trial potatoes supplied. Changes in control store sales were used as a reference or zero point and the trial store figures were compared to these. The sales of the pilot group potatoes were always higher than the control store sales (control stores were marketing red soil potatoes in all three trials). In trial one and two relatively small increases were experienced in comparison with the control stores. The third market trial showed improvements in the trial stores stocking retail ready cartons, and significantly higher returns in the trial stores using paper bags (figure 4). The sales increases experienced in trial



**Figure 4. Percentage increase in gross produce sales in pilot group trial stores**

three show major opportunities for improvements in potato sales which could have the potential to improve returns for everyone in the potato supply chain. Something that is often overlooked at retail level is the eighty twenty rule i.e., 20% of effort is being put into a product which can improve sales by 80%. Potatoes as a fruit and vegetable category at retail level are somewhere between 10% and 14% of produce sold and are only rivalled by bananas. The potential for improving revenue from potato sales is by far the highest for any fruit and vegetable, as even a small improvement in returns for potatoes is equivalent to the value of a whole category of some of the other fresh produce lines stocked. If we use the increases achieved in trial 3 (figure 4) and assume there are 220 produce outlets in Queensland (between the three major retailers) with average gross sales of \$60 000. There is the potential to sell an extra \$136 000 worth of just this one line of

potatoes/week. At \$700/tonne this is the equivalent of around seven and a half, twenty-five tonne semitrailer loads per week.

The argument presented here is that even a small amount of extra effort in improving handling, displays and presentation of potatoes can greatly improve gross produce sales for retailers. There was no apparent relationship between ticket price and sales (appendix 10) which confirms the results of previous research, (Lewis 1994) more recent research in Western Australia (Market Equity 1999) shows that price is not the main factor affecting the consumer's decision to purchase potatoes.

## **Grower experiences**

Grading to a set specification provided a consistent target for the growers to meet. The pilot group had previously not marketed their produce using a written quality specification and found the use of the specification important for improving their quality. Conversations held with consumers regarding their decision to purchase revealed that consumer expectations were easily met if the specification was adhered to.

By using a traceability code (a packed-on date) the pilot growers were able to monitor the movement of their potatoes beyond the farm gate. The ability to track produce had a lot of benefits for growers particularly when there were stock rotation problems in either the markets or at the retail level. On one occasion, a quality complaint received by the growers from the retailer for aged stock was actually tracked down to a retail distribution centre error.



**Plate 4. Potato paddock oversown with barley to reduce soil adhesion on potatoes at harvest**

The packed-on date was particularly important for the store staff when displaying stock as most stock lines often did not have traceability codes that were easily translated. The use of a packed-on date was by far the easiest means for everyone in the supply chain to achieve sound stock rotation.

The retail specification actually required a use-by date, but after several negotiations the retailer agreed to a concession on this due to the case put forward by the growers that shelf-life on potatoes is very variable and depends on how the potatoes are stored. Therefore giving consumers a use-by was considered inappropriate, as potatoes are not highly perishable.

The growers in the pilot group soon learned that product consistency and supply continuity were two major issues to be addressed to keep the customer satisfied. Firstly, cool storage was used for bulk potatoes before packaging to maintain an emergency supply in case wet weather prevented access to paddocks. This cool storage had the added benefit of drying mud on the potatoes which improved the consistency of brushing at grading. Secondly, a number of growers particularly in the heavier soils would oversow (plate 4) their crops approximately eight weeks before harvest with a cover crop such as barley (winter) or french millet (spring). This cover crop helped to manage soil moisture levels closer to harvest resulting in cleaner potatoes.

### Marketing Implications

The most important finding of this trial was that potatoes of a consistent quality level were preferred by consumers and that the industry standard packaging for loose potato supply i.e., the 20 kg hessian bag is not the best packaging format available to the industry. Potatoes supplied in paper bags (plate 5) had a fresher appearance than those supplied in hessian bags (plate 6). There was no evidence to show a consumer preference for red soil potatoes. Sales of potatoes in the control stores (red soil potatoes) were lower than sales of potatoes (black soil potatoes) in the pilot group stores (figure 4). Quality inspections performed at store level in trial three, clearly showed the greatest amount of defects in the control stores (figure 5).

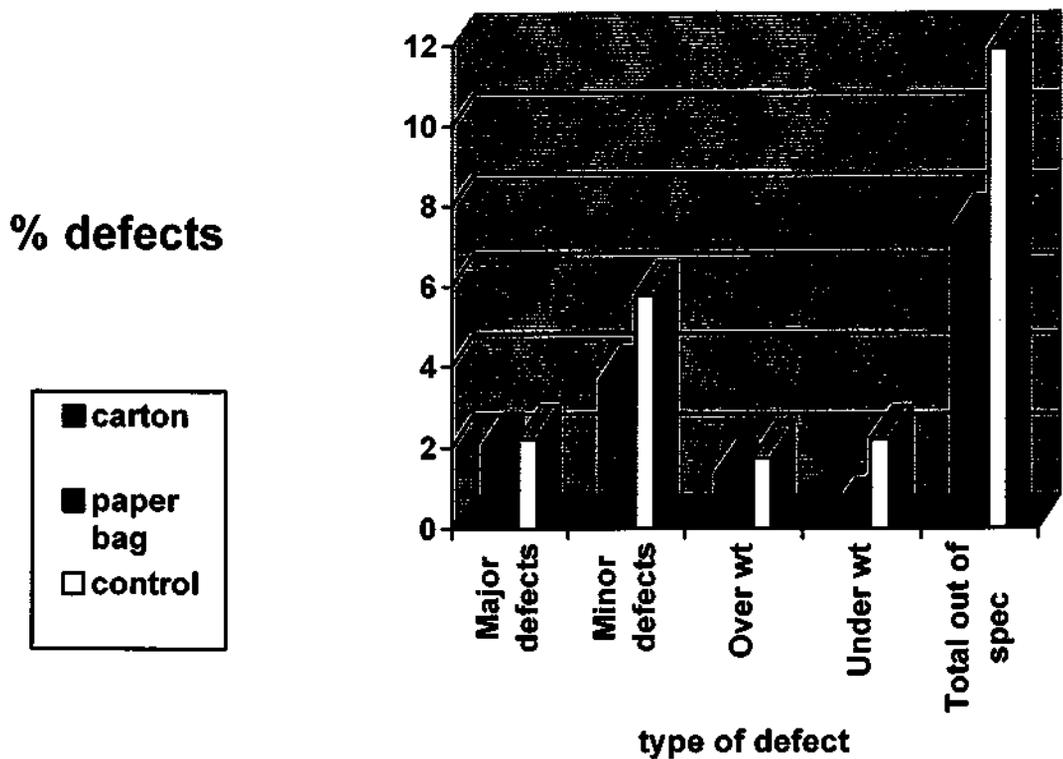


Figure 5. Graph comparing quality defects for 1998 spring trial

This suggests that a major factor influencing the consumer's decision to purchase is related to consistent appearance/quality. In the third market trial potatoes supplied in cartons did not, as expected, sell better than those delivered in paper bags. The carton potatoes had advantages due to improved stock rotation however, the retail staff took greater care filling and maintaining displays at the paper bag stores resulting in uniform consistent displays and the highest level of sales (figure 4). This improvement in cleaning and filling displays, combined with a more consistent product being supplied by the growers, delivered a result that was well beyond what anyone expected. In fact the store group using paper bags sold 50% more premium loose brushed sebago potatoes during the trial than before the trial.



**Plate 5. Five-day-old potatoes supplied in paper bags**



**Plate 6. Five-day-old potatoes supplied in hessian bags**

## **7.3 Marketing**

A major objective of this project was to develop a marketing model for the fresh potato industry. To meet this objective the marketing chain had to be analysed in detail. Previous research had been performed on the marketing channels in Queensland (Marketshare 1994) and found them to be long, with many steps resulting in growers receiving little if any feedback on market requirements. In this project the intention was to validate these findings in a practical sense by taking a production unit (the pilot group) on a journey from the farm to the consumer. When this project was developed there were major doubts and questions in growers minds due to large differences between farm gate price and retail ticket price.

To address this objective a number of key issues had to be addressed and skills developed within the pilot group to overcome these issues. In the sections ahead the findings and experiences of the group have been identified as the key marketing issues/activities experienced by the pilot group involved in this project.

### **Production vs Consumption**

What is selling a product and what is marketing a product? Selling a product is having a sales and production orientation where the primary concern is to produce as much as possible with high efficiency and then to aggressively sell the product. By this definition growers have a distinct production orientation with the agents doing the selling. Marketing a product is about having a consumer and market orientation. A consumer orientation is based on determining what the consumer needs and wants before deciding what product to produce or sell. The majority of potato growers then clearly have, a selling and production orientation and are not marketing their product in the true sense.

In the past most of our farmers always had someone coming to them wanting their product. The role of produce agents has historically been to act as a sourcing agent for a product hungry marketplace. Hence the marketing was done at the growers mailbox. As technology has advanced, yields have improved, new areas have been developed and supply has increased. Our economy in most areas is now market driven not production driven. There are plenty of potatoes and only the people out there doing something different or offering a different product with perceived different benefits are demanding a price.

***Where demand is no longer driving the market the farmer is no longer the price maker. Instead the farmer takes whatever price is being offered.***

In a market driven economy selling a product is no longer marketing it. Marketing is about service, choice, perceived benefits, branding, and product guarantee. Supplying a value added product in a cardboard carton for direct retail display was an example of this. Here value was added and the price per kilogram was higher as the customer, ie., the retailer, perceived a benefit due to ease of handling and the potential for improved display management. The pilot group experienced this change and went beyond the mailbox. The main vehicle for achieving this was improved communication. The traditional communication system used by growers ie., information via agents and growers, was found to be poor. Information was often slow to arrive, of poor quality or filtered to an extent that it was approaching untruthful. The growers were able to improve their potato quality and understanding best by talking to retailers and in particular to consumers who were

purchasing their product in retail outlets. The use of this customer/consumer orientation, ie focussing on what the customer required, created demand and the product was pulled through the supply chain.

A production orientation is not only the domain of the farmer. This was also true of retailers. Staff at store level don't like to throw produce out either. This is not because they are too lazy but because the store is their farm and product they throw out is seen as a sale they do not make. Most farmers never want to throw out product because of exactly the same reasoning. The only problem with this approach is that consumers now have a choice and if they don't like the product being offered they will buy something else, like pasta or rice.

## **Market access**

Traditionally, access to potato markets was very open. In a marketplace now tending to be market driven ie., a distinct consumer orientation, there have been substantial changes and these changes now act as barriers for growers trying to access their traditional markets.

The pilot group identified three major areas where market access restrictions need to be overcome:

- **Food safety requirements**
- **Reduced number of customers**
- **Quality management as a prerequisite.**

During the course of this project the pilot group worked along the supply chain and made the following observations with regard to these market access restrictions.

## **Food safety requirements**

A heightened awareness in the community to food safety issues has led the major retailers to demand from suppliers, compliance with international food safety protocols. This has been in most cases driven by fear of litigation after several major food safety contamination cases in Australia. Food safety is not seen by consumers as an optional extra but is expected. Consumers do not consider being poisoned when purchasing a food product but take for granted it is safe.

Therefore to supply produce to most customers ie., the big three retailers and the majority of processors, requires some sort of management system in place that addresses food safety. At the start of this project in 1996 this was not a current market access restriction. Today in 2000 approximately 80% of the retail fresh market and 90% of the processing industry have either set deadlines or have the implementation of some form of on-farm food safety based system as a prerequisite to supply.

## **Reduced number of customers**

The number of customers in the retail sector has fallen significantly. The dominance by the three major chains (Woolworths, Coles, and Franklins) at the expense of smaller independent operators means that potato growers, merchants and agents have fewer individual customers to deal with. As these major customers have become larger they have moved to improve their efficiency by having fewer direct suppliers. This has resulted in fewer larger merchants of potatoes supplying this large sector of the market. This is a serious market access restriction to the average grower as they now have only a few people to deal with to access this market. This means there is less competition between these major direct suppliers and if a grower cannot form a strong alliance with one of these buyers or does not have something unique to offer then their market access is restricted. This has impacted heavily on smaller growers who have no large volumes of product and really have nothing to offer the merchant/retailer that they cannot source elsewhere. The pilot group found no easy answer to this problem and at the time of writing this report a number of the original pilot group growers along with some other growers were conducting a market and business planning exercise to try to find some solutions.

Previously a lot of growers have been fortunate to have unique supply windows when the customers ie., merchants and retailers, were forced to buy from them. This was often good for individual growers as they could sell their potatoes regardless of quality, but on the other hand bad for the industry as this created complacency particularly with regard to quality. This allowed new products such as pasta and rice little competition when they first entered the market. As new production areas have been developed, few unique supply windows are left and unless there is a natural disaster somewhere there are now few unique supply opportunities. This of course was the driving force behind the development of the red soil potato as districts with red-soil are fewer than those without red-soil. This marketing strategy has differentiated the red-soil potato in the eyes of the retailers. This has driven price up in those areas and reduced price in areas that cannot supply that product. A marketing strategy like this is however not a long-term strategy, as it is not consumer driven. Inevitably supply will increase from the red soil areas and because a red soil potato is just that, a potato with red soil on it, there are now a lot of people washing potatoes and rolling them in red soil. This is extremely bad for the industry as these potatoes will have poor shelf-life and give consumers an even worse perception of quality. However it remains that the red soil exercise has been an interesting one in the marketing sense as it has created a new product in the customers eyes ie. the retailer, and helped some farmers improve their income. The consumer sees no benefit in this and the colour of soil has never been shown as a consumer driven proposition. In fact, information gathered in this project when talking to retailers indicates washed potatoes are becoming the most sought after potato type as consumers prefer products that offer convenience and ease of preparation.

## **Quality management as a prerequisite**

As well as demanding food safety as a prerequisite to supply, a number of major customers also require a management system for their suppliers aimed at improving quality and controlling quality. The last four years has been a time of great turmoil with the requirement for various systems and much confusion. Between 1996 and 2000 all the major retailers and most of the major processors have put in place requirements for direct suppliers to have some form of quality management system.

The list of systems has been long, with companies such as Woolworths and Smiths Snackfoods even developing their own proprietary systems and other major customers adopting more universal systems. For growers this has meant there are restrictions to who they can supply depending on what system they have in place. So before any grower plants a crop they must make sure they have the appropriate QA system in place to supply their desired market. This has been a major change for growers in the Australian potato industry.

## **Quality Management**

Improving quality in the potato industry still remains the number one hurdle for the industry to overcome. The pilot group clearly showed that providing consistent quality could stimulate demand for this staple product. Contrary to what has happened in most industries, quality of product is still a worthwhile marketing tool.

Most growers think that their potatoes are the best quality in the marketplace. The pilot group soon learned that until the final product is evaluated against a set specification, not many growers are selling a consistent quality product.

The experiences of this project show that true QA is made of three components:

- **Quality Planning**
- **Quality Control**
- **Quality Improvement**

## **Quality Planning**

Quality planning must take place and is based around planning for the product output required by the customer. Developing a specification is a critical part of this process and true planning cannot take place until there is a clear target to meet. An example experienced by the pilot group was the changes to plant spacings required to meet the premium loose brushed sebago specification used in the three market trials. On a number of the farms involved in the trials plant spacings had to be reduced to produce smaller potatoes as a lot of the growers involved were traditionally growing a large line of sebago for the food service market that went to chips and scallops.

## **Quality Control**

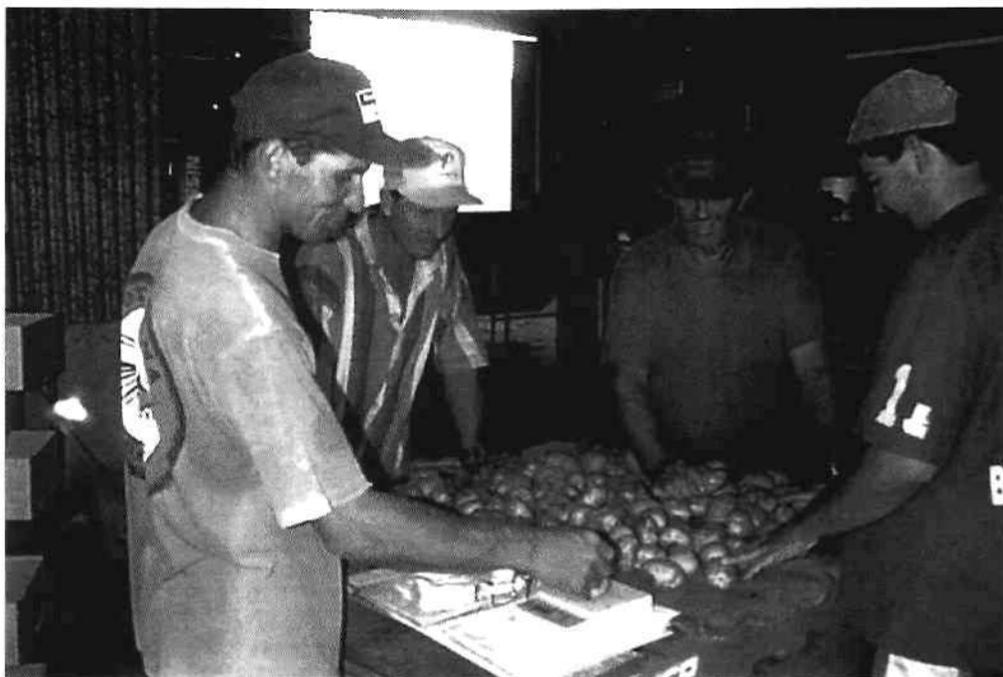
Once the potatoes were grown and packed, quality had to be checked. This was simply done by comparing the number of defects and the sizing to the specification (plate 7). In the first market

trial this quality control had the greatest impact on the pilot growers. The pilot growers as with the majority of growers at the time had rarely ever evaluated their potatoes and if they did, this was a very informal look with definitely no quantitative analysis of size and defects.

*This basic lack of quality control had to be overcome and still has to be overcome before the potato industry ever looks like moving to true QA.*

The retail specifications at the time gave no thought as to how to go about the evaluation. If the specification level of a particular defect was 5% what was this percentage based on the number of tubers or the weight of the product? Of course the most objective measure is to work by weight and this project was instrumental in working on quality control issues like these. To date, many so-called quality assured packing facilities still perform quality checks based on a general visual assessment of the defects in a sample. The question for the quality auditors out there must surely be then the level of significance of such a subjective evaluation process.

If the defective potatoes are not removed before the potatoes reach the retail display then the consumer does the final quality control. This is arguably why our consumers have such a preference (Lewis 1994) for loose displays as they do not trust us to remove the defects, they have to. The problem of course with letting the consumers remove the good potatoes and leave the bad ones is that the appearance of displays deteriorates resulting in reduced sales.



**Plate 7. Growers performing quality control inspection of packed product**

## **Quality Improvement**

Quality improvement was demonstrated by the pilot group on many occasions in the project, with examples of equipment upgrades to reduce damage, alterations to post harvest storage conditions to

improve quality and modifying packaging systems to improve consistency and quality. None of these improvements would have occurred unless quality control inspections were performed.

***It is simply not possible to improve performance without measuring it***

The question for the Australian fresh potato industry is how do we transform this into an across-industry phenomenon? The answer is quite straightforward: the specifications for supply must not vary. If a major retail customer sets a specification they must adhere to it. Alterations to specifications and acceptance of product inside and outside these specifications, is still too subjective and is driven by market forces. Recent research (Henderson & Franz 1998) has demonstrated poor potato quality in our industry is still a major problem.

## **7.4 Marketing Myths**

To demonstrate the production orientation of our supply chain, below is a list of the popular myths found in the potato industry during the course of this project. The work done in this project when exploring supply chains has failed to substantiate any of these myths. These myths are perpetuated within the supply chain by growers, agents, merchants and retailers, not by the consumer.

