



Know-how for Horticulture™

**Study tour to analyse
the processes and
operations of the
American and
European beetroot
industry, September
2004**

Ashley Zelinski
Golden Circle

Project Number: VG04062

VG04062

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Final Report

VG04062

**Study Tour to Analyse the Processes and
Operations of the American and UK Beetroot
Industries**

September 2004

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Purpose Of trip

Overseas Study Tour of Major Red Beetroot production in North America and Europe covering the following topics:

- To analyse the seed production and selection process of our major seed suppliers.
- Investigation into the availability of new varieties more suited to the Australian environment.
- Compare and contrast the operational activities of Beetroot production in America and the UK with Australia's activities.
- Compare and contrast the retail offering of Beetroot products in the UK and America and investigate and analyse new product innovations

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1. Media Summary

Delegates making up the majority of Australia's Beetroot industry recently embarked on a Study Tour to analyse the processes and operations of the American and European beetroot industries. The group of 5 traveling were made up of 3 growers and 2 processor representatives, however the planning organising and support for the Tour included input and assistance from several organizations including HAL, QDPI, Golden Circle and seed companies Bejo and Syngenta.

The Tour lasted for 20 days and traveled through 4 countries including Holland, Denmark England and USA visiting all stages of the production process from seed production and processing to farming and on to final processing.

The Tour was focused on 4 key areas of study, all of which are significant in the ability of the industry to continue to compete in an increasingly competitive global environment.

The key areas are:

- The Analysis of the Major Beetroot Seed Producers
- The Investigation into the availability of new varieties more suited to the Australian Environment
- To compare and contrast operational activities of Beetroot production in America and UK with Australia's Beetroot production activities.
- Compare and contrast the retail display of Beetroot products in America and the UK with Australia's and investigate and analyse new product innovations.

The outcomes of each area are:

- A much better understanding of the process and importance of seed production to the overall performance of the industry, as well as a better understanding of both the growers and seed companies requirements and the ability of both to work much closer as a result of this networking opportunity.
- Several new varieties as well as more information on current varieties will allow the industry continue variety trials aimed at improving some of the current issues.
- Several processes identified both within processing and growing will now be considered and trialed to help improve productivity and quality. Some of these include row spacing, plant densities, harvesting techniques, raw material storage, washing, grading, blanching etc.
- Several products were identified that have been successful in growing the market for Beetroot in the UK, many of these product could be readily processed within our current supply chain and will be considered in the future.

The group has arrived home safe and without incident, all planned visits were conducted as well as being able to visit some items on the wish list including machinery manufacturers and research centers. The team was very fortunate to receive the level of support provided by the locals of all visits and wish to acknowledge their kind support and friendship.

The group feels confident that information gained on the Tour will assist the industry in addressing some of its current problems, and look forward to using the information to ensure the industry remains globally competitive into the future.

2. Executive Summary – Key Learning’s

Report 1 – Analysis of the Major Beetroot Seed Producers

1. The level of understanding of both the customer and supplier requirements regarding Australian Beetroot seed requirements was relatively low.
2. There were noticeable differences in the level of professionalism and business focus displayed by current Beetroot seed supply companies.
3. All seed companies displayed a wish to work closer with Australian producers.
4. Workplace order of European businesses visited was well above the Australian standard.

Report 2 – Investigation into the availability of new varieties more suited to the Australian Environment

1. There are many more varieties being used commercially overseas and available for trials in Australia than the industry had knowledge of.
2. There is detailed information regarding the breeding and subsequent characteristics of different varieties currently used and being trialed however this information has not been made available in the past.
3. Open pollinated varieties currently being used by Australian producers are not being supported by seed companies, and that when taking selections of this material for seed production Australian requirements are not being considered.
4. There are alternative sources of the open pollinated varieties used by the Australian industry available.
5. Australian producers need to continue variety trials focused on both production suitability and optimum planting windows.
6. There is the opportunity to have varieties developed specifically for Australian conditions and requirements.