### **Marketing Myth No.1**

*Red soil potatoes are better than blacksoil potatoes.* As mentioned earlier the market trial work showed no definite consumer preference for soil type (figure 4). In fact the preference is more for sound uniform potatoes that serve the purpose the consumer has for them. The reality is that red soil potatoes have been branded and differentiated in the market by suppliers. This was not consumer driven but supplier driven and has been promoted to educate/convince consumers of a difference. In the marketplace both styles of brushed potatoes have advantages and disadvantages. Red soil potatoes present better when harvested in wet conditions and are not prone to greening as much as blacksoil potatoes. On the other hand blacksoil potatoes when prepared properly are more like a washed potato and consumers hands do not get as dirty when they are handling them. There is no clear preference yet demonstrated by consumers for either style of brushed potato.

### **Marketing myth No. 2**

*The retailers are making 200 to 300 % profit on potatoes.* This myth is common amongst growers who base this on the difference between farm-gate price and retail ticket price. This myth is often fuelled by merchants and agents because they don't want to be seen as making too much as they have to face the growers daily. What is often not considered is the number of steps and particularly double (even triple) grading of potatoes. There are several steps in the typical potato marketing chain and everyone has to add something on. In general, across a category like potatoes, retail

markup is approximately 50% of buy price. Retailers charge a further 3-5% to their direct suppliers as an advertising and product promotion levy.

### **Marketing Myth No. 3**

*Every grower in every district around Australia thinks their potatoes taste the best and this is a market advantage.* This is a myth as there is no documented evidence that consumers buy a potato for its flavour. Market research (Lewis 1994) has shown that quality and consistency is the most important factor affecting the decision to purchase. This has been backed up by the results of the market trials conducted in this research. Recent West Australian research (Market equity 1999) has shown that appearance and what the potato is cooked with, are the two most important factors consumers consider when purchasing potatoes.

### **Marketing myth no.4**

*If one retail chain is on special they all have to compete as consumers buy on price.* If one chain runs a special the others want to follow. This is driven by the belief that consumers are coming to their shop to buy a staple like potatoes, and while they are there they will spend money on other products such as bread and toothpaste and hence increase returns for the whole store. Research shows that consumer decision to purchase is not related to what else people are purchasing and is not greatly affected by price. In fact as mentioned above, quality, consistency, (Lewis 1994) appearance and what the potato is being cooked with (Market equity 1999) are the most important factors and the majority of consumers do not rate price as a limiting factor until potatoes go over \$1.50/kg (Lewis 1994). This was supported in the market trials where it was estimated that only 1 out of 20 stores was purely price driven. What other industry consistently markets its product below what the market is prepared to pay?

### **Marketing Myth No.5**

*Competition is supposed to be good for consumers.* In this industry it is not. When prices are lowered due to fierce competition particularly when potatoes are over supplied, everyone in the supply chain has to reduce returns. The main way suppliers cope with reduced returns is to sacrifice quality. This in turn reduces consumption further compounding the oversupply. Store losses and returns of defective product are higher. When this happens everyone in the supply chain equation from growers to consumer is a loser.

### **Marketing Myth No 6**

*The market price for potatoes is what retailers are paying.* The reality is that retailers do not buy central market potatoes in 50kg bags. They buy value added lines in special size packs graded to their requirements and they of course pay more for them.

## **Marketing myth 7**

*The market price sets the retail price.* When market prices vary, retail prices also vary but by no means as much. During the market trials performed by the pilot group, market price varied up to \$150/tonne but retail buy price would only change by \$50/tonne.

## **7.5 Marketing Model**

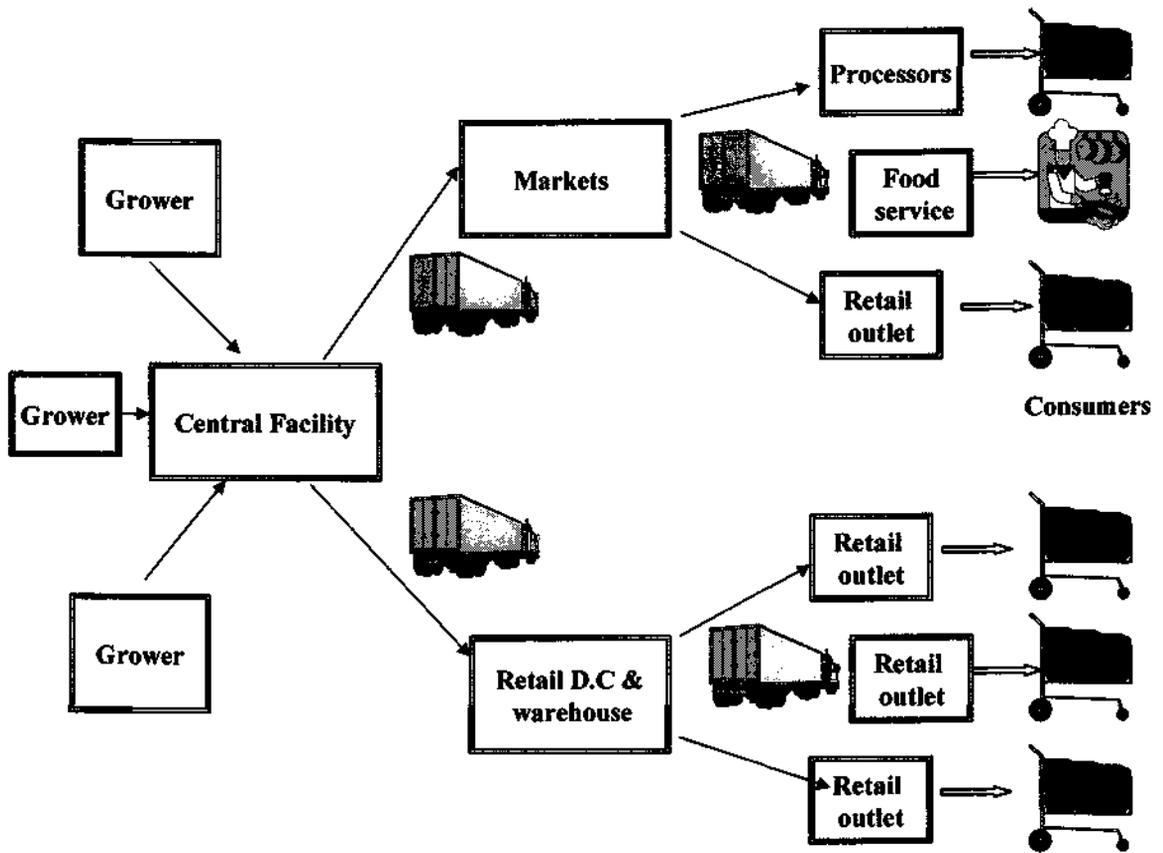
It is an impossibility to develop a "one size fits all" marketing model for the Australian potato industry. However based on the experiences of the pilot group of growers involved in this project, a number of market supply options have been evaluated. When evaluating a supply/marketing chain for potatoes there are two issues to be considered, the product and the marketing of the product. No longer in this industry do the people doing the marketing necessarily have to handle the product. In fact, the industry is now starting to see more product going direct to retailers with the marketing being done by people who never actually handle the product.

### **Product flow**

The first step in improving the fresh market supply chain is to address double handling of potatoes. Potatoes are often graded then regraded and traded between markets and agents. These actions rarely add value to a transaction only cost. Quality is also affected by extra handling and as demonstrated in the market trials stock rotation and freshness are harder to achieve when potatoes are being handled by multiple parties. The role of the central markets has changed dramatically with the expansion of the major retailers. No longer does the central market fulfil the storage/warehousing and order collation role for the entire industry as it once did. The major retailers now have their own facilities to perform these functions. Growers in particular need to be mindful of this if they want to improve the quality of their potatoes and on farm returns. An improved product flow model has been presented in Figure 6.

There is now one basic principle that growers need to adopt to improve quality:

***Reduce handling steps in the product supply chain that do not add value.***



**Figure 6. Product flow model for the fresh potato industry**

## Potato Marketing

As the fresh potato industry has moved from selling product to marketing it, so too has the role of our marketers. Traditionally local agents and market merchants were the marketers or should we say sellers of potatoes. Their role was driven by demand and their role was primarily in sourcing volumes of product to fill a market need. As discussed earlier we now have a situation where demand no longer outstrips supply and if it does, this now only happens for short time periods, due mainly to major changes in weather conditions which affect production capability. The experiences of this project clearly show that as the market has changed and so also has the role of the people doing the marketing.

The second basic marketing principle for the fresh potato industry is:

***People who sell potatoes as opposed to marketing them will not be profitable.***

To market potatoes successfully in today's industry requires skills in promoting the benefits and advantages of the product to the customer and consumer. Only the merchants and agents who adopt a strong consumer orientation will survive. Growers must therefore also be conscious of who is doing their marketing and whether they are sellers or marketers. The market access issues discussed earlier preclude the majority of growers from direct supply to the major retailers and therefore, it is desirable to centralise and/or amalgamate volumes in one facility.

## **Grower options**

Fresh potato growers basically have two choices to make. They either continue to play a passive role in the marketing of their product, or they become more involved in the control of their product once it leaves the farm. If growers decide to actively pursue their own marketing they are entering an area in which they lack skills and current market credibility. This however may be the only option for some growers as the number of supply points is further reduced. Presented below are four possible scenarios that explore the current market chain and some new options for growers:

- Use the traditional potato marketing chain
- Form strategic alliances with major suppliers/marketers
- Form marketing groups/cooperatives and joint packing facilities
- Become large enough to market in own right

**Note:** An evaluation of these scenarios has been performed from a growers viewpoint. It is hoped that this evaluation will help growers to make better decisions about their marketing options. Figures 7, 8, 9, and 10 show the marketing steps and assumptions on the cumulative value of the potato as it moves through the marketing chain. These values need to be considered in conjunction with the disadvantages and advantages listed.

### The traditional potato marketing chain

The traditional marketing chain (figure 7) is one where the grower has little control over the potatoes once they leave the farm. Growers in this chain often feel powerless and communication of consumer needs is usually poor (Marketshare 1994). This chain however offers growers security as it is currently in place and requires little investment or risk by the grower. The biggest threat to this traditional chain has come from the concentration of the market by the three major chains where approximately 80% of fresh potatoes are now being sold.

- ✓ Currently have market access
- ✓ Supply network and infrastructure exists
- ✓ Potatoes can usually always be sold at some price
- ✓ Merchants have long associations with some customers
- ✓ No understanding of marketing needed by growers
- ✗ Market access is shrinking
- ✗ Often has many handling steps
- ✗ Potatoes may be traded many times
- ✗ Unpredictable returns for growers
- ✗ Growers have poor understanding of consumer needs
- ✗ Growers lack control of marketing
- ✗ Growers lack ability to respond to market changes quickly
- ✗ Supply and demand driven
- ✗ Little support for individual growers
- ✗ Individual growers have no brand or image

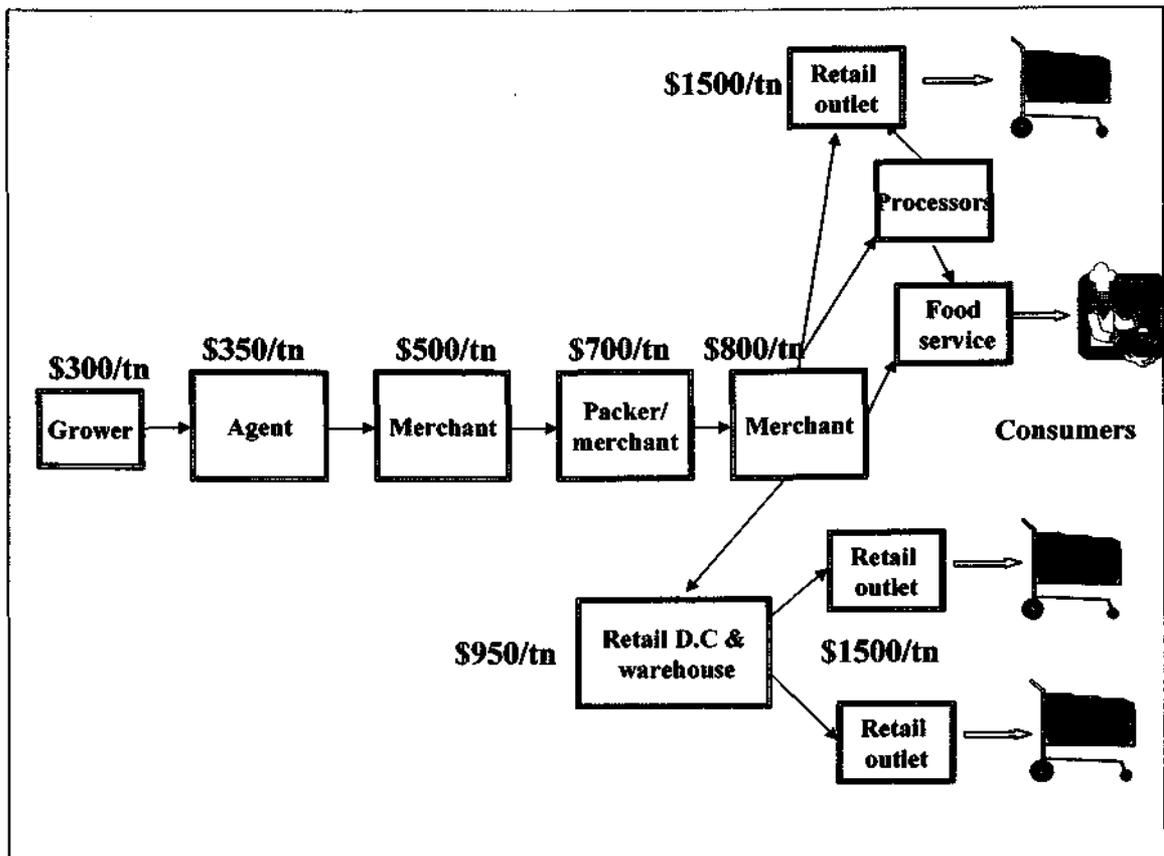
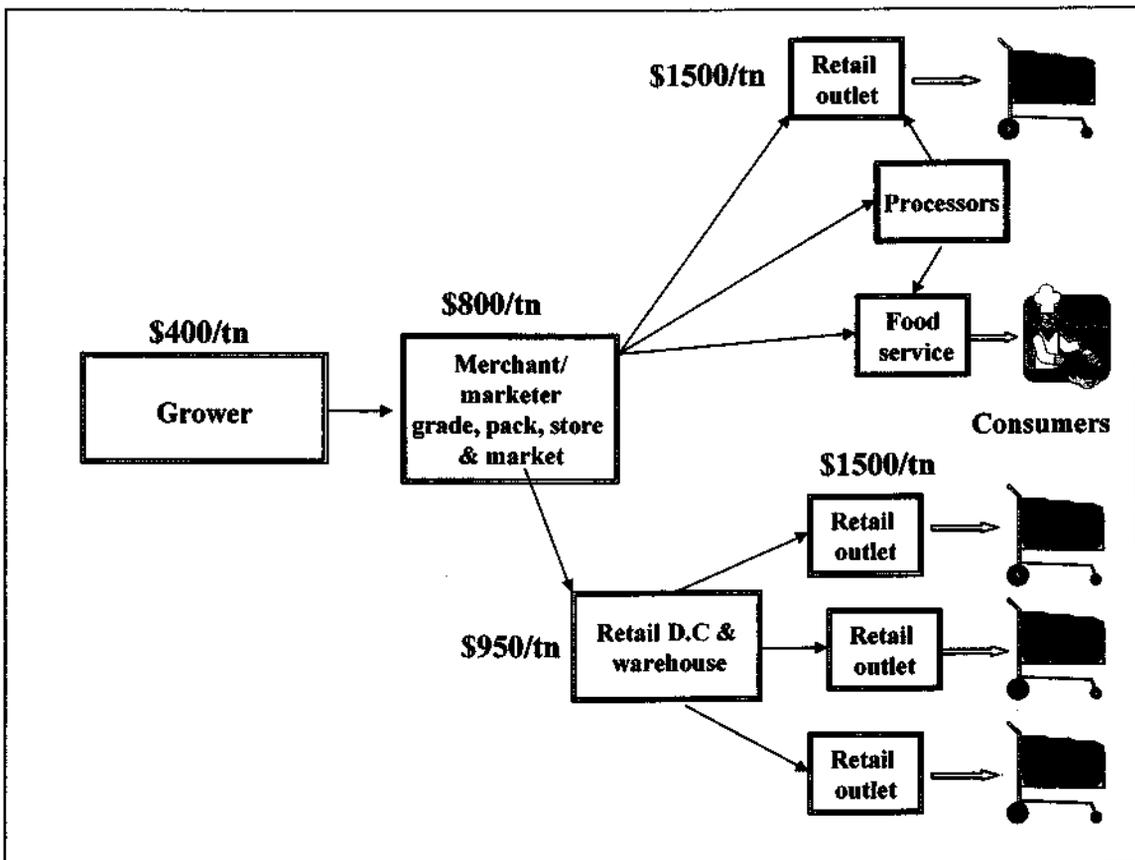


Figure 7. Traditional potato marketing chain showing potential price per tonne at various stages in the marketing chain

### Strategic alliances with current direct suppliers

Forming strategic alliances (figure 8) with current direct suppliers provides once again low capital outlay and low risk to the grower. Usually the supply network and customer base is already built. Of course the grower is quite removed from the customer and consumer but has more information on requirements than the grower supplying in the traditional supply chain.

- ✓ Currently has market access
  - ✓ Supply network and infrastructure exists
  - ✓ Potatoes can usually always be sold at some price
  - ✓ Usually less handling steps than traditional supply chain
  - ✓ Some support for preferred growers
  - ✓ Large market share
  - ✓ Large volumes created
  - ✓ Merchants have long associations with some customers
  - ✓ Only a limited understanding required of marketing by most growers
- 
- ✗ Growers have poor understanding of consumer needs
  - ✗ Growers lack control of marketing
  - ✗ Individual growers have no brand or image

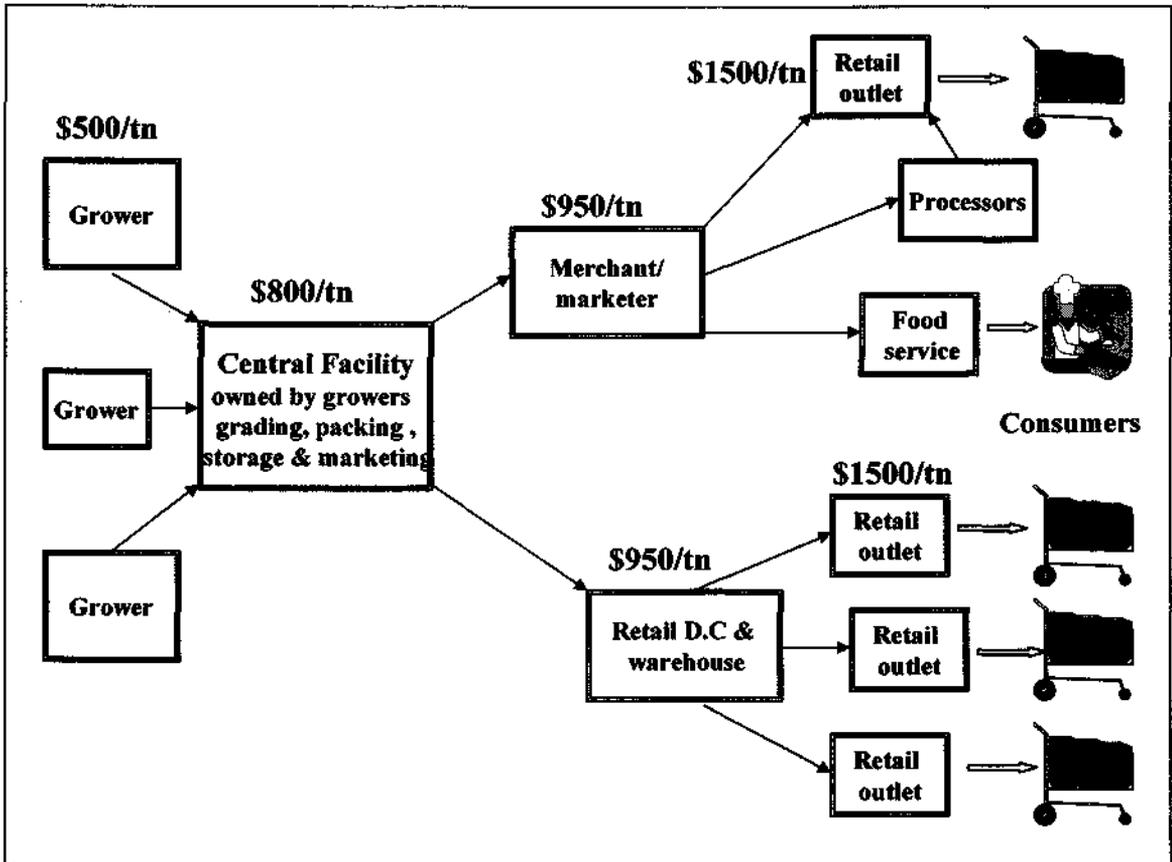


**Figure 8. Strategic supply alliance with an existing direct supplier showing potential price per tonne at various stages in the marketing chain**

## Grower cooperation

For growers to establish cooperatives/companies there are two options. First, doing their own marketing or, outsource this marketing to another agency like a merchant or specialist brokerage (figure 9).

- ✓ Growers have control over who does their marketing
- ✓ Less individual investment on infrastructure
- ✓ Allows growers to concentrate on growing
- ✓ Potential for higher returns
- ✓ Reduced handling steps
- ✓ Improved grower understanding of consumer needs
- ✓ Can have own brand/identity
  
- ✗ Requires some financial outlay by growers
- ✗ Market has to be built from nothing
- ✗ Need to employ people or agencies with specialist skills
- ✗ Requires commitment from all members



**Figure 9** Grower cooperation model where grower owned business controls marketing showing potential price per tonne at various stages in the marketing chain

## Direct grower supply

Direct grower supply (figure 10) to major customers provides growers the most control over their product marketing and the simplest marketing chain. However the grower now usually needs to have very large supply windows and have at their disposal the skills needed in everything from growing to potato marketing. This option is clearly limited to a very few growers due to limited opportunities in the market place and the sheer scale of operation needed.

- ✓ Complete control of marketing by grower
- ✓ Shortest possibly supply chain
- ✓ Can have own brand/identity
- ✓ Potential for highest returns
- ✓ Improved grower understanding of consumer needs
  
- ✗ Requires large financial outlay by growers
- ✗ Market has to be built from nothing
- ✗ Need to employ people or agencies with specialist skills
- ✗ Grower needs to do everything
- ✗ Need to have a very large supply volume and window

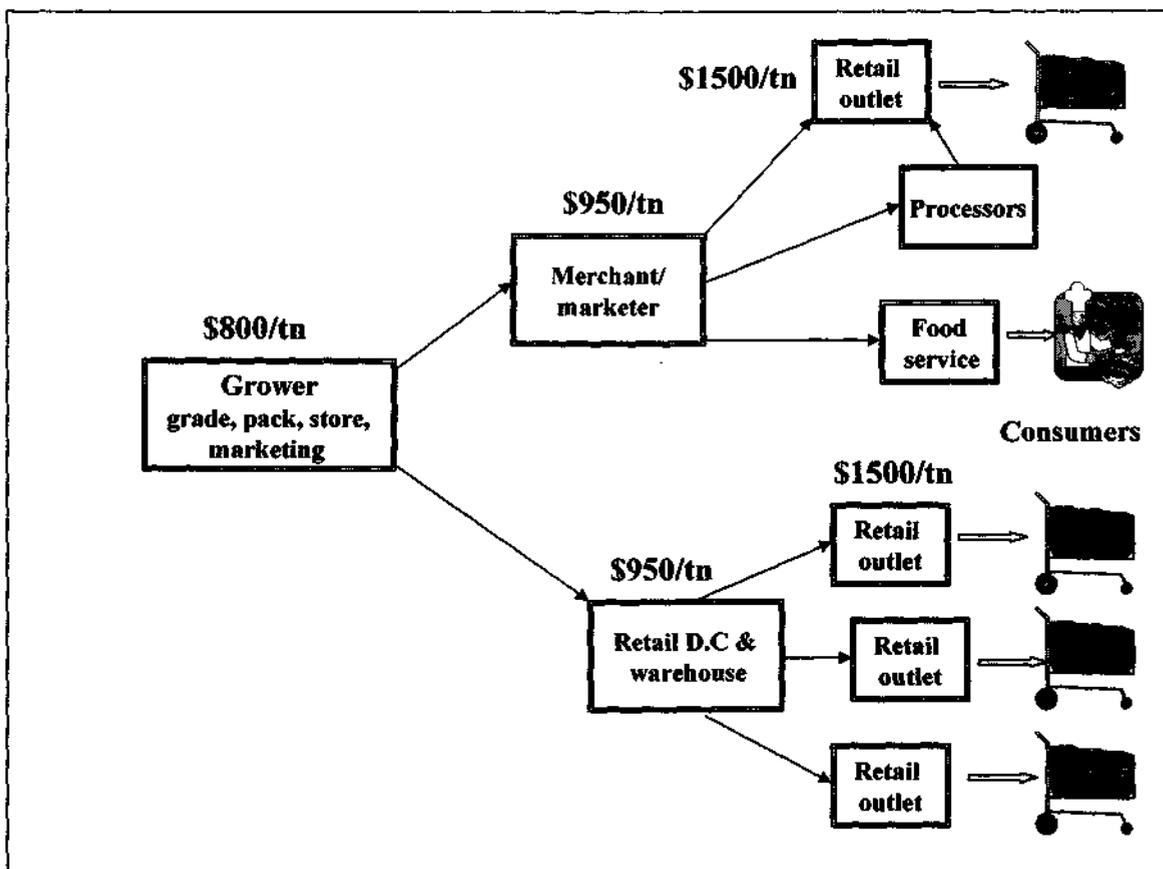


Figure 10 Direct grower to retail marketing chain showing potential price per tonne at various stages in the marketing chain

## **8.0 Acknowledgments**

I would firstly like to acknowledge my professional colleagues and industry representatives for their support during the course of this project, in particular Dr Ken Jackson, Craig Henderson, John Bishop, Ian Rickuss and Craig Wilson.

During the course of the project I have met and worked with growers, merchants, agents, retailers, government advisers and industry representatives all over Australia. The spirit of cooperation and friendly attitude of these people has been the most rewarding part of this whole exercise. It would be impossible for me to acknowledge all of these people here but for anyone I have dealt with in the course of this project I would like to extend a sincere thankyou. All of you, although at times you may not realise it, share a common goal, to improve the potato industry.

Last but not least the pilot group of growers at Gatton. These growers have made a difficult task a lot easier than it should have been. Their spirit and enthusiasm to learn new things has shown why they have stuck at farming potatoes for so long under the circumstances they have been in. Working with a group of people like this has been a truly rewarding experience and I hope I have been able to demonstrate some benefits to improve their position in this industry at such a trying time.

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## Potato Farming Practices Checklist

By completing this checklist and addressing the areas highlighted an ongoing commitment to **Good farming Practices** can be demonstrated.

***This checklist needs to be completed before the start of every season or at least once a year.***

The completed document needs to be retained as a record of the assessment.

### Chemical hazards

✓ Yes X No

Prior use of a site is considered before planting. Where necessary soil testing is performed to establish levels of metals and chemical residues.	<input type="checkbox"/>
Only fertilisers and gypsum with low cadmium levels are used.	<input type="checkbox"/>
Chemicals and fertilisers have been properly stored so that leaks and spills cannot contaminate soil, crops and harvested produce.	<input type="checkbox"/>
Anybody who uses chemicals on my property has been accredited. Chemsafe in Qld, Farmcare other states. <b>Training certificate required</b>	<input type="checkbox"/>
All equipment used to apply and or measure chemicals is regularly maintained and calibrated. <b>Record required</b>	<input type="checkbox"/>
Bins used for seed are not used for fresh potatoes, or if they are, they are washed to prevent contamination from seed dressings.	<input type="checkbox"/>
Records of all chemical and fertiliser applications are kept which include date of application, location, WHP expiry, chemical used, rate and person who applied the chemical. <b>Record required</b>	<input type="checkbox"/>
Trucks are always checked prior to loading to ensure fresh potatoes are not transported with anything toxic such as fuels, chemicals or fertilisers. <b>Record required</b>	<input type="checkbox"/>
Pallets are inspected prior to use to ensure they are free from chemical contaminants and fertiliser.	<input type="checkbox"/>
Packaging is stored in a manner to prevent contamination from fertilisers and chemicals.	<input type="checkbox"/>
Pallets of packaged potatoes are not top stacked to prevent dirt contaminated with fertiliser or chemicals falling in with the potatoes.	<input type="checkbox"/>
Bulk bags are inspected before filling for chemical and other contaminants <b>Record required</b>	<input type="checkbox"/>
Harvesters and graders are checked prior to use for any oil leaks that could contaminate the potatoes and where necessary repaired.	<input type="checkbox"/>
Food grade grease is used on rollers and on any points requiring grease where potatoes may come into contact.	<input type="checkbox"/>
Cadmium and chemical residue levels are monitored to ensure potatoes meet mpc and mrl's. <b>Certificates of analysis required</b>	<input type="checkbox"/>
A traceback system is in place so any contaminated produce can be traced back to the paddock of production <b>Record required</b>	<input type="checkbox"/>
Only registered chemicals are used in wash water and the levels are closely monitored. <b>Record required</b>	<input type="checkbox"/>
When storing potatoes they are kept dark or covered to prevent the entry of light which produces toxic greening chemicals.	<input type="checkbox"/>

**Physical hazards**

Prior use of a site is considered before planting, sections highly contaminated with potential physical hazards such as glass are not used.	<input type="checkbox"/>
Paddocks beside roadways are inspected before working the ground or harvesting to remove glass bottles.	<input type="checkbox"/>
Glass and foreign objects are excluded from areas where direct contamination of produce may occur eg lights over grading table are covered, staff on graders are not permitted to use glass drink containers.	<input type="checkbox"/>
Pallets and trucks are inspected to ensure they are free of foreign bodies such as glass and metal shavings before use/loading.	<input type="checkbox"/>
Bulk bags are inspected before filling for foreign objects such as glass and metal. <b>Record required</b>	<input type="checkbox"/>
Pallets of packaged potatoes are not top stacked to prevent bits of wood and other physical contaminants from falling in with the potatoes.	<input type="checkbox"/>
A traceback system is in place so that bags with foreign objects can be traced back to the paddock of production. <b>Record required</b>	<input type="checkbox"/>

**Microbiological hazards**

A pest control program has been established in packing and storage sheds.	<input type="checkbox"/>
Dogs/birds and other animals are prevented from entering packing sheds.	<input type="checkbox"/>
Toilet, hand washing and lunch facilities are available and staff have been trained to use them.	<input type="checkbox"/>
All packaging is stored in a vermin/pest free environment.	<input type="checkbox"/>

**Quality hazards**

A written specification nominating defects and allowable levels has been negotiated with customers prior to harvest.	<input type="checkbox"/>
Measures are implemented during growing and harvesting to control quality hazards that may not be visible at harvest.	<input type="checkbox"/>
Where a quarantine protocol must be followed to gain entry to a domestic or export market, all specified procedures are followed.	<input type="checkbox"/>
Staff involved in grading packing and harvesting have been trained to recognise handling defects of potatoes.	<input type="checkbox"/>
Quality control inspections are performed on packaged product to ensure the specification is met and the results are recorded.	<input type="checkbox"/>

Checked by \_\_\_\_\_ on \_\_\_\_/\_\_\_\_/\_\_\_\_

**Reminders on anything that needs to be addressed**

# Australian Potato Industry

## Quality Assurance Guide Document Toolkit for Farmers

Eric Coleman



Australian Potato Industry Council



## Introduction

The *Quality Assurance Guide Document Toolkit for Farmers* was prepared as part of a Horticultural Research and Development Corporation project 'Development of a quality assured production and marketing system for the fresh potato industry'. This project was developed by DPIQ and QFVG and was funded by the national potato levy.

Potato growers in the Lockyer Valley in Queensland formed a pilot group to determine market access requirements and trial findings commercially in order to benefit and assist potato growers around Australia.

During this process food safety systems like *Hazard Analysis Critical Control Points (HACCP)* were applied to on-farm production. It soon became obvious that the application of such systems was an onerous task, one of the main reasons being the lack of documented or *Good Manufacturing practices (GMPs* — or in this case GFPs Good farming practices) for the potato industry.

By applying HACCP across a number of operations numerous commonalities and opportunities to develop good practices were identified. The Australian Potato Industry Quality Assurance Guide for potato Farmers was developed. To compliment this a document toolkit with examples of the types of documents illustrated in the guide has been compiled to help farmers to start keeping records that are essential for their on-farm QA systems.

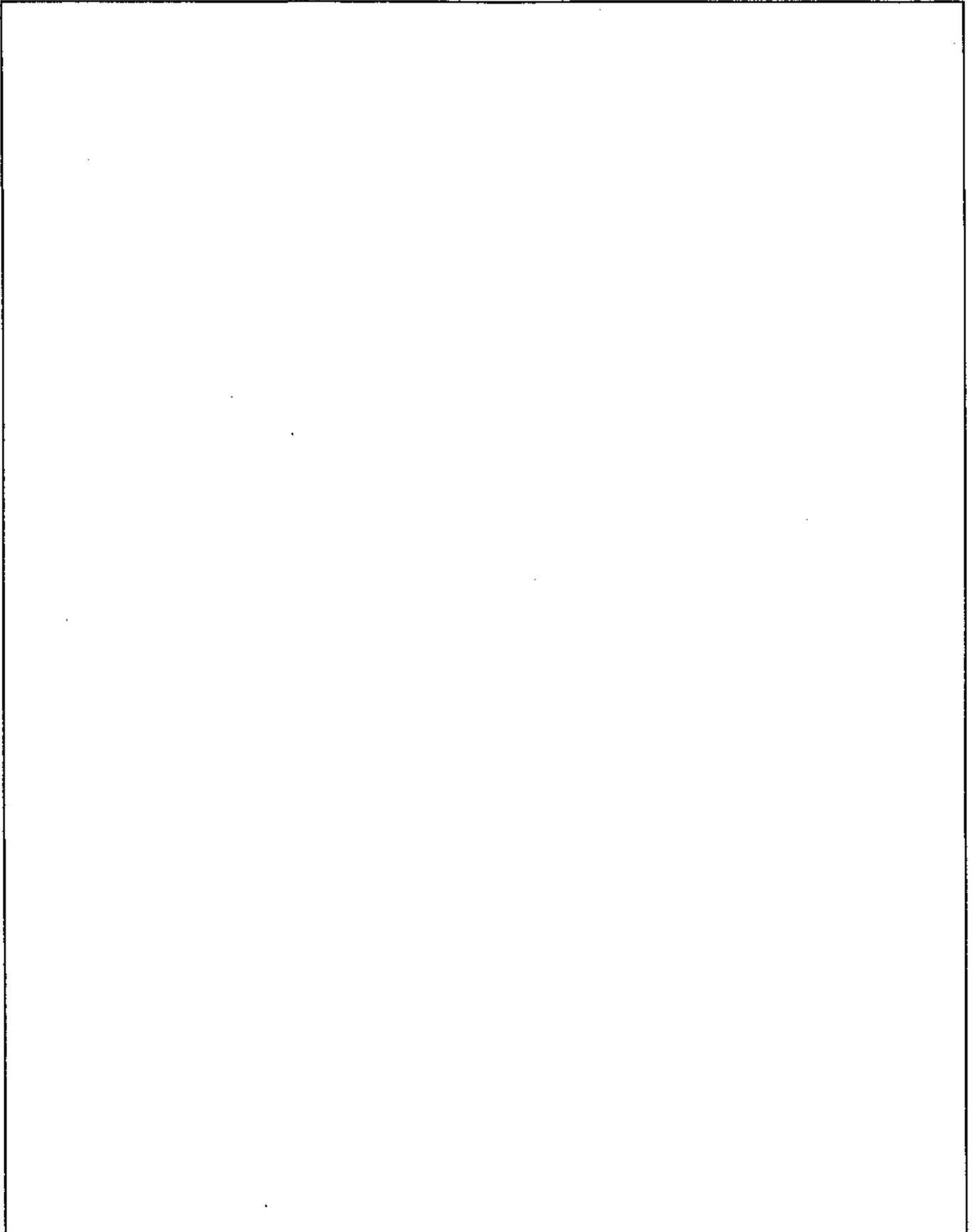
**The document toolkit is not comprehensive but aims to provide a point from which an individual operator or business can develop their own documents**

When these documents are completed on a regular basis they form a written record which can be used to demonstrate to another party compliance with good practices as per the Australian Potato Industry Quality Assurance Guide for Potato Farmers.

If you require further Information contact Eric Coleman on 0754662222

# Property Map

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<b>Farm</b>	<b>Year planted</b>	<b>Authorised by</b>
-------------	---------------------	----------------------









<b>Delivery docket for:</b>				<b>Docket No:</b>	
<b>Transport Company:</b>				<b>Date :</b>	
<b>Units</b>	<b>Unit size</b>	<b>Product ID (batch code)</b>	<b>Product description</b>	<b>Truck Inspection</b> ✓Yes x No	
				Free from glass metal and rocks	
				Free from chemicals fertilisers and toxic products	
				Free from manure and vermin	
				<i>Note: If no has been answered to any of the above do not load truck and inform supervisor.</i>	
<b>Truck Loaded and Inspected By:</b> _____				<b>Driver:</b> _____	

# Harvested or Bulk Potato Specification

<b>Product quality</b>	
<b>Variety</b>	
<b>Description</b>	
<b>Handling Requirements</b>	
<b>Traceability</b>	
<b>Storage</b>	
<b>Defects</b>	
<b>Insect damage</b>	
<b>Rots</b>	
<b>Greening</b>	
<b>Total defects</b>	
<b>Food Safety</b>	
<b>Chemical residues</b>	
<b>Contaminates</b>	
<b>Foreign Objects</b>	

Authorised by: \_\_\_\_\_ .Date: \_\_\_\_\_.