Report 3 – Compare and contrast operational activities of Beetroot production in America and UK with Australia’s Beetroot production activities

1. Australian production is based on an American model.
2. Australian soil and environmental conditions are very different to both the US and UK.
3. UK farm production has a much higher focus on value adding before sale to processors.
4. There are considerable differences in farm production requirements, environmental conditions and grower support between the US UK and Australia.
5. Economies of scale of farming suppliers are generally larger in both the US and UK, harvesting equipment is more advanced in both cleaning ability and harvesting rate.
6. Processor capacity in Australia is larger than most OS operators, processing and particularly packing equipment in general is more advanced in Australia.
7. There were noticeable differences in efficiencies at all stages of the production process between the different processors visited.
8. There is new and advanced beetroot processing equipment available that has the capability to further reduce labour costs in Australia.

Report 4 –

Compare and contrast the retail display of Beetroot products in America and the UK with Australia's and investigate and analyse new product innovations

1. The market for processed beetroot varied considerably between each country visited, and each country was experiencing a different stage of development ranging from decline or stagnation to new product growth.
2. The standard flavour profile between the US and Australia was similar where as the UK was very different.
3. Consumption habits of consumers varied between each country, however in all cases the elder population made up the majority of consumption.
4. Packaging for each country was traditional in that glass or cans in similar sizes to that used in Australia was the main offering; the UK was the only country to be offering new innovative packaging to the market.
5. Australia was the only country to feature beetroot in national fast food chain menus.
6. The declining aged market and the requirement to lift sales in the younger generation is a challenge for all producing countries.

3. Itinerary - Beetroot Study Tour (September/October 2004)

Day 1 **Sun** 19/9/04 Brisbane - Amsterdam

Day 2 **Mon** 20/9/04 Arrive Amsterdam.
Drive to Bergen

Bejo Seeds – Afternoon Tour Head office and seed processing facility

Day 3 **Tues** 21/9/04
Bejo Beetroot Field Day (Warmenhuizen)

Day 4 **Wed** 22/9/04
Syngenta seeds – Visit to Head office and seed processing facility as well as variety displays (Enkhuizen)

Day 5 **Thu** 23/9/04
Amsterdam – Copenhagen (*Overnight Horsens*)

Day 6 **Fri** 24/9/04
AM: Visit robotic weeding research group at Danish Ag Institute, Bygholm.

9.00 Welcome and introduction to Bygholm - Svend Christensen
9.15 Automated weed detection - Henning T. Søgård
9.45 Field robot and demonstration of weeding robot - Thomas Bak
10.30 Innovative implements - Martin H. Jørgensen

Depart Bygholm Research Centre at 11:00am and drive to Flakkebjerg Research Centre to visit Dr Per Rydahl

PM: Visit weed research team at Danish Agricultural Institute, Flakkebjerg (contact: Per Rydahl)
13.30 Short introduction to main activities at research Centre Flakkebjerg.
13.45 Introduction to chemical weed control in sugar beets in Denmark.
14.00 Development of a Decision Support System for weed control - with a special focussing on beets.
15.00 Coffee/cakes/soft drinks
15.30 Guided Tour around Research Centre Flakkebjerg
16.00 End of visit

Day 7 **Sat** 25/9/04
Visit Asa-lift, Soro (*Overnight Soro*)

Day 8 **Sun** 26/9/04
Copenhagen – Manchester. Drive to York

Day 9 **Mon** 27/9/04
AM: Visit Stockbridge Technology Centre
PM: Visit Haizelwoods Processors + grower visit

Day 10 **Tue** 28/9/04
Visit South Yorkshire/Nottinghamshire grower visits/harvesting; retail outlet and a processing plant for cooking/vacuum packing

3. Itinerary - Beetroot Study Tour (Cont) (September/October 2004)

Day 11 **Wed 29/9/04**

AM: Travel to East Anglia to visit largest producer in UK, Soham in Cambridgeshire

PM: Travel to Grantham to Visit Stanhay Precision Seeders

Day 12 **Thurs 30/9/04**

Flight from UK – Chicago – Madison.

Day 13 **Fri 1/10/04**

Visit to University of Wisconsin beet breeding team. University of Wisconsin, Madison
Beetroot breeding team: Dr Irwin Goldman and Nick Bretibach.