# Packed Potato Specification

<b>General Description</b>	
<b>Variety</b>	
<b>Description</b>	
<b>Size</b>	
<b>Major Defects</b>	
<b>Greening</b>	
<b>Sprout</b>	
<b>Internal disorders</b>	
<b>Rots</b>	
<b>Minor Defects</b>	
<b>Growth cracks</b>	
<b>Skinning</b>	
<b>Mechanical damage</b>	
<b>Deformed</b>	
<b>Insect damage</b>	
<b>Packaging and Handling</b>	
<b>Packaging</b>	
<b>Traceability</b>	
<b>Handling</b>	
<b>Storage</b>	
<b>Transport</b>	
<b>Product Safety</b>	
<b>Chemical residues</b>	
<b>Contaminates</b>	
<b>Foreign Objects</b>	

Authorised by: \_\_\_\_\_ Date: \_\_\_\_\_

# Laboratory Sample Sheet for Chemical Testing

**Sample Details:** Use a separate sheet for each sample

**Date:** \_\_\_\_\_ **Name of sender:** \_\_\_\_\_

**Crop:** \_\_\_\_\_ **Block/area ID:** \_\_\_\_\_

**Return address:** \_\_\_\_\_ **Phone:** ( ) \_\_\_\_\_

\_\_\_\_\_ **Fax:** ( ) \_\_\_\_\_

\_\_\_\_\_

**Chemicals to test for** Please tick as required

Please test the enclosed sample for the potato industry list of persistent chemicals shown in **BOXES A & B**

Please test for the current use chemicals I have listed in **BOX C**

*Please report MRLs in potatoes for all chemicals indicated below*

- BOX A Previous use unregistered**
- Aldrin
  - Alpha BHC
  - Beta BHC
  - Chlordane
  - Dieldrin
  - DDD
  - DDE
  - DDT
- Endrin
  - Heptachlor
  - Heptachlor epoxide
  - HCB
  - Methoxychlor
  - Lindane
  - Oxychlordane

- BOX B Current use persistent chemicals**
- Endosulfan

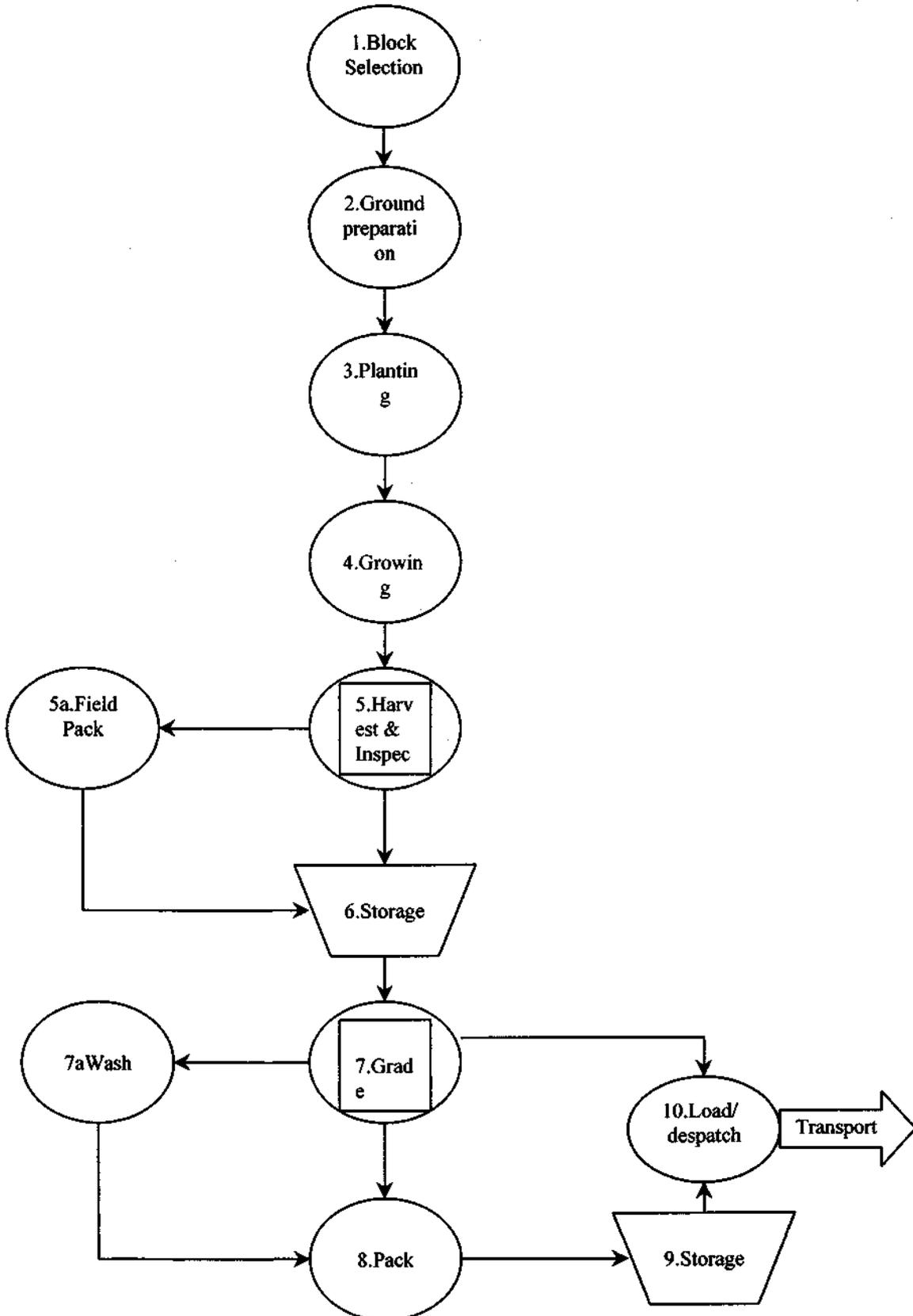
**BOX C Current use chemicals** (Please list other currently used chemicals below that you require tested)


**Please tick here if you want to test for CADMIUM**

# Potato Quality Control Sheet

Date packed							
Batch Code							
Grade							
Pallet/bag No							
Sample rate							
Sample Size							
Check weight							
<b>Size</b>				<b>Spec:</b>	<b>%</b>		
Oversize							
Undersize							
Total							
Total %							
<b>Major defects</b>				<b>Spec:</b>	<b>%</b>		
Green							
Sprout							
Internal disorders							
Rots							
Total							
Total %							
<b>Minor Defects</b>				<b>Spec:</b>	<b>%</b>		
Growth crack							
Skinning							
Mechanical Damage							
Deformed							
Insect damage							
Total							
Total %							
<b>Product Safety</b>				<b>Spec:</b>	<b>%</b>		
Foreign objects.							
Packaging contamination							
WHP check							
Comments							

# Generic Potato growing/harvesting and packaging Flow diagram



## Potato Industry Hazard Analysis.

The following hazard analysis was assembled using the input of potato growers. This hazard analysis was then used to develop potato industry QA guidelines.

Every hazard of medium significance is incorporated into a food safety checklist for the potato industry. This checklist prompts growers to adopt new procedures and also acts a vital internal assessment programme.

Every hazard of a high significance (which in the pure sense could be considered as a critical control point if there were no controls in place) is carried through to the QA guidelines as a specific action and requires some supporting documentation to verify the activity is being carried out.

Once all the control measures listed here are in place as either a good farming practice on the checklist or a recording requirement there appears to be no critical control points. This is due to the low risk nature of potato production especially when compared to foods with sensitive ingredients such as eggs and milk. This is confirmed by applying the new draft ANZFA risk classification system.

Without any food safety/training system in place the highest possible rating that could be given on the new ANZFA scheme would be rated as a low risk product requiring 3 yearly inspection.

However with an industry recognised system such as this one the risk category becomes very low and only requires 5 yearly inspection under the new scheme.

**The package of checklists formed by using this analysis has in effect allowed the production of industry prerequisites that eliminate the need for individual producers to apply HACCP**

This would then bring growers to a level that would make them approved suppliers to most accredited packaging houses and merchants and alleviate the need for implementation of accredited third party systems unless they are supplying a customer directly who requires it.

Step 1: Block Selection

Input	Hazard	Cause	s e v	r i s k	s i g	Reason for significance	Control Measure
Block	<i>Physical</i> Foreign Objects	Rubbish,/ refuse from passing cars, glass.	H	L	L/ M	Only of concern on road frontage. Number of steps later to reduce this hazard eg. rollers and chains on harvesting and grading equipment allow separation.	Inspect paddock before working ( <i>Food Safety checklist</i> )Don't use paddock next to road.
		Old Building sites, glass metal and rubbish.	H	L	L/ M	Problem in new unknown blocks inspect and decide before use. Number of steps later to reduce this hazard eg. rollers and chains on harvesting and grading equipment allow separation.	Don't use highly contaminated block (Food safety checklist).
		General Sticks, stones, metal and glass in paddock, pieces of tree root old plough parts.	H	L	L/ M	Decide before use of block as per GFP checklist Number of steps latter to reduce this hazard eg rollers and chains on harvesting and grading equipment allow separation.	Don't use highly contaminated block (Food safety checklist).
		Soil and stones attached to potatoes after harvest	L	L	L/ M	Dependant on final use. <u>For processing with no further cleaning this is an important step for minimising this hazard.</u>	<u>Only use block with suitable soil type.</u> (Food safety checklist).
	<i>Chemical</i> Residue in excess of MRL	Residues of registered chemicals from previous land use.	H	L	L	WHP period on registered chemicals will not present food hazard. Only long term chemicals affecting potatoes are herbicides. These will cause growth failure therefore no uptake into edible portion.	Use registered chemicals





Step 2: Ground Preparation

Input	Hazard	Cause	s e v	r i s k	i g	Reason for significance	Control Measure
Tractor Work	<i>Physical</i> Glass, metal.	Broken Headlights Machinery Parts	H	L	L	Highly unlikely occurrence	Regular Maintenance
	<i>Chemical</i> Oil/diesel	Leaks Breakdowns	L	L	L	Plants won't grow where soil is contaminated	Regular Maintenance
Fertiliser (organic)	<i>Physical</i> Foreign objects	Contaminated manure ie bits and pieces of plastic and metal.	L	L	L	Highly unlikely occurrence. Digging and sorting processes later remove possible contaminates.	Inspection and removal.
	<i>Chemical</i> Heavy metals in excess of MPC (Cadmium)	High levels in manures	H	L	M/H	Possible problem if sewage manures are taken from areas of industrial activity.  History of use of product without high levels	Check certificate of analysis for product (Food safety checklist).  Retain product analysis/spec
Fertiliser (chemical / gypsum)	<i>Chemical</i> Heavy metals in excess of MPC (Cadmium)	Using high Cadmium fertiliser	H	L	M/H	Dependant on soil test/potato test data and use of low cad-fertiliser Could be high or low dependant on other conditions and agronomic practices refer <i>Managing cadmium in Potatoes for Quality Produce.</i>	A nalysis of fertiliser as per supplier certification. Use low cad fertiliser (Food safety checklist) Retain product analysis/spec
Agricultural chemicals, herbicides/fungicides/pesticides	<i>Chemical</i> Exceeding MRL	Incorrect application Incorrect chemical Not following withholding. Any form of use contrary to registration.	H	L	M/H	Exceeding MRL will result in consumer problems therefore responsible use is important.	Trained operator. Record required Spray diary. Record required Follow WHP. Calibrated equipment. Record required Block identification. Record required (Food safety checklist)



## Step 3: Planting

Input	Hazard	Cause	s e v	r i s k	s i g	Reason for significance	Control Measure
Seed	<i>Chemical</i> Residue in excess MRL	Seed set not growing and is harvested with crop.	H	L	L	Rejected on basis of visual quality at grading or by consumer. <u>For processing potatoes these could be missed however this likelihood is very rare due to discolouration on cooking.</u>	Grading of finished product. Approved suppliers of seed.
		Seed dressing applied incorrectly.	H	L	L	Usually go rotten and remain attached to bush Hard to overapply as only a minimum amount will coat before falling off.	Trained operator
Fertiliser	<i>Chemical</i> Heavy metals in excess of MPC (Cadmium)	Using high Cadmium fertiliser.	H	L	L/H	Dependant on soil test/potato test data and use of low cad-fertiliser Could be high or low dependant on other conditions and agronomic practices refer <i>Managing cadmium in Potatoes for Quality Produce.</i>	Analysis of fertiliser. Record required Use low cad fertiliser. Crop history Record required (Food safety checklist).
Tractor Work	<i>Physical</i> Glass, metal.	Broken Headlights. Machinery Parts.	H	L	L	Highly unlikely occurrence.	Regular maintenance
	<i>Chemical</i> Oil/diesel.	Leaks, breakdowns	L	L	L	Plants won't grow where soil is contaminated.	Regular Maintenance
Agricultural chemicals, herbicides/fungicides/pesticides	<i>Chemical</i> Exceeding MRL	Incorrect application. Incorrect chemical. Not following withholding. Any form of use contrary to registration.	H	L	M/H	Exceeding MRL will result in consumer problems therefore responsible use is important.	Trained operator. Record required Spray diary. Record required Follow WHP. Calibrated equipment. Block identification. Record required (Food safety checklist)



Water	<p><i>Chemical</i> Exceeding MRL Chemical</p> <p><i>Microbiological</i> Human pathogens</p>	<p>Registered and unregistered chemicals in underground and surface water storages.</p> <p>Ground and surface water contaminated by livestock and sewage/effluent.</p>	H	L	L	<p>Levels of chemicals required to give a residue would have to be very high. Ie at commercial application rates. Literature search 1998 showed no instances. Water is not sprayed directly onto product.</p> <p>Water not in contact with product. Natural flora present will inhibit selective pathogen growth. UV radiation will destroy pathogen DNA and reduce load. End use of product is cooked.</p>	<p>Correct storage of agricultural chemicals on farm</p> <p>None required</p>
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Step 5: Harvest and inspection

Input	Hazard	Cause	s e v	r i s k	s i g	Reason for significance	Control Measure
Agricultural chemicals, herbicides/fungicides/pesticides.	<i>Chemical</i> Exceeding MRL.	Not following withholding.	H	L	H	Exceeding MRL will result in consumer problems therefore responsible use is important.	Trained operator. Record required Spray diary. Record required Follow WHP. Calibrated equipment. Block identification. Record required (Food safety checklist). Buffer zone. Agreement with neighbour.
		Spray drift	H	L	L	At harvest bush is dead and systemic long acting chemicals that are poisonous are not taken into tuber.	
Tractor Work.	<i>Physical</i> Glass, metal.	Broken Headlights. Machinery Parts.	H	L	L	Highly unlikely occurrence.	Regular maintenance
	<i>Chemical</i> Oil/diesel.	Leaks, breakdowns.	H	L	L	Plants won't grow where soil is contaminated.	Regular maintenance
People	<i>Physical</i> Foreign objects/glass.	Drink containers/personal effects.	H	L	L	Broken bottle etc at this point would not easily be incorporated with potatoes.	Training. No glass policy
Bins/bunkers and truck bodies/bulk trailers.	<i>Chemical</i> Exceeding MRL.	Bins used for seed and not washed. Also bins used as rubbish bins and then for potatoes.	M	H	L/ M	Would result in low level surface contamination. But is noted as a common occurrence.	Inspect before use Separate bins for seed Separate bins for potential toxic rubbish(Food safety checklist).



	<p><i>Physical</i> Wood, nails, glass</p>	<p>Bins in poor state of repair and used as rubbish bins and then for potatoes</p>	<p>H</p>	<p>L</p>	<p>L</p>	<p>No reported incidences of this occurring in potatoes. Potatoes are graded and inspected before packing.</p>	<p>Inspect before use Separate bins used for rubbish</p>
	<p><i>Microbiological</i> Human pathogens</p>	<p>Rodents living in empty bins</p>	<p>H</p>	<p>L</p>	<p>L</p>	<p>End use of product ie cooking, eliminates risk</p>	<p>Inspect before use Pest control programme</p>



Step 6: Bulk Storage

Input	Hazard	Cause	s e v	r i s k	s i g	Reason for significance	Control Measure
Shed/ Cold Room	<i>Microbiological</i> Faecal contamination	Rodents/vermin living in shed/coldroom environment	H	L	L/ M	End use of product ie cooking eliminates risk Good practice to control pests.	Pest control programme (Food safety checklist)
	<i>Physical</i> Glass	Broken lights. Drink containers.	H	L	L	Highly unlikely occurrence. However glass is severe food hazard.	Cover lights(Food safety checklist). <i>Training</i>
	<i>Chemical</i> Exceeding MRL.	Cross Contamination from storage in close proximity	H	L	L/ M	Practice has sometimes occurred in the past. However there are no documented cases for this in potatoes.	Correct storage of chemicals. (Food safety checklist)
Light	<i>Chemical</i> SGA exceeding 200 mg /kg.	Light reaching potatoes, uncovered bins.	H	M	L/ M	Varieties released in Australia are selected for low initial SGA level. Potatoes are graded to remove green. Consumers have general awareness of toxicity of green potatoes.	Cover bins. Exclude light (Food safety checklist).



## Step 7: Grading and Inspection

Input	Hazard	Cause	s e v	r i s k	s i g	Reason for significance	Control Measure
Grader	<i>Chemical</i> Oil and grease.	Oil leaks broken seals and use of toxic grease.	L	L	L	Oil and grease clearly visible can be selected at grading and recognised by consumer.	Regular maintenance. Use food grade grease on contact surfaces Quality inspection .
	<i>Physical</i> Metal	Shavings from collapsed bearings and metal to metal surfaces.	H	L	L	External contamination only with slight chance of metal being embedded.	Regular maintenance. Quality inspection GFP
People	<i>Physical</i> Foreign objects/Glass.	Drink containers/personal effects.	H	L	L/ M	External contamination with these objects would not allow easy incorporation into product. However staff may do this	Training. No glass policy (Food safety checklist)
	<i>Microbiological</i> Human pathogens	Wounds/dirty hands.	H	L	L/ M	End use of product ie cooking, eliminates risk. However good practice.	Staff training Hand washing facilities (Food safety checklist)
Potatoes	<i>Chemical</i> Greening chemical SGA	Light reaching potatoes, in previous steps.	H	M	L/ M	Consumer awareness of green potato problem is high and this step removes large proportion of affected product.	Trained staff ( <i>potato quality descriptor</i> ). Physical removal. (Food safety checklist)
	<i>Physical</i> Foreign objects and glass	Contamination and incorporation of glass and metal at previous steps	H	L	L/ M	GFP measures throughout process. Grading equipment is designed to allow foreign objects/matter to fall out.	Trained staff Physical removal (Food safety checklist)

Step 7a : Washing

Input	Hazard	Cause	s e v	r i s k	s i g	Reason for significance	Control Measure
Water	<i>Microbiological</i> Human pathogens.	Wash water source contaminated by run off, sewerage or animal excrement.	H	L	L	End use of product ie cooking eliminates risk <i>No recorded instance in literature search sept 98.</i>	Analysis of water . Use freshwater rinse. Chlorination. Treatment and management of recycled water.
	<i>Chemical</i> Exceeding MRL and unregistered chemical	Contaminated ground water /stored water from past and present agricultural activity.	H	L	L	Level of contamination would need to be extreme to cause problem. <i>No recorded instance in literature search sept 98.</i>	Analysis of water . Use freshwater rinse.
Chemical to control bacterial rots.	<i>Chemical</i> Exceeding MRL.	Incorrect dosage of registered chemical. (Chlorine)	H	L	L	Chlorine is registered and is oxidised in light.	Analyse wash water regularly Train staff.
		Using unregistered postharvest chemical.	H	L	M	People may be selling chemical without registration.	Use chemicals that are registered (Food safety checklist)
Washer/mac hinery	<i>Chemical</i> Oil and grease	Oil leaks broken seals and use of toxic grease.	L	L	L	Oil and grease clearly visible. These can be selected at grading, also recognisable by consumer.	Regular maintenance. Use food grade grease on contact surfaces(Food safety checklist). Quality inspection ( <i>potato quality guide</i> ).
Potatoes	<i>Physical</i> Metal	Shavings from collapsed bearings and metal to metal surfaces	H	L	L	External contamination only with slight chance of metal being embedded	Regular maintenance Quality inspection



	<p><i>Physical</i> Soil and rocks</p>	<p>Not washed properly</p>	<p>H</p>	<p>L</p>	<p>L/ M</p>	<p>Defect clearly visible during sorting and by consumer <u>In processing this may be a more significant hazard.</u></p>	<p>Presoaking Staff training Quality inspection</p>
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Step 8: Packing

Input	Hazard	Cause	s e v	r i s k	s i g	Reason for significance	Control Measure
People	<i>Physical</i> Foreign objects, glass.	Drink containers/personal effects.	H	L	L	External contamination with these objects would not allow easy incorporation into product.	Staff training
	<i>Microbiological</i> Human pathogens.	Wounds/dirty hands.	H	L	L/ M	End use of product ie cooking eliminates risk. However considered good practice.	Staff training Hand washing facilities(Food safety checklist).
Packaging, bags	<i>Microbiological</i> Human pathogens.	Rodents living in and around packaging.	H	L	L/ M	End use of product ie cooking eliminates risk <i>No recorded instance in literature search sept 98.</i> However pest control considered good practice.	Pest control programme (Food safety checklist).
	<i>Chemical</i> Exceeding MRL	Contamination by registered and unregistered chemicals from recycled packaging particularly bulk bags.	H	L	L/ M	Often from unknown source.	Use new bags. Inspect bags before use (Food safety checklist). Use bags of known origin.
Pallets	<i>Chemical</i> Exceeding MRL	Use of pallets contaminated with chemicals and fertilisers.	H	L	L/ M	Product is in a package which gives some protection. However this is a known possible occurrence.	Inspect pallets before use(Food safety checklist).
	<i>Physical</i> Nails and pallet wood.	Broken and damaged pallets.	H	L	L/ M	Product protected and chance of foreign object being embedded is highly unlikely.	Inspect pallets before use (Food safety checklist).



Packaging machinery	<i>Chemical</i> Oil and grease	Oil leaks broken seals and use of toxic grease	L	L	L	Oil and grease clearly visible can be selected at grading and recognised by consumer.	Regular maintenance Use food grade grease on contact surfaces
	<i>Physical</i> Metal	Shavings from collapsed bearings and metal to metal surfaces	H	L	L	External contamination only with slight chance of metal being embedded	Regular maintenance



Step 9: Storage

Input	Hazard	Cause	s e v	r i s k	s i g	Reason for significance	Control Measure
Coldroom/Sheed	<i>Physical</i> Foreign Objects/Glass.	Drink containers/broken light fittings.	H	L	L/ M	Rarely occurs, product now in packaged form. However considered good practice to exclude glass	Lights covered, staff trained(Food safety checklist)
	<i>Chemical</i> Rat bait.	Spillage and incorrect use of rat baits.	H	L	L	Product now packaged therefore limited mode of entry.	Suitable pest control stations and pest control monitoring in place .
	<i>Microbiological</i> Human pathogens	Rodents/vermin living in shed/coldroom environment	H	L	L/ M	End use of product ie cooking eliminates risk. However considered good practice to have pest control	Pest control programme (Food safety checklist)
Light	<i>Chemical</i> SGA.	Excessive storage in direct light.	M	L	L	Short storage time. Greening is basis for rejection by consumers and processors.	Cover packages that allow light entry if stored more than 6 hours.
Forklift	<i>Physical</i> Foreign Objects/Glass.	Broken light/mirror.	H	L	L	Low likelihood of occurring. Product is now bagged.	



## Step 10: Loading/despatch

Input	Hazard	Cause	s e v	r i s k	s i g	Reason for significance	Control Measure
Forklift	<i>Physical</i> Foreign objects, glass	Broken light/mirror.	H	L	L	Low likelihood of occurring. Product is now bagged.	
Transport (bulk)	<i>Physical</i> Foreign objects, glass and stones.	Contamination from previous loads.	H	M	H	Direct contact with product under pressure. Has been encountered previously. <u>Especially in processing situation.</u>	Check truck (Food safety checklist) Approved transport supplier. Reject transport. Record required
	<i>Chemical</i> Fertiliser.	Contamination from previous loads.	H	M	H	Direct contact with product. Has been encountered previously. <u>Especially in processing situation.</u>	Check truck (Food safety checklist) Approved transport supplier. Reject transport. Record required
	<i>Microbiological</i> Human pathogens.	Contamination from previous loads.	H	L	L	End use of product ie cooking eliminates risk.	Check truck Approved transport supplier. Reject transport.
Transport (palletised)	<i>Chemical</i> Fertiliser, fuel, unregistered and registered chemicals.	Product sent on truck carrying fertiliser, fuel or chemicals.	H	L	M/ H	Bad practice to mix food and toxic substances during transport in case spillage. However is an unlikely occurrence.	Check truck(Food safety checklist) Approved transport supplier. Reject transport. Record required

## Step 1: Block Selection

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
<p><b>Chemical</b> Heavy metal in excess of MPC, Cadmium,</p>	Use block which has been tested or has a known cadmium history.	CCP	0.1 mg /kg cadmium in final product.	Analyse cadmium level in potatoes. Initially test each block then 3 yearly if 0.05mg/kg or less. If greater than less than 06mg/kg then yearly.	Select alternate site Modify practices eg increase organic matter, etc as per <i>cadmium brochure</i> .	Property map. Crop history sheets. <b>Retain potato certificate of analysis</b>
<p><b>Unregistered chemical</b> <i>Note: These only apply on new blocks or blocks with no proven history</i></p>	Use block which has been tested or has a known history.	CCP	As per A12-14 of Australian food standards code.	Analyse a representative list of o/c, o/p's for product initially if no detectable levels don't do again. If any detections compare to code and do again annually.	Select alternate site.	Property map. Crop history sheets. <b>Retain potato certificate of analysis.</b>

## Step 2: Ground Preparation

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
<p><b>Chemical</b> Heavy metal in excess of MPC, Cadmium, from fertilisers and gypsum.</p>	Use low cadmium fertiliser (for organics consider other metals as this may affect other crops later) Use mined gypsum	CCP	50 mg /kg of P	Check every load against suppliers spec Request certificate of analysis from supplier.	Reject fertiliser Find a new supplier.	Property map. Crop history sheets. <b>Retain fertiliser analysis/spec</b>
Exceeding MRL	Trained operator Spray diary Follow WHP	CCP	Follow label instructions 100% of the time	Check spray diary every 6 months and randomly monitor use.	Isolate affected area if applicable. Retrain operator. Recalibrate equipment.	Training Crop History Calibration record

Step 3: Planting

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
Chemical Heavy metal in excess of MPC, (Cadmium, in fertiliser)	Use low cadmium fertiliser (for organics consider other metals as this may affect other crops later)	CCP	50 mg /kg of P	Check every load against suppliers spec Request certificate of analysis from supplier	Reject fertiliser Find a new supplier	Property map. Crop history sheets. Retain fertiliser analysis/spec
Exceeding MRL	Trained operator  Spray diary  Follow WHP	CCP	Follow label instructions 100% of the time	Check spray diary every 6 months and randomly monitor use.	Isolate affected area if applicable Retrain operator Recalibrate equipment	Training Crop History Calibration record Retain certificate of analysis for current use chemicals

Step 4: Growing

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
Chemical Heavy metal in excess of MPC, (Cadmium, in fertiliser)	Use low cadmium fertiliser (for organics consider other metals as this may affect other crops later)	CCP	50 mg /kg of P	Check every load against suppliers spec Request certificate of analysis from supplier	Reject fertiliser Find a new supplier	Property map. Crop history sheets. Retain fertiliser analysis/spec
Exceeding MRL	Trained operator  Spray diary  Follow WHP	CCP	Follow label instructions 100% of the time	Check spray diary every 6 months and randomly monitor use e	Isolate affected area if applicable Retrain operator Recalibrate equipment	Training Crop History Calibration record Retain certificate of analysis for current use chemicals

## Step 5: Harvest and Inspection

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
<i>Chemical</i> Exceeding MRL by not observing WHP	Check crop record before harvest to ensure expiry of withholdinh period.	CCP	100% adherence to WHP.	Check spray diary prior to harvest.	Isolate product. Analyse product. Recall product.	Spray diary (must be signed)
<i>Chemical</i> Seed dust and chemical residues in bins.	Inspect before use Separate bins for seed Separate bins for potential toxic rubbish	CP	Inspect bins 100% of time Wash seed bins 100% of time	Inspection before use	Remove and clean Remove and segregate for rubbish	<i>GFP checklist</i>

## Step 6: Bulk Storage

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
<i>Chemical</i> Greening chemical SGA <i>This hazard is only critical if not graded further</i>	Cover bins Exclude light	CP	Cover bins and exclude light whenever stored for more than 12 hours	Check stored product is covered or stored out of light. Inspect before despatch.	Isolate and remove/grade out. Retrain staff.	Final QC inspection sheet.

Step 7: Grading and Inspection

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
<i>Chemical</i> Greening chemical SGA	Trained staff ( <i>potato quality guide</i> ) Physical removal	CCP	200mg /kg or as per customer spec	Final QC inspection	Notify sorters Isolate defective product Regrade product Slow grader Increase number of sorters	QC inspection sheet
<i>Physical</i> Foreign objects and glass	Trained staff Physical removal		Nil foreign objects	Final QC inspection	Isolate defective product. Reject defective product.	QC inspection sheet

Step 7a: Washing

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
<i>Physical</i> Soil and rocks <i>This is only considered a hazard in processing.</i>	Presoak. Train staff. Inspect product.	CCP	Free of attached soil and rocks.	Final QC inspection	Remove soiled potatoes. Improve washing process.	QC inspection sheet. Staff training.

Step 8: Packing

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
Chemical Exceeding MRL by using contaminated packaging.	Use new bags. Inspect bags before use ( <i>GFP checklist</i> ). Use bags of known origin.	CCP	Never use contaminated packaging.	Final QC inspection. Monitor bags delivered.	Reject packaging before use. Isolate contaminated product.	QC inspection sheet.

Step 10: Loading/despatch

Potential Hazard	Control Measure	CCP/CP	Critical Limit	Monitoring Procedure	Corrective Action	Record
Chemical Cross contamination by loading into bulk vessels or despatching on transport carrying toxic goods.	Check truck ( <i>GFP checklist</i> ) Approved transport supplier. Reject transport.	CCP	Inspect transport 100 % of the time	Inspection of transport and record on delivery docket/despatch paperwork.	Reject truck. Wash truck.	Inspection noted on dispatch paperwork
Physical Cross contamination by loading into bulk vessels	Check truck ( <i>GFP checklist</i> ) Approved transport supplier. Reject transport.		Inspect transport 100 % of the time		Reject truck. Wash truck.	





9. How much of your crop are you prepared to market through this system.

- a quarter
- a half
- more than half
- whole crop

10. What has attracted you to this project ?

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11. How do currently market your potatoes ?

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12. Are you currently applying any form of Quality Assurance ?

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13. Indicate which way you harvest

- Hand harvest into bins
- Hand harvest into bags
- Machine harvest
- Other \_\_\_\_\_

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## GROWER QUESTIONNAIRE

*PROJECT: Development of a quality assured production and marketing system for fresh potatoes*

NAME:

DATE:

QUESTION 1. (Change) Are you prepared to grow different varieties to what you currently grow ?

QUESTION 2. Do you have any washing facilities ?

QUESTION 3. Have you got any grading / packing equipment ?

QUESTION 4 (Change) If it became necessary would you be prepared to modify your current harvesting method to suit market requirements ?

QUESTION 5 (Teamwork) How willing would you be to share resources within the team ?

QUESTION 6 (Amount) How many hectares will you plant under this system in autumn ?  
winter/spring ?

**QUESTION 7** Approximately what product tonnage will these planting's make available autumn ?  
winter/spring ?

**QUESTION 8 (Traceability)** Are you prepared to keep records of things like pesticide, fertiliser & herbicide applications ?

**QUESTION 8 (Food Safety)** Are you willing to conduct tissue testing of your crop for things like cadmium ?

**QUESTION 9 (Training)** Can you make alternative arrangements for running the farm to attend regular meetings/training sessions if a schedule is available ?

**QUESTION 10** How do you currently source seed ?

**QUESTION 11** Would you be prepared to source seed by alternative means ?

**QUESTION 12** Do you have cold storage facilities for holding potatoes after harvest ?

**QUESTION 13 (only applicable to people who bag their own product)** Would you change to packaging in a 20 kg bag if the customer required it ?

**QUESTION 14** Have you had any previous training or experience in Q.A. systems.

## Market Trial Report

**Project** : Development of a Quality Assured Production and Marketing System for the fresh Potato Industry

**Author** : Eric Coleman

**Date** : 26/9/97

**Subject** : Market Trial Autumn 1997 crop.

### **Summary**

As part of this project, a market trial was conducted from late June until the middle of August 1997 (otherwise known as the autumn crop). This trial was focussed on meeting the needs of consumers who purchase premium loose, brushed potatoes. To meet consumer expectations, a pilot group of growers graded their potatoes in accordance with the Woolworth's, premium loose, brushed Sebago specification.

During the course of this trial, the grading of potatoes in accordance with a written product specification produced a slight increase in sales of loose, brushed potatoes .

The trial showed a significant reduction in sales as stock on display appeared to age. This highlighted the need for further work to be conducted on packaging and stock rotation as these factors directly affect the consumers decision to purchase potatoes.

The Consumers decision to purchase potatoes is according to freshness, where their measure of freshness is dominated by appearance of the potatoes, in particular mechanical damage.

### **Introduction**

This project is funded by The Horticultural Research and Development Corporation and is intended to develop a model for production handling and marketing systems, and to improve profitability of fresh market production.

The Market Trial conducted was intended to provide a consistent supply of potatoes to meet the needs of consumers. Monitor consumption and identify changes. Improve growing and harvesting practices by using customer feedback to target areas for improvement. Apply various principles of Quality Assurance to potato production.

### **Method**

The trial consisted of a pilot group of ten growers, Bairds a Queensland based merchant, involved in the implementation of the SQF Quality code and Woolworths Queensland. Six Woolworth's stores located in suburban Brisbane provided outlets for the potatoes.

Potatoes were graded by the growers at a number of different facilities in the Lockyer Valley, either on growers premises or at a contract grading shed.

The potatoes were then delivered to the merchant, then onto Fruitex (Woolworths distribution centre) and then delivered to the stores.

*Production:* After grading, a sample of approximately 10 kg was taken randomly per tonne of potatoes and evaluated using Woolworth's specification.

*Marketing:* The potatoes supplied (from herein referred to as QA potatoes) were not the only premium loose, brushed in the produce section and were displayed in close proximity to Woolworths standard line of loose, brushed Sebago. The QA potatoes were marked at the same price as the standard line so consumers were given a choice in no way affected by price. No bias was given to the QA potatoes with both lines equally sharing favourable shelf space. However overall shelf space for premium loose, brushed Sebago was increased in some instances. Ticketing and promotion were identical with some stores noting that the QA potatoes were local produce.

The consumer was not coerced to buy the QA line and had no idea of the background and history of this produce such as traceability, crop records, and food safety.

Results were gathered by a weekly survey conducted in the stores using a standard format (appendix 1).

Growers also visited the stores and spoke to consumers purchasing the QA potatoes.

### **Results**

*Production: Final Inspection and Testing results (Quality Control)* against Woolworth's specification are compiled in appendix 2.

Some of the major obstacles encountered related to the level of mud on the produce early in the season, high levels of postharvest mechanical damage, procurement of new equipment ie correct size screens to achieve sizing and a high incidence of greening of the crop before harvest.

Results gathered on each occasion product was packed were used as a guide for **corrective action** needed to meet **specification**. Major corrective actions taken and possible preventive strategies have been documented (appendix 3).

Major corrective actions implemented relate to harvester/grader modifications and using the specified requirements as a guide to produce what is required all the way through the production process.

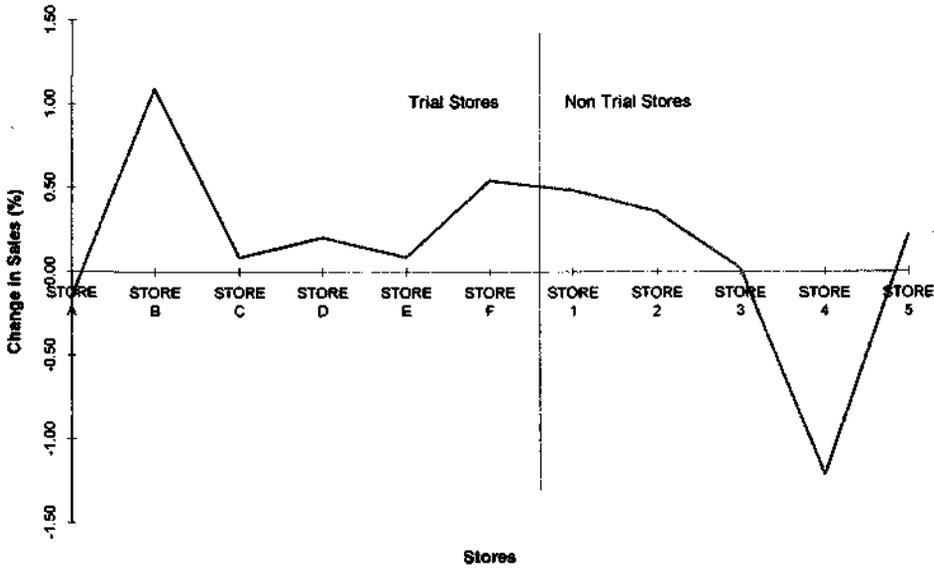
*Marketing:* Changes in sales and gross return were examined in two ways.

*Firstly, as a percentage of gross produce sales;*

The percentage premium loose, brushed Sebago made up of gross produce sales for the six trial stores was calculated and compared to gross sales for the period before the trial. To compensate for seasonal increases this figure was compared to a group of five other stores (control stores) which did not run the QA line. This showed a 0.37 % increase in gross return compared to the control stores.

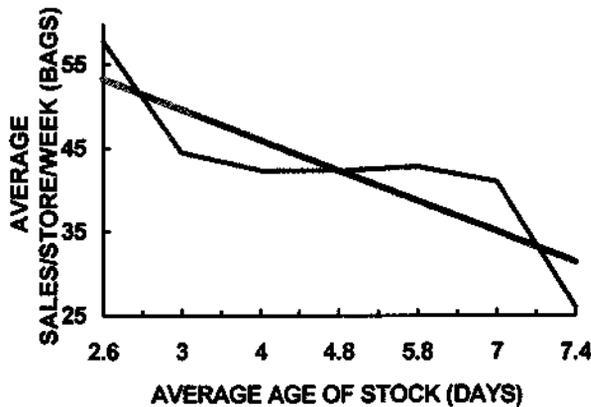
*Secondly as a percentage of premium loose, brushed Sebago sales;*

A nett increase in premium loose, brushed potato sales of 8.00% was achieved by stocking two lines of potatoes, ie the QA and Standard lines. These results are encouraging but their significance needs to be tested further, as although the return from premium loose brushed potatoes increased in all but one store some of the control stores also experienced substantial increases (Figure 1).



**Figure 1. Change in premium loose brushed Sebago sales before and during trial period as a percentage of total produce sales. The trial stores had a combined increase in return from premium loose, brushed Sebago of 0.37 % when adjusted for variation due to seasonal and marketing strategies using the control stores.**

There is a definite relationship between age of stock and sales (mainly due to premature aging because of packaging integrity see discussion) A significant downward movement occurred in the number of bags sold per store as the age of the stock on display increased (Figure 2).



**Figure 2. Effect of age of stock on the number of bags sold.**

When produce managers were asked to compare the freshness of the QA line to the standard line on 77.5% of occasions they rated the freshness of the QA potatoes higher than the standard and only thought freshness was lower when the stock was older than approximately 5 days. This is probably due to the produce managers using firmness as a guide to freshness, as well as appearance. The consumers use firmness as the second test and the produce needs to look good enough to pick up before they get to this stage.

Size of potatoes was something consumers had a preference for, with small potatoes often remaining on the stand and then needing to be discarded.

**Discussion**

**Specification:** Grading to a set **specification** was advantageous as over the period of the trial, processes particularly in harvesting and grading, could be continuously improved as the **specification** provided a consistent target to meet, not a moving one. In most instances growers market their produce in large lots with no written requirement, this arrangement does not tend to foster much improvement. By using a **specification** growers were able to instantaneously and objectively rate their own performance so they would know how consistent their produce was, well before it reached the consumer.

**Traceability:** The application of the QA principle of **Traceability** proved advantageous for **all parties**. Growers were able to monitor the movement of the produce beyond the farm gate and help the merchant and retailer pinpoint any deficiencies in the supply chain post farm gate such as, stock rotation and reductions in sales in particular areas. The use of a **traceability** system also allowed growers to assess individual lines of produce on display after making modifications to the harvesting and grading process giving accurate feedback on the effectiveness of individual **corrective actions** undertaken (Appendix 3).

A major improvement for the retailer was the use of the packed on date as a management tool for monitoring staff actions with respect to rotations on display. This was particularly apparent in stores where bags of potatoes are used on displays for presentation purposes ie dummies and where whole bags are put on display in bins. Placing full bags on the display to build it up (dummies) can sometimes be a problem as fresh produce is tipped onto the display with the old bags remaining underneath. By the time the old bags are opened onto the display they may have aged quite a bit. This is contributed to by staff on different shifts/days not being able to identify the stock, as individual bags have no date coding or batch number.