Day 14 **Sat 2/10/04** **Free Day**

Day 15 **Sun 3/10/04**

Drive to Stevens point visit Del Monte Contract grower

Day 16 **Mon 4/10/04**

AM: Visit to Del Monte Foods, Plover Wisconsin
Contact Don Caine or Roger Jacob: ph: 7153448285

Don.Caine@delmonte.com

Drive to Denmark

PM: Visit large contract grower Myron Kudic, Denmark

Visit to Lakeside Foods Incorporated and contract growers (Belgium WI)

Drive to Port Washington

Day 17 **Tues 5/10/04**

Visit to Seneca Foods

Seneca Foods, Clyman Wisconsin

Contact Andy Bennett or Virgil Sisson: ph 920 696 3331

Email: ABENNET@senecafoods.com

Drive to Madison Airport

Flight Madison – Chicago - Seattle

Drive to Mt.Vernon

Day 18 **Wed 6/10/04**

Visit Alf Christianson Seed Co.

Tour of Alf Christianson Seeds research station.

Meeting with Chris seed General Manager and beet breeder.

Day 19 **Thurs 7/10/04**

Drive Mt. Vernon – Seattle

PM: Flight Seattle – Dallas Fort Worth - Los Angeles – Auckland - Brisbane

Day 20 **Fri 8/10/04** Transit to Brisbane

Day 21 **Sat 9/10/04** Arrive Brisbane (AM)



4. Contacts List

| | |
|---|--|
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4. Contacts List (Cont)

| | |
|---|--|
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| <p>Kudick Farms Myron & Kathleen Kudick 18722 Lyons Rd Denmark, WI 54208 Tel: (920) 863-3481 Fax: (920) 776-1064 Email: kudick4beets@aol.com</p> | <p>Alf Christianson Seed Co. Difang Chen – Vice President of Sales PO Box 98 Mt Vernon, Wa 98273 USA Ph: (360) 419-3020 Fax: (360) 419-3035 Email: difang_chen@alfseed.com</p> |
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5. Report 1 – Analysis of the Major Beetroot Seed Producers

5.1 Introduction

Seed quality and consistency has been identified in research work in the last 3 years to be one of the key issues effecting productivity and beetroot quality within Australian Red Beetroot production.

Historically all seed requirements and procurement was managed by Golden Circle as per the requirements for processing, whilst this process has worked well for many years in recent years seed quality and consistency have called for a greater focus in this area. As such growers and processors are now working collectively to improve quality.

One of the key components of improvement is to understand the processes and facilities used by our different seed suppliers and the supply chain supplying them.

Key Seed Supplying Companies

Traditionally Golden circle procured 95% of seed requirements through Syngenta seeds, the varieties used were Detroit dark red and New Globe which are both open pollinated varieties.

However in recent years due to reduced performance particularly in Detroit dark red the industry have been trialing new varieties from other seed suppliers.

This has resulted in the inclusion of Bejo and Lefroy Valley supplying smaller quantities of Hybrid and open pollinated varieties for commercial usage as well as several varieties currently in trial stages.

For this exercise the only seed companies that were investigated during the Tour were Bejo, Syngenta and Alf Christenson Seeds due to these being our current key suppliers and their localities fitting the over all Tour program.

5.2 Bejo Seeds

Introduction

Bejo's head office and world seed testing and processing base is in Holland, this was our first visit on Tour and coincided with the companies varieties field days. Bejo is one of the world's largest vegetable seed companies and possibly the most respected for quality. Crops produced for seed include all vegetable crops and some ornamentals. Seed is produced all over the world depending on the availability of suitable locations.

Their Beetroot seed production is based mostly in France, New Zealand and the USA, however all seed irrespective of where it is produced returns to Holland for testing and processing, the main variety produced for Australian Beetroot growers is Pablo which is mostly produced in NZ.

Workplace Order

Work place order was very impressive, from the administration offices to testing labs and seed processing and packaging the work place order was a model for the modern workplace. Signposting of all equipment, machines & product were prevalent, simplified work procedures, good plant design and standardisation of all areas is maintained to ensure minimisation of waste in the process.

Employee morale was terrific, showing a great deal of knowledge and understanding of their processes. Much responsibility was shown regarding the level of care, effort taken in keeping areas clean and tidy.

Machinery was technologically advanced with low numbers of well skilled labour used to run the lines.

All offices were neat, organised and ergonomically designed with workstations used to utilise space efficiently – employees were involved in designing their workplace to accommodate their respective needs and hence a positive spin for morale and work ethic.



Bejo seed cleaning

Seed testing and processing

Attention to detail regarding all aspects of seed testing and processing was evident, quality control aspects of testing was exemplary with all critical control points showing evidence of being adhered to.