**Grower Implications:** Evaluations in the supermarket revealed a substantial reduction in visual appearance of the product whenever it had been packed for more than 72 hours. This deterioration of appearance was supported by consumers with a marked slow down in sales (Graph 2). The produce managers also supported this by rating the freshness of the QA line higher than the standard line except when the potatoes aged. This premature aging is believed to be due to penetration of light through the packaging, causing greening. Desiccation (or drying ) of the potatoes on the surface is also suspected due to the open weave of the bag. The drying accentuates minor marks and blemishes.

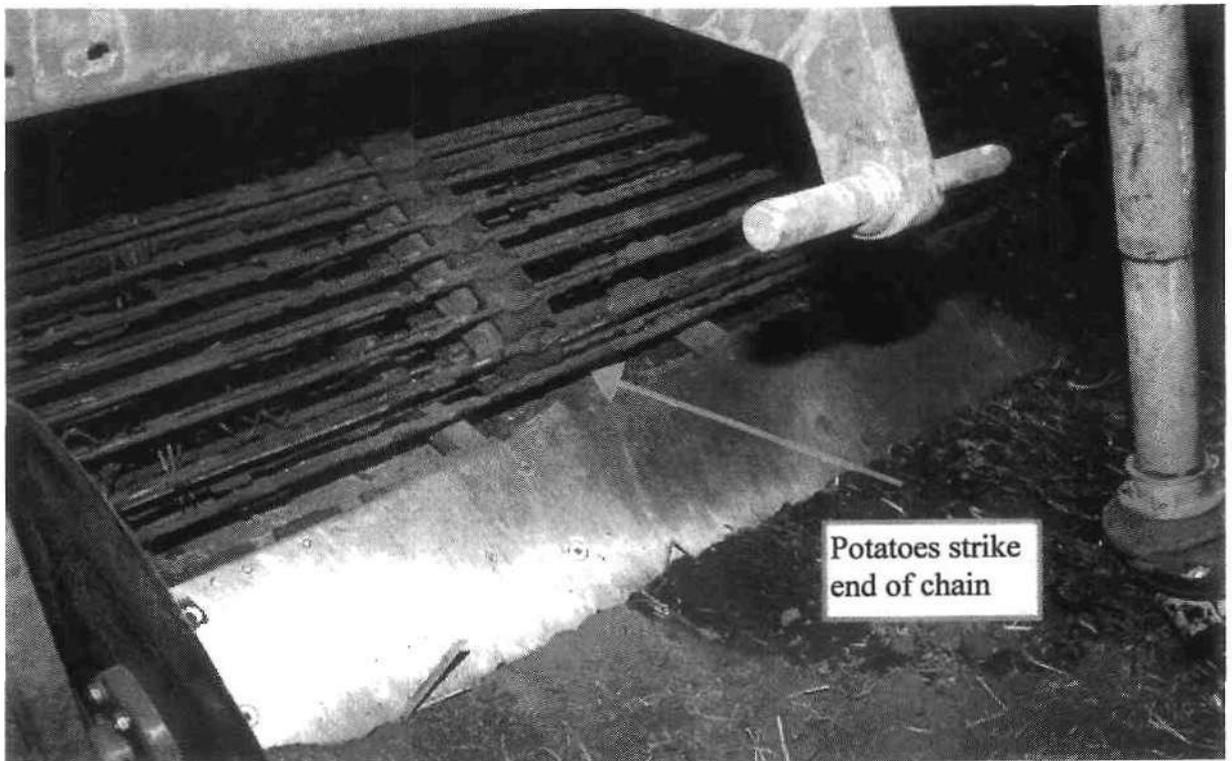
This assumption is supported by a small one bag trial performed during the course of the trial which showed a marked difference in potato appearance between two types of packaging ie hessian and paper after five days. The potatoes in the paper bag had a brighter fresh dug appearance with no greening or dried out wounds. The potatoes in the hessian bag were a dull grey with an overall green tinge and even the smallest of wounds had a dried out appearance. Also many of the produce managers surveyed suspected that the brushed black soil potato which is relatively free from soil compared to the standard lines is more exposed to the elements pointing to a need for better preservation of the product through alternative packaging.

The frequency and level of mechanical damage removed in the grading process to meet specification is an area where a number of improvements have been made and further improvements need to be made. Some of these include extra cushioning and padding on metal surfaces (plate 1).



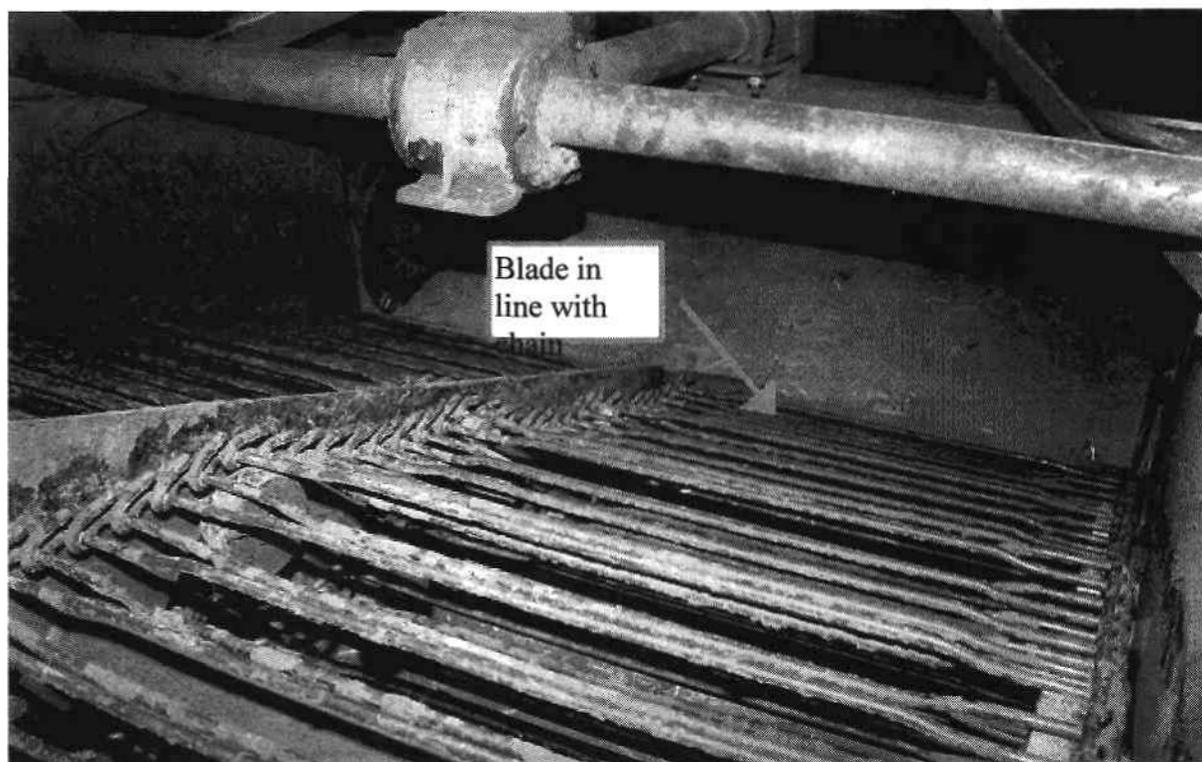
**Plate 1. Rubber padding fitted to rear of a two row digger to stop potatoes striking rear steel support.**

Poor alignment of the digger blade and the primary elevator chain was shown to cause major product damage. On one digger model a proportion of potatoes slide over the cutter blade and hit the end of the elevator chain (Plate 2). On a different digger potatoes can slide over the cutter and travel smoothly onto the elevator chain (Plate 3).



**Plate 2. When potatoes travel over the cutter blade they hit the end of the elevator chain causing high levels of mechanical damage.**

On one farm the use of a digger with the blade parallel to the elevator chain produced a reduction in mechanical damage of approximately 14 % of total yield. By preventing the mechanical damage, quality was built in not inspected in by rejecting the defects. This improvement in product quality can be seen by looking at the final inspection and testing results for sample one and two packed on the 25/7/97 (appendix 2).

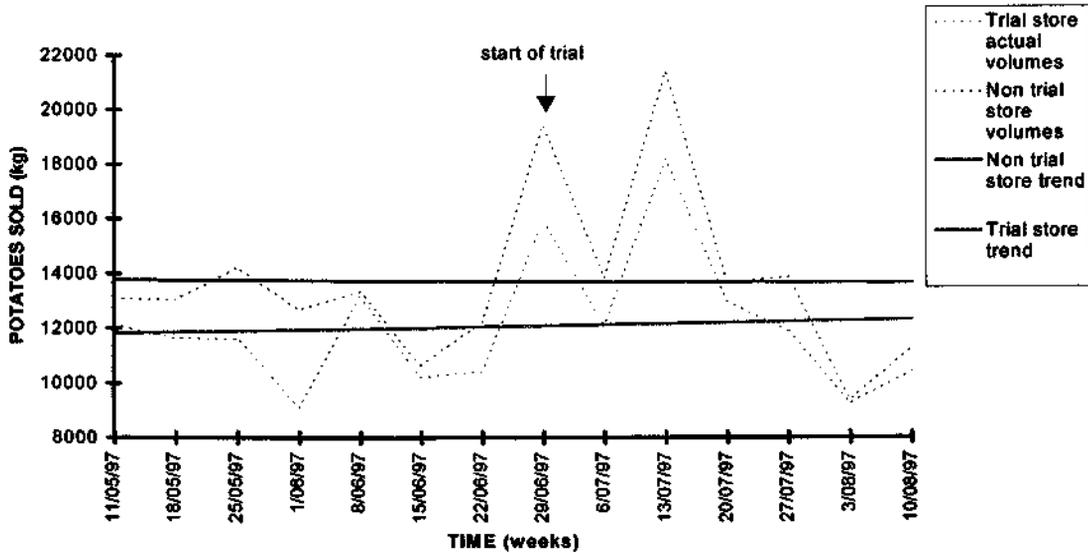


**Plate 3. Looking down the elevator we can see the transition from the cutter to the elevator on this digger is totally flat allowing the potatoes to travel onto the elevator smoothly with minimal mechanical damage.**

*Marketing Implications:* These findings suggest that not the type of loose, brushed potato on display but the soundness and size of the produce has the biggest affect on the consumers decision to purchase. This poses interesting questions in regard to the preference various buyers have with regard to potatoes grown in different soil types. As mentioned earlier if we look at the volume of potatoes sold in the trial and non trial stores (Figure 3) there is a slight upward trend in the amount of loose brushed potatoes being sold in the trial stores. This may be attributed to by a number of things:

1. A **product modification/extension** ie simply offering the consumer a modified product.
2. Greater shelf space/frontage for potatoes.
3. Improvement in product consistency over time.

The true impact of this trial as a test of these factors was somewhat masked due to the problems identified earlier with regard to packaging. Further trial work should prove more conclusive if the packaging issue is addressed.



**Figure 3. Weekly Store volumes for trial and non trial store before and during the trial**

We can assume that if the drop in sales due to age (Figure 2) is halted by using better packaging then the increase in volume of sales in the trial stores may exceed that of the control stores substantially. These findings require further investigation as they have ramifications for the whole Australian potato industry as far as improving total sales simply by offering greater choice (a product modification) and improved consistency to consumers. This is further supported by the selling ratio of the QA line and the standard line which was consistent while the QA line presented appeared in a fresh state. There was no apparent consumer preference for soil type, however there was a definite preference for sound, uniform potatoes.

### **Recommendations**

A further trial needs to be conducted on a more commercial basis. The advantage with this would be a greater volume of product to iron out any handling/movement restrictions created by not having enough critical mass to sustain stock turn around.

Key areas to be further investigated include:

1. Trial a paper bag vs the currently accepted full bright hessian. This could be done by comparing two groups of stores each being supplied potatoes in different packaging.
2. Further refinement of digging and grading technology to minimise mechanical damage. Different solutions will be required on farm compared to last season with respect to soil moisture and temperature, grading and transport temperatures, due to the different season of the previous crop. Another trial needs to be carried out in the spring crop which is harvested in the October-November period.
3. Specific attention to stock rotation post farm gate to provide the consumer with the freshest possible product with the quickest possible turnaround. This would be best achieved by supplying the next trial direct to Fruitex and continue using the current traceability system based on packed on date on each bag of potatoes. Bairds will not handle the produce but will maintain their role as the marketing agent for the growers and handle ordering and invoicing.

4. Further data needs to be gathered on the preference consumers have for various soil types and whether or not a product extension will help to increase the volumes of loose brushed potatoes sold thus improving gross returns for everybody in the supply chain. This would best be achieved by using two groups of stores where one stocks the QA line only, with the other stocking the standard and the QA line.

#### ***Acknowledgments***

The help and support of Woolworths Queensland has been greatly appreciated. In particular the time contributed by the Store Managers, Produce Managers and Produce Staff. The time and interest shown by Wally Collins has enabled the growers involved to improve their operations and produce greatly, which in turn translates to better return for everyone in the supply chain.

We would also like to thank Bairds produce for their support and offering the growers involved the opportunity to work with them in improving our industry.

#### ***Glossary of terms***

**Corrective Action:** Identification of problems and taking action to stop them occurring again.

**Specification:** An agreement (usually written) between you and your customer of what is required.

**Final Inspection and Testing:** Evaluation of product (using some sort of specification) before it is sent to the customer to check that it meets the customers requirements.

**Traceability:** A system of identification that allows product to be identified and linked to its place of origin from any point in the supply chain.

**Product Modification:** Modifying an existing product by changing product quality, restyling, or any combination of these (Lusch and Lusch 1987)

# Spring Trial Report

## *Development of a quality assured production and marketing system for fresh potatoes*



## Spring Trial Report



**Paper Bag Display**



**Hessian Bag Display**

**Project :** Development of a Quality Assured Production and Marketing System for the fresh Potato Industry

**Author :** Eric Coleman

**Date :** 27/4/98

**Subject :** Market Trial Spring 1997 crop.

### **Summary**

As part of this project, a market trial was conducted in November 1997 (otherwise known as the spring crop). This trial investigated questions raised in a previous trial with regard to product quality and shelf life and resulted in following findings.

1. Paper bags reduced greening and dehydration of the potatoes.
2. Paper bag sales were higher than hessian bag sales.
3. Supplying directly to the supermarket using an existing merchant as a broker improved stock rotation and reduced the age of produce supplied to the consumer.
4. Controlled atmosphere storage post harvest ie before grading, after grading and during transport improved potato quality and continuity of supply.

### **Introduction**

This project is funded by The Horticultural Research and Development Corporation and is intended to develop a model for production handling and marketing systems, and to improve profitability of fresh market production.

The Market Trial conducted complemented earlier trial work (autumn crop) where ageing and quality defects such as greening had a negative impact on sales. This trial set out to address these problems using improved post harvest packaging and handling, whilst identifying practices which have an impact on final product quality.

### **Method**

The trial consisted of a pilot group of ten growers, Bairds a Queensland based merchant, involved in the implementation of the SQF Quality code and Woolworths Queensland. Thirty Woolworth's stores located in suburban Brisbane provided outlets for the potatoes.

These stores were divided into three groups.

- 1) **Control** group selling premium loose brushed sebago potatoes supplied by existing suppliers in hessian bags.

- 2) *Hessian* group selling premium loose brushed sebago potatoes supplied by the Lockyer Valley QA group in full bright hessian bags.
- 3) *Paper* group selling premium loose brushed sebago potatoes supplied by the Lockyer valley QA group in 3 ply, 89/73/73 HWS, paper bags.

To assess greening product was inspected in store and photographed.

Dehydration was measured by comparing bag weight at time of packing to bag weight 48 hours later in store. This represented product from a cool chain environment. A shed trial was also performed by weighing bags at time of packing and at various times over a 10 day period. This represented a hot environment.

Potatoes were graded by the growers at a number of different facilities in the Lockyer Valley.

The potatoes were delivered to Fruitex (Woolworths distribution centre) for distribution to the stores.

After grading, a 20kg sample was used to perform quality control checks every 4-5 tonne packed and evaluated using the Woolworth's specification.

The potatoes supplied (from herein referred to as QA potatoes) were supplied to 10 of the stores in a 20 kg sewn paper bag. A further 10 stores were supplied in a 20 kg sewn hessian bag. A further group of 10 stores was used as a control or reference group and were supplied via existing supply arrangements mainly with potatoes from other growing districts. The pilot group potatoes were the only loose brushed sebago being supplied to Woolworths Queensland from the Lockyer Valley during this period.

Pricing of premium loose brushed sebago remained consistent across the 30 stores except on a few occasions when individual stores went into combat pricing with competitors.

Ticketing and promotion were identical with some stores noting that the QA potatoes were local produce.

The consumer was not coerced to buy the QA line and had no idea of the background and history of this produce such as traceability, crop records, and food safety.

Wherever possible potatoes were stored in a modified atmosphere after harvesting ie in a cool, dark and moist environment. Temperatures between 8 degrees Celsius and 16 degrees Celsius with humidity of 90-95 % were used. After packing potatoes were then stored at 8-12 degrees Celsius and 95% humidity. All transportation was carried out in refrigerated tautliners.

### **Results**

Both qualitative and quantitative results were gathered by a weekly survey conducted in the stores using a standard format (appendix 1).

A summary of **final Inspection and Testing results (Quality Control)** for the product supplied during the course of the trial are shown in table 1.

Parameter	Specification	Autumn Trial	Spring Trial
over wt (%)	350 gm	2.69	1.75
under wt (%)	110gm	1.62	0.52
average wt (gm)	n/a	205	193
major defects (%)	2%	2.7	1.38
minor defects (%)	10%	6.28	4.5

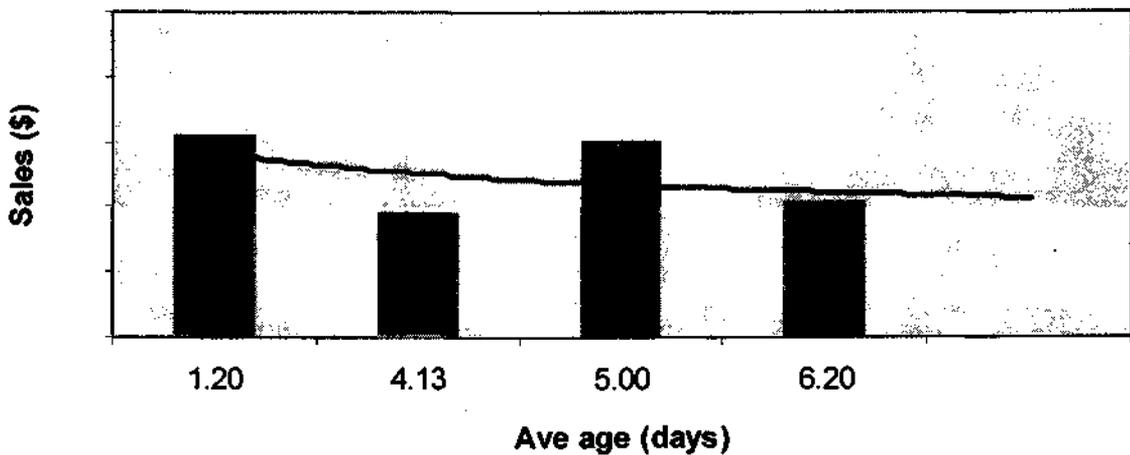
**Table 1. Summary of quality control results for autumn and spring trials**

The dollar value of sales of loose brushed sebago were calculated as a percentage of gross produce sales. The two groups of stores using the different packages were then compared to the control group. This comparison was made between a four week period before the trial and the four week period of the trial (table 2).

Store Group	Drop in Sales %
Control	0.5
Hessian	0.25
Paper	0.13

**Table 2. Shows a drop in sales during the trial for all three groups of stores.**

There is no apparent correlation between the age of stock on display each week and sales for either the paper or the hessian group stores figure 1 & 2.



**Figure 1. Shows no significant trend in paper bag sales as the age of stock increases.**

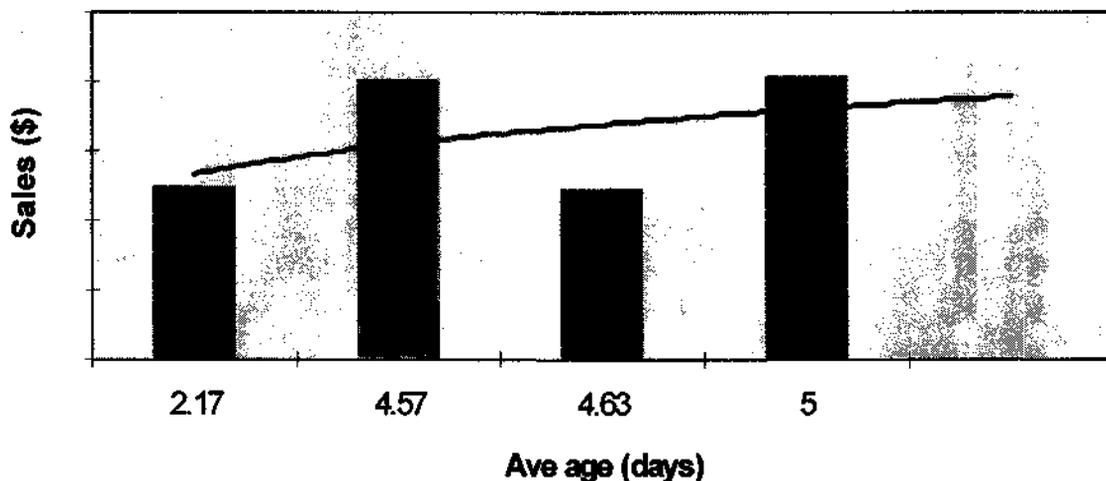


Figure 2. Shows no significant trend in hessian bag sales as the age increases.

The differences in dehydration of potatoes in paper and hessian bags, in a cool chain environment with the final weight taken at the stores after 48 hrs is shown in figure 3. Figure 4 shows the drop in weight of paper and hessian bags in a shed environment.

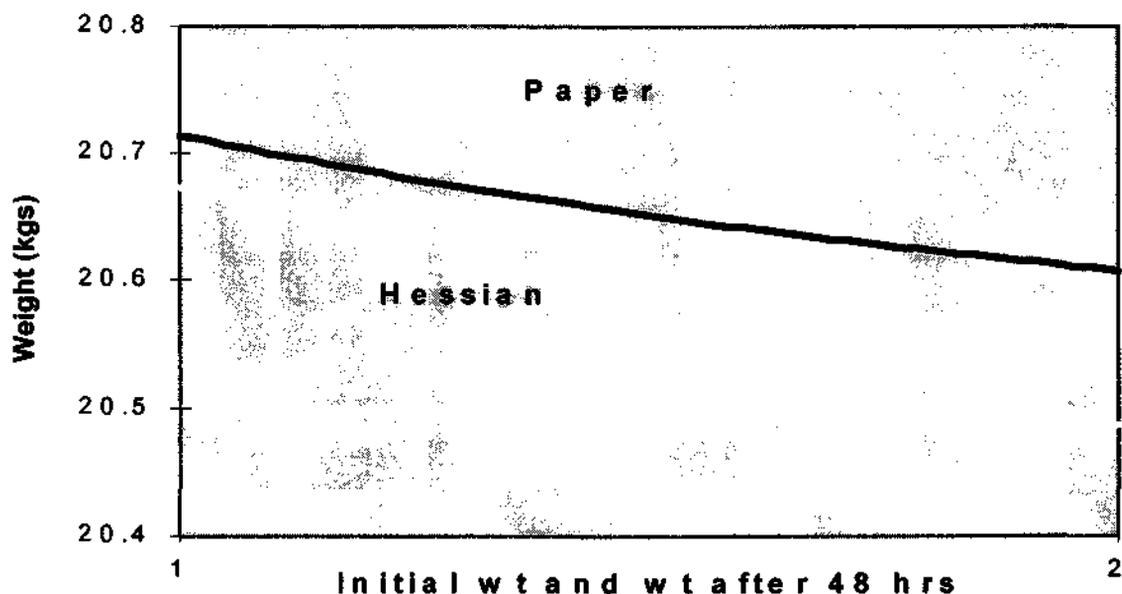


Figure 3. Cool chain dehydration for paper and hessian bags.

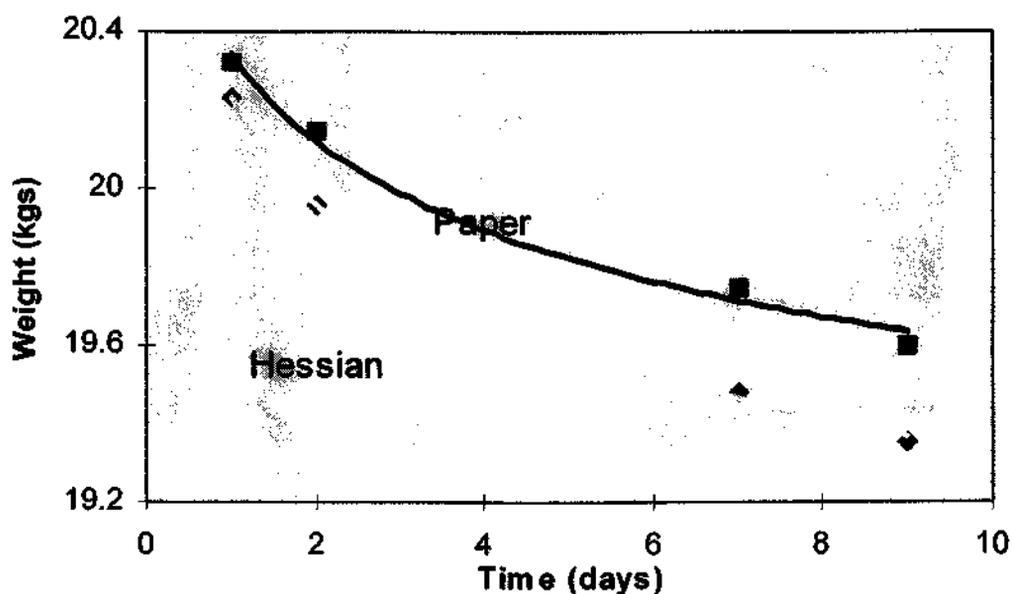


Figure 4. Shed dehydration for paper and hessian bags.

#### Discussion

In a previous trial conducted in autumn 1997, potatoes packed in hessian bags often exhibited unacceptable levels of greening. This was shown by comparing average age of stock on sale to sales figure 5.

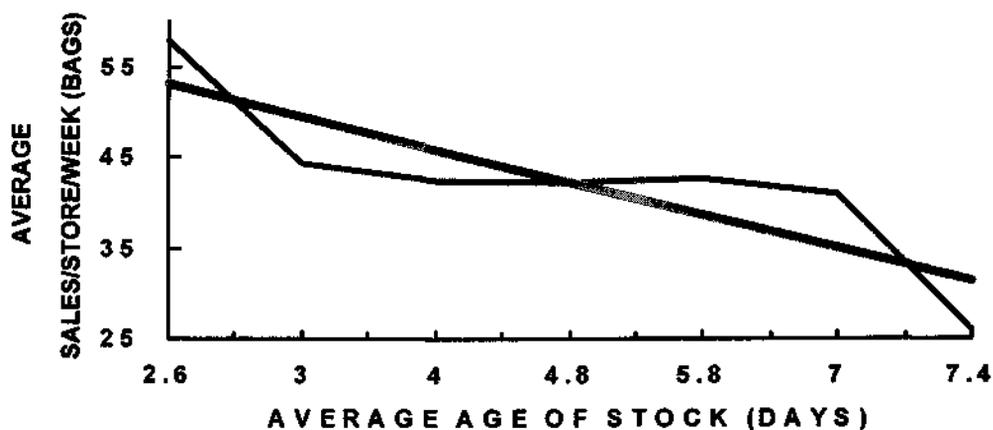


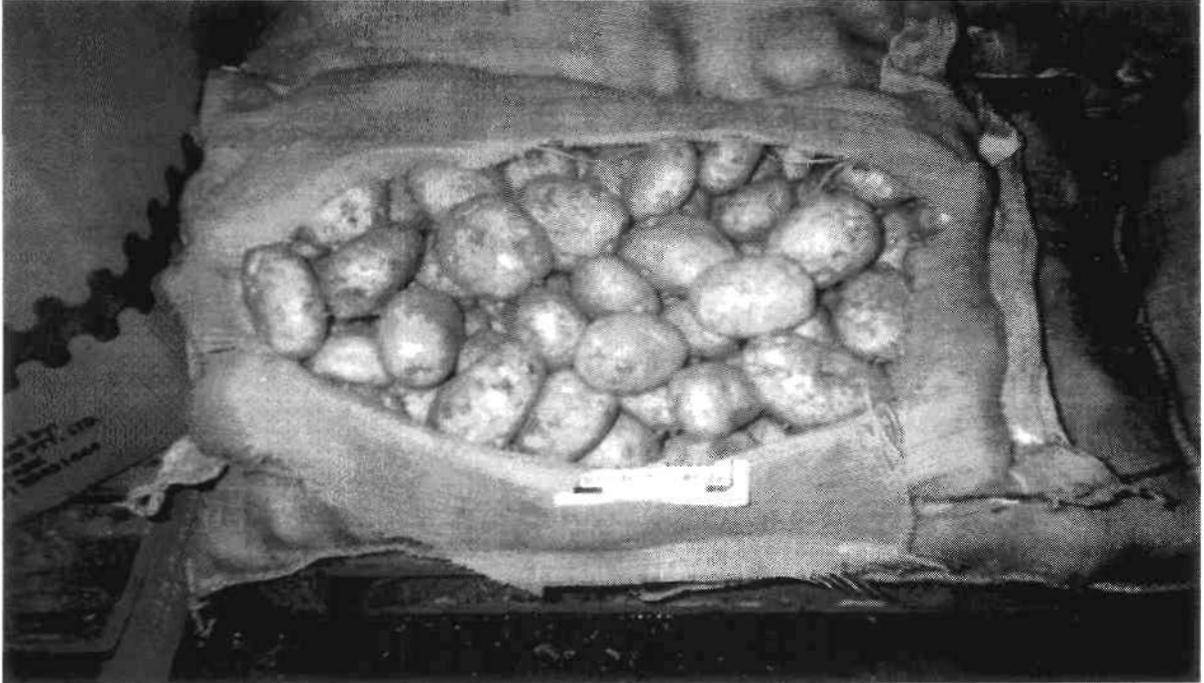
Figure 5. Comparing bags sold to age of stock in the autumn trial

The assumption from this was that excessive greening of potatoes in hessian bags was turning consumers away. This trial was designed to try and find a solution to this problem by using a different package ie paper to overcome this problem. Figure 1 & 2 clearly show no relationship between age of stock and sales for either hessian or paper.

One or a combination of the following has overcome the problem:

- a different form of packaging to exclude light (ie paper)
- using a modified atmosphere, or cool chain as much as possible (ie dark and cool) to preserve potatoes in hessian bags.

Visual inspection of potatoes in store showed variable levels of greening in hessian bags. On some occasions greening was noticed where similar age stock did not show any (Figure 6 & 7). This is most probably due to the positioning of the bags while at fruitex or in the stores, as both these locations have bright lighting. The bags on the outside of the pallets and the top receive much more light. The paper bag was far superior with no apparent difference in greening even after extensive periods in these conditions. From a retailers point of view a package that blocks light entirely, like paper would be preferable.



**Figure 6. Six day old potatoes showing signs of aging in hessian.**



**Figure 7. Six day old potatoes showing no signs of aging in hessian.**

Potatoes in paper bags did not show any considerable greening, this can be clearly seen on the front cover where potatoes that are 10 days old exhibit no greening on display, compared to potatoes from hessian bags that are 8 days old.

A reduction of dehydration in paper compared to hessian is also thought to be a significant contributor to the apparent differences in freshness of the two displays photographed on the front cover. Figure 8 shows a paper bag with 2 potatoes from a hessian bag of the same age and same source in the left corner of a paper bag.



**Figure 8. Two potatoes from a hessian bag of the same age in the left hand corner of a paper bag.**

After 48 hrs potatoes packed in paper in the cool chain had lost 0.41% less moisture than those in hessian. In 48hrs in a shed environment the paper bag had lost 0.51 % less weight.

The level of dehydration that occurs in the shed environment over a ten-day period, figure 4 is quite remarkable. The dehydration bruising that results probably accounts for the poor quality potatoes we see on markets when potatoes have been dug for any great length of time.

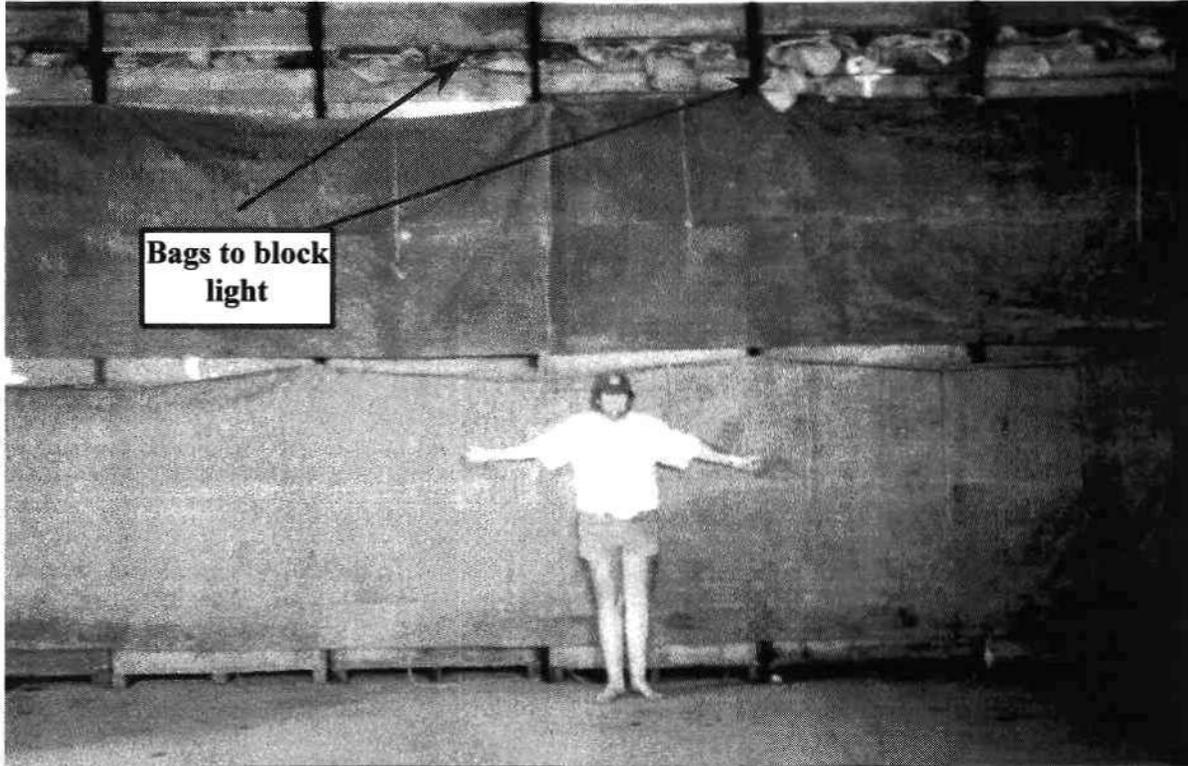
On a few occasions where a cool dark area was not available for potatoes before packing careful handling ie coverage of bins with tarpaulins and closing of crevices allowing light entry was used as a substitute and proved quite effective (figure 9).

The drop in sales of the loose brushed sebago category during the trial is directly attributed to the strong competition experienced from washed potatoes which were often substantially cheaper than the brushed potatoes (up to 40 cents/kg).

The relatively small drop in sales experienced in the stores carrying the paper bags suggests that consistent quality potatoes, graded to a specification, in a package that protects them, are

preferred by consumers even when a cheaper product that does not require washing is available. This confirms findings of Lewis 1994 that price is not the main factor in attracting consumers.

Only 1 out of the 20 store seemed totally driven by price with this store being in an area of low socio economic status.



**Figure 9. Potato bins with light entry blocked by canvas and hessian bags**

Despatching produce directly to Fruitex with the merchant acting as a marketing broker improved turn around with consumers often being presented with produce under 24 hours from time of grading. In some instances potatoes were reaching retail outlets less than 24 hrs after digging. This also reduced handling damage, possibilities of stock rotation errors and added transport costs between the markets and Fruitex.

Supplying produce to retail outlets involves more than just supplying **consistent quality** but also **consistent quantity** ie continuity of supply. To achieve this a number of strategies not normally employed by these growers (because they do not normally supply the retail market directly) had to be employed. The **growers had to schedule** their harvesting and grading to **meet demand** something, which has not been a common requirement. Previously harvest has been something done as quickly as possible to beat possible poor weather and uncertain prices.

This left the uncertainty of wet weather. As is the case in any heavy soil area, potatoes that are clean one day can be very dirty and unattractive the next.

To minimise residual soil moisture potato paddocks were over sown with moisture reducing crops such as French millet. Cool storage of potatoes (not cold storage) helped to dry out mud attached which then fell away in grading revealing clean fresh looking potatoes. This

stabilisation period in a cool dark area also provided a buffer against spring storms with no apparent loss in freshness. In fact potatoes removed from the ground and then stabilised at a constant temperature and humidity were fresher and had a better shelf life than potatoes that were not cooled and remained warm. This is thought to be mainly due to the amount of dehydration in potatoes stored in a hot dry environment, figure 4.

Once again the use of a written specification provided a firm target for supply and removed a lot of the ambiguities involved with supply of fresh produce. The specification allowed growers to aim for a particular size and type of product to meet consumer demand right from the planning stages to the final packout. Quality control checks particularly when packing could then be compared to inward goods inspections at Fruitex to fine tune further requirements.

Paper bags experience more movement on the pallet whilst in transit so some form of light strapping such as netting or flexible tape is also desirable and proved effective in the trial.

The paper bag is harder to sew than a hessian bag. This can be overcome by lengthening the stitch and sharpening the needles. Conventional sewers propel themselves across a hessian bag, whereas on paper this causes damage, so a sewer with a driven bag like a pedestal sewer may prove better. At the time of printing one grower was adapting a pedestal sewer for trialing. The amount of physical handling of the bag is also increased due to the more complicated sewing process. For anyone contemplating changing to a paper bag these costs need to be fully investigated with regard to returns, to make the changeover feasible to the grower.

These findings suggest that not the type of loose, brushed potato on display but the soundness and size of the produce has the biggest affect on the consumer's decision to purchase. This poses interesting questions in regard to the preference various buyers have with regard to potatoes grown in different soil types. As mentioned earlier if we look at the volume of potatoes sold in the trial store groups and control store group the trial store groups had a smaller drop in sales than the control

This trial casts doubt on two common myths in the potato industry. Firstly that only produce that has been freshly dug is marketable. On the contrary holding produce for a short time under controlled conditions can prove favourable particularly with soil reduction. Also removing field heat straight after digging improves product freshness at the point of sale. When potatoes are dug and packed warm they then tend to cook on the way to the consumer. Secondly the myth about soil preference is not substantiated by these findings. The best approach for the industry as a whole would be to concentrate on giving the consumer the freshest produce available from the different districts as it becomes available, that is **graded consistently**.

### ***Acknowledgments***

The help and support of Woolworths Queensland has been greatly appreciated. In particular the time contributed by the Store Managers, Produce Managers and Produce Staff. The time and interest shown Barry Ross, Malcolm Maclean, Kosta Conomos, and Wally Collins has enabled the growers involved to improve their operations and produce greatly, which inturn translates to better return for everyone in the supply chain.

We would also like to thank Robyn Shearer and Ken Law at Bairds Produce for their support and patience in trialing these concepts and offering the growers involved the opportunity to work with them in improving our industry.

***References***

Lewis, I. (1993). Australian potato industry marketing research and market development strategies for fresh potatoes. Horticultural Research and Development Corporation Report.

## Spring Survey

<b>DATE</b>				
<b>STORE</b>				
<b>DATE CODE ON DISPLAY &amp; BAG TYPE</b>				
<b>PULP TEMPERATURE</b>				
<b>QTY REJECTED</b>				
<b>GENERAL APPEARANCE AND SIZE GRADING</b>				
<b>WHAT DEFECTS HAVE OCCURRED THIS WEEK</b>				
<b>HOW WOULD YOU RATE THE FRESHNESS OF THIS PRODUCT</b>				
<b>ARE THE GROWERS SUPPLYING WHAT YOU WANT</b>				
<b>COMMENTS</b>				

# Spring Trial Report 1998

*How to sell 50% more  
Potatoes.*



*Development of a Quality Assured Production and Marketing system for Fresh Potatoes.*

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## Spring Trial Report 1998



Diagram 1. Well-presented paper bag display.



Diagram 2. Retail ready cartons provide uniform retail displays.

**Project:** Development of a Quality Assured Production and Marketing System for the fresh Potato Industry.

**Author :** Eric Coleman.

**Date:** 8/2/99.

**Subject:** Market Trial Spring 1998 crop.

### **Summary**

A market trial was conducted in November 1998 (otherwise known as the spring crop). This trial investigated questions raised in a previous trial with regard to product quality and shelf life and resulted in the following findings.

1. Paper bags produced higher sales than retail ready cartons.
2. Paper bags and retail ready carton sales were higher than control stores.
3. Retail ready cartons improved handling in the stores and ease of stock rotation.
4. Retail ready cartons increase the cost of loose brushed potatoes.
5. By improving product consistency and retail displays increases in sales of up to 50% are possible.

### **Introduction**

This trial was conducted as part of a national project funded by The Horticultural Research and Development Corporation. The project is intended to develop a model for production handling and marketing systems, and to improve profitability of fresh market production.

The Market Trial conducted complemented earlier trial work (autumn crop 1997 and spring crop 1998) where positive impacts on sales were noticed when quality defects such as greening and mechanical damage were reduced. The intention of this trial was to compare a proven form of packaging, ie paper bags, to an emerging new pack format for potatoes, the cardboard carton.

Commercial transactions for this trial were performed using a grower Co-Operative, that was an approved supplier to the retailer.

### **Method**

The trial consisted of a pilot group of ten growers, a grower co-operative and nine retail chain stores located in Brisbane, South east Queensland and Northern NSW.

The trial stores were divided into three groups.

- 1) **Control group** selling premium loose brushed sebago potatoes supplied by existing suppliers in hessian bags.

- 2) **Paper group** selling premium loose brushed sebago potatoes supplied by the Lockyer Valley QA pilot group in 3 ply, 89/73/73 HWS, paper bags.
- 3) **Retail ready carton group** selling premium loose brushed sebago potatoes supplied by the Lockyer Valley QA pilot group in 16kg retail ready carton.

Potatoes were graded as soon after harvesting as possible and where holding was necessary, for example, to overcome weather changes they were held at approx 12 C and 95 % Relative Humidity. Potatoes were graded by the growers at a number of locations in the Lockyer Valley and then stored at a freight-forwarding depot until despatch.

To assess quality, checks were performed on every batch/pack run of both paper bags and cartons and evaluated using the Woolworth's specification. Further checks on individual packs were then performed in store with a final shelf-life evaluation performed on a storage sample (a storage sample was maintained from every batch at 12 C and 95 % RH).

After packing, potatoes were then stored at 8-12 degrees celsius and 95% humidity. All transportation was carried out in refrigerated tautliners. The potatoes were delivered to Fruitex (Woolworths distribution centre) for distribution to the stores. In store data was also collected on the amount of wastage in individual stores and was collected by the produce manager or their nominee.

The pilot group potatoes were the only loose brushed sebago line being supplied to Woolworths Queensland from the Lockyer Valley during this period.

Pricing of premium loose brushed sebago remained consistent across the 9 stores except on a few occasions when individual stores went into combat pricing with competitors. Ticketing and promotion were identical across the stores.

The consumer was not coerced to buy the QA line and had no idea of the background and history of this produce such as traceability, crop records, and food safety.

### Results

Sample point	Onfarm		In-store			Storage	
	Carton	Bag	Carton	Bag	Control	Carton	Bag
Major defects(%)	1.65	1.27	2.04	1.50	2.21	1.49	2.89
Minor defects(%)	2.91	3.13	3.64	2.27	5.79	3.70	3.85
Over wt(%)	1.36	3.05	1.34	1.23	1.73	1.72	1.02
Under wt(%)	0.78	0.67	0.40	0.68	2.20	0.95	1.20
Total out of Spec(%)	6.70	8.12	7.42	5.68	11.93	7.86	8.96

Table 1. Quality control results shown as percentage of defects across store groups.

Store group	Carton	Bag	Control
Increase in Loose brushed sebago sales (%)	77.38	113.57	61.37
Increase in gross sales (%)	1.05	1.79	0.76
Nett Increase in total produce sales (%).	0.26	1.03	0.0

Table 2. Increases in sales during trial period.

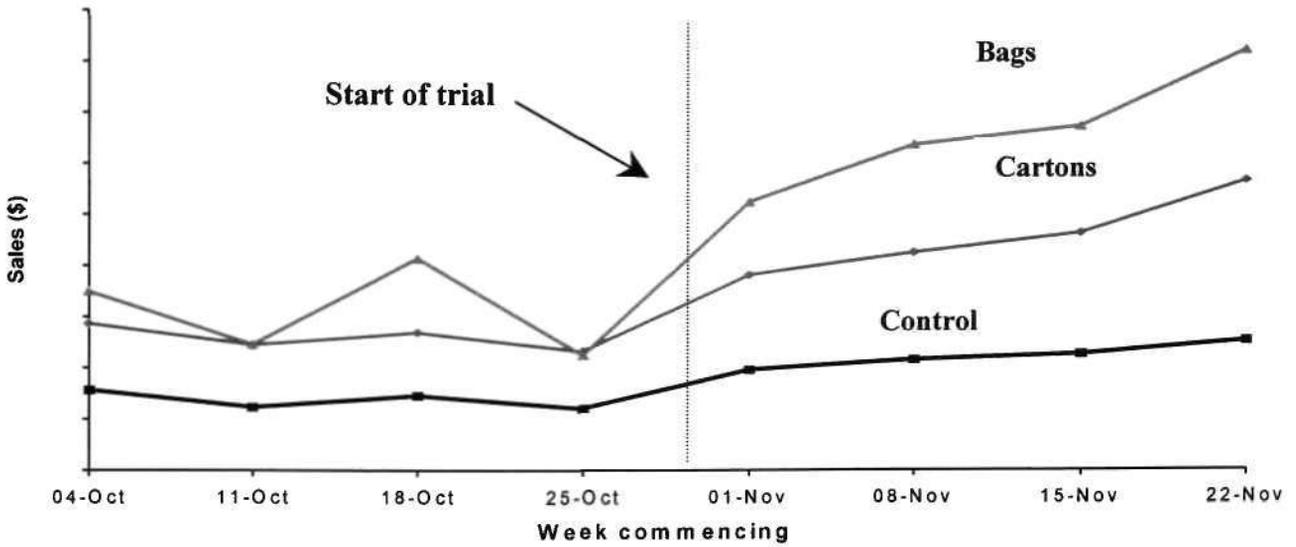


Figure 1. Comparison of potato sales by store group before and during trial.

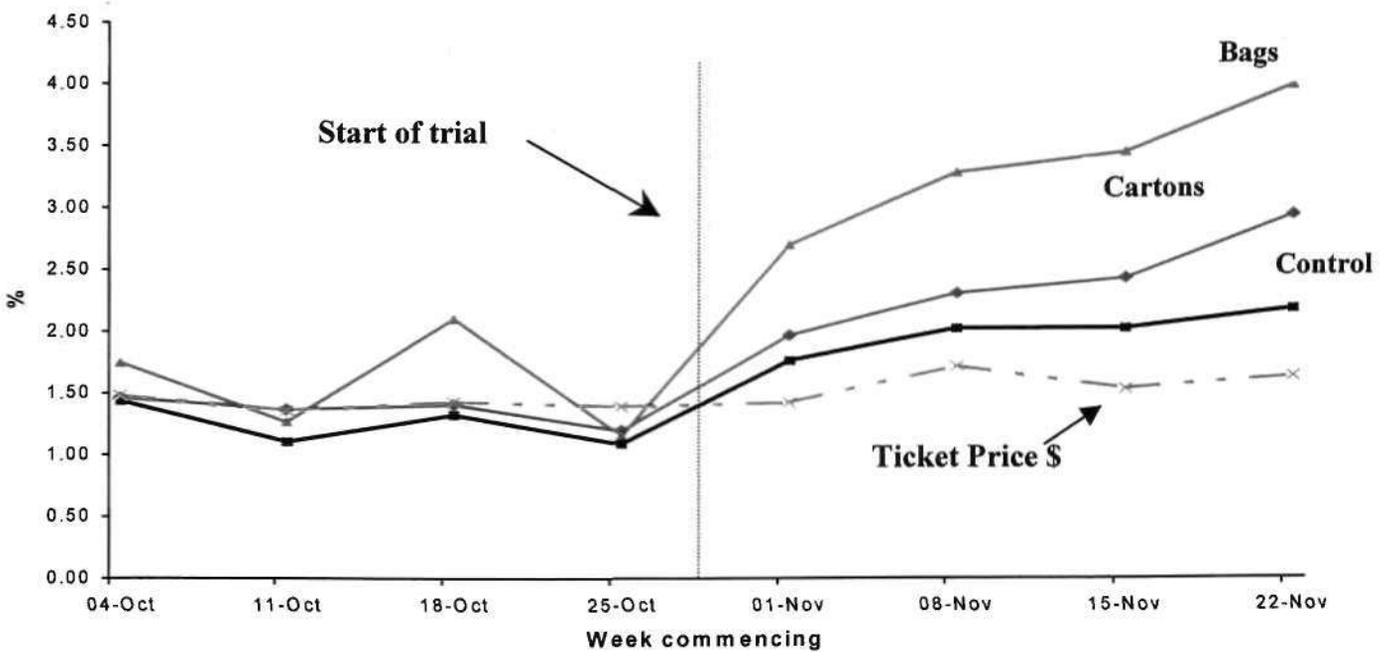


Figure 2. Sales as a % of gross produce compared to ticket price by store group .

***Discussion***

The increase in sales experienced in the stores carrying the paper bags and cardboard cartons suggests that some factor is making a positive impact on sales compared to the control stores. These factors have been explained by examining the trial outcomes under the following two headings:

- ❖ Improved product consistency and
- ❖ Improved presentation of product

***Product Consistency***

Previous trials (Coleman, 1997 & 1998) have demonstrated consistent quality potatoes, graded to a specification, in a package that preserves the potatoes, are preferred by consumers. Sales of these potatoes is not always adversely affected by cheaper lines or specials, this was demonstrated in the first and second weeks of the trial when specials on washed lines did not impact on sales (figure 1). There appears to be no correlation between ticket price and sales for this line of potatoes during the trial period (figure 2). These two findings confirm previous market research (Lewis 1994) that price is not the main factor in attracting consumers.

Comparison of quality control results (table 1) shows no difference in the final quality of potatoes sold in cartons and paper bags. This is contrary to anecdotal reports, which suggest that cartons reduce damage significantly. The most plausible explanation for this is that by supplying directly from the farm to the retail distribution centre manual handling, stock rotation errors and lead times were reduced significantly. Hence a more efficient supply line was created which has resulted in less product damage than was expected in the paper bags. Furthermore the produce was sourced from a production area close to the market and was not transported over long distances.

***Potato display/presentation***

One assumption about retail ready cartons is that they will improve stock rotation and hence the aesthetic appearance of the displays, this will in turn induce consumers to purchase more product. The sales results do not show the carton display as a better performer than bags. A possible reason for this soon became apparent during the trial. It was noted that produce managers in all the stores were putting in an extra special effort to keep displays looking good (diagram 1). The result of this was that the loose displays were of a higher than normal standard resulting in the paper bag stores having improved presentations.

The intent of the trial was to show that under normal operating conditions the retail ready carton would require less attention than bag displays and by default provide improved levels of presentation. Therefore it is entirely possible that under normal operating conditions the retail ready carton will perform better than bags even though that is not reflected in the results (figure 2). This is in no way a reflection on the produce managers but more on the design of the trial where this factor was overlooked. Therefore it is entirely possible that the results of the trial are biased and do not give a true carton/ bag comparison.

This fact needs to be evaluated further in order to get a better understanding of the relative merits of the 2 types of packaging.

***Carton/bag comparison***

The use of retail ready cartons adds a considerable cost factor, which in this trial does not support a similar growth in sales.

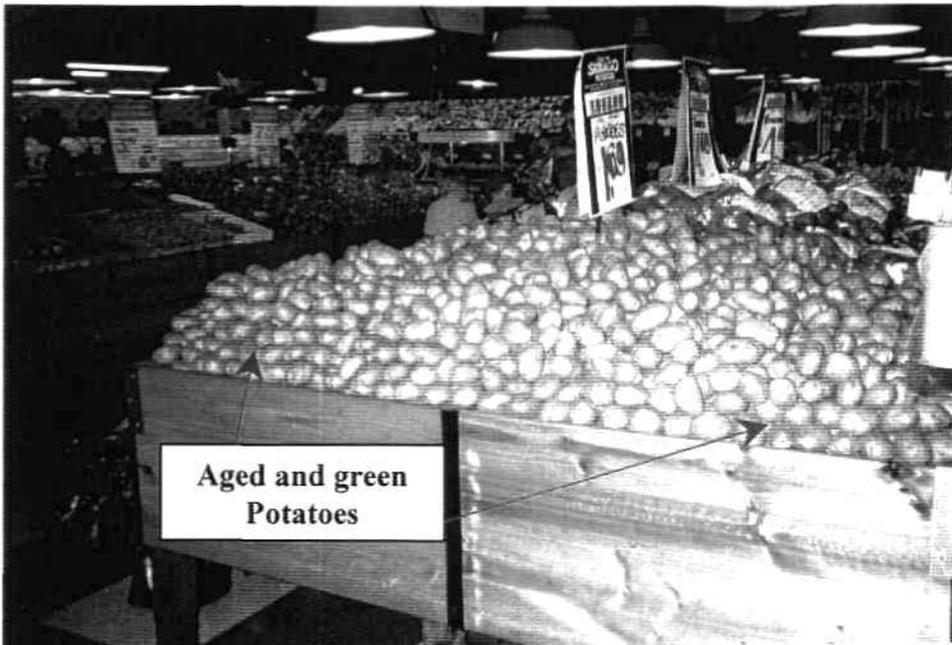
The use of a retail ready cardboard carton had the following outcomes.

*Positive outcomes*

- ❖ improved stock rotation.
- ❖ more uniform display appearance.
- ❖ minimised light entry while on the display (see bag display diagram 3).
- ❖ lids could be put back on cardboard carton out of store hours to protect displays from light.
- ❖ staff preferred handling the cartons.

*Negative outcomes*

- ❖ extra 8.6 cents/kg packaging cost.
- ❖ extra 4 cents/kg transport cost.
- ❖ extra labour cost in packing shed.
- ❖ capital plant and equipment upgrade costs in packaging sheds.
- ❖ increased value of packaging inventory.



**Diagram 3. Paper bag display Showing aged potatoes on the bottom.**

*Summary and Recommendations*

These findings suggest that not the type of loose, brushed potato on display but the soundness size and appearance of the displays have the biggest affect on the consumer's decision to purchase.

***In fact Consistently graded potatoes that are then well presented at the retail level have the potential to improve potato sales by up to 50% (figure 2) .***

This trial has also shown that:

- ❖ Both the trial store groups had greater increases in sales than the control group.

- ❖ Across the board viability of cartons to replace bags needs to be based on case by case evaluation of costs and benefits.
- ❖ Retail ready cartons show potential as an aid to improving displays.
- ❖ Improving presentation and management of displays at the retail level has a definite impact on sales.
- ❖ Further work is needed on the impact of display management and presentation.

### ***Acknowledgments***

The help and support of Woolworths Queensland has been greatly appreciated. In particular the time contributed by the Store Managers, Produce Managers and Produce Staff. The produce managers and staff in the stores need to be highly commended, their ideas enthusiasm and willingness to participate and work with the growers has been most rewarding.

By working together growers and retailers have been able to demonstrate in a positive way the opportunities still to be realised in the growing and marketing of potatoes. The time and interest shown Malcolm Maclean and Greg Dnharam has enabled the growers involved to improve their operations and produce greatly, which inturn translates to better returns for everyone in the supply chain.

We would also like to thank Kathy Marriott from Valley Fresh Co-op Assn Ltd, Rick Casten and his staff at Lindsay Brothers Transport Gatton for their efficient and timely service. Also Growpack supplies Gatton played a crucial role in developing and sourcing the retail ready cartons used in the trial.

The help and assistance of Peter Case in collecting data and monitoring displays was greatly appreciated.

### ***References***

Lewis, I. (1993). Australian potato industry marketing research and market development strategies for fresh potatoes. Horticultural Research and Development Corporation Report.

Coleman, E (1997) Autumn Trial 1997: *Trial of growers grading to set specifications.*

Coleman, E (1998) Spring Trial 1997: *Trial comparing paper bags and hessian bags.*

<b>Date</b>	<b>Type of training</b>	<b>Topics covered</b>	<b>Learning Phase</b>
3/2/97	Facilitated group	Goals, vision, what needs to be changed, product life cycle, perception, paradigms, power and influence	Sharing a common vision
10/3/97	Facilitated group	What is quality, quality control, quality assurance, defects, specifications, social styles, building relationships with customers	Awareness Understanding
25/3/97	Field trip	Building relationships, understanding customers, awareness of supply chain issues	Awareness Understanding
14/4/97	Facilitated group	Review customer relationships, accepting food safety, food hazard, requirements, negotiation	Understanding Acceptance
16/5/97	Facilitated group	Developing markets, consensus, customer focus	Acceptance Commitment
22/6-3/8/99	IDO facilitated market trial	Build customer relationships, work as a group to a set specification	Understanding Acceptance Commitment Adoption
19/9/97	Specialist Industry training	Chemical user training	Awareness Understanding
18/8/97	Facilitated group	Review trial results against specification Quantify strengths and weaknesses of group product in the market place	Understanding Acceptance
8/9/97	Facilitated group	Develop next field trial, Compile and develop potato food safety hazards, examine relevance of chemical storage to food safety.	Acceptance Commitment
2-29/11/97	IDO facilitated market trial	Meet consumer needs improve product quality	Commitment Adoption
4/2/98	Facilitated group external speaker	Examine marketing aspects of a supply chain using a broker	Awareness Understanding
23/2/98	Facilitated group	Brainstorm/analysis of brokerage marketing. Review of approved supplier requirements for growers as individuals and as marketing groups	Understanding Acceptance Commitment
25-26/3/98	Specialist Industry training	HACCP course	Understanding Acceptance
10-16/3/98	Field trip	Marketing systems, packaging and grading	Acceptance Commitment Adoption
2/6/98	Field trip	Review brokerage marketing	Acceptance
19/10/98	Facilitated group	On-farm QA, traceability, continuous supply, changing packaging, complete generic HACCP plan	Commitment Adoption
1-29/11/98	Market trial	Improve presentation and appearance of product, product branding	Adoption
Feb 99	Where to next	Group capability, understanding the market as we do can we be a commercial force.	Adoption