Testing equipment and process was state of the art and know within the European industry to be the bench mark, as such Bejo do a lot of contract seed germination vigour and purity testing for other seed companies.

Cleaning of seed was very efficient, all equipment appeared to be very well maintained and whilst some older equipment was evident the majority seemed to be recent or latest technology. There was an obvious focus on customer needs, with continual requests asking how they may service us better or more efficiently in the future.

Seed Quality Control

The seed germination, vigour and purity testing was completed under ideal conditions, seed handling and storage was well controlled therefore minimising risk of degradation and stored under the ideal conditions of 10 – 14 c and 30% relative humidity. All processing, storage and distribution was controlled by lots under a coded scanning process to give traceability of product per batch from the growing field through testing processing packing and shipping.



Bejo seed quality assurance

5.3 Syngenta Seeds

Introduction

Syngenta is a very large multinational seed company; it encompasses several individual seed companies and is represented in most countries. The company is currently the 3rd biggest seed company in the world and produces seeds in many different locations around the world. The entity we visited was S&G seeds which is located in Enkhuizen in Holland and is responsible for all of the European based Beetroot seed production and processing, most Beetroot seed production occurs in France and is brought back to Holland for processing. The key variety handled by this operation for Australian production is New Globe.

No photos were able to be taken during this visit.



Work Place Order

Workplace order at Syngenta was not in the same class as Bejo, however still fair compared to Australian processing standards. Equipment all seemed to be well maintained and not too old, capacity seemed to be greater than Bejo however this would be difficult to measure. Staff seemed to be of much more casual nature regarding work; however were still very conscientious and seemed content.

A lot more waste was evident through out the processing operation compared to Bejo, and cleaning was evidently not as high a priority.

Luckily they were processing Beetroot seed on the day of our visit.

Attention to detail regarding seed testing and processing was again not to the same standard as Bejo, we were able to identify foreign seed within the graded Beetroot seed. When asked if this was to be removed the reply was “perhaps” depending on whether the operator felt there was too much present. This needs to be taken in context however as we were talking to factory staff, we were also shown the seed purity lab and there was evidence of a QA process in place. They had a very large climate controlled greenhouse operation for plant variety work which is mostly consumed by work on ornamentals plants.

Seed Quality Control

We toured all seed germination, purity and QA labs of which there was evidence of standard process and controlled by a computerised lot system recording all relevant data.

The work place order was not good relative to other areas of the organisation. These facilities were less impressive than Bejo however the basics seemed to be in place.

They also had a seed cool storage facility controlling the optimum environment for seed storage. Packaging equipment was a mix of old and new with most of the new equipment focused on small retail packaging of seed. New Globe Seed produced for the Australian market is generally packed in large pallet boxes for shipment; this seed is then repackaged into appropriate bags by Pacific seeds in Toowoomba for storage and distribution by Golden Circle

5.4 Alf Christenson Seeds

Introduction

Alf Christenson Seeds is a small seed company compared to the previous two; it is based in Mt Vernon just north of Seattle in the USA. The company is owned by the Japanese and grows much of their beetroot seed within driving distance from the factory. They produce much of the Beetroot seed used in the USA; all of our Detroit Dark red comes from this source via Syngenta as the agent. The key part of this business is their Beetroot breeding program which supplies the varieties to seed companies around the world, they are investing continually in developing improvements to the current lines for a range of different applications.



Alf Christenson seeds – Bulk seed packing

Work Place Order

Again not in the same class as Bejo and possibly lower than the standard at Syngenta, the building that the processing was operating in was very old and not particularly suited to good work place order, however this point was identified by the management and they are moving to new premises within the next 12 months. Equipment used for grading was not as advanced as the other seed companies however seemed adequate. Cleanliness was not to the same standard; however product control and identification seemed to be in order. There was evidence of a quality control process however we were not able to visit the testing facilities.

5.5 University of Wisconsin Beetroot Breeding Program

Introduction

It should be noted that this visit was for research purposes only, and as such should not be compared to seed producing companies visited. However the visit was worth while and the information gathered relevant to this section of the report.

Program Activities

This program is headed up by Dr Irwin Goldman and is part of the University of Wisconsin Horticulture Department.

They have a long history of involvement with Beet breeding however their main function now is to breed germ plasm for seed companies breeding programmes and specific requests from processors. Some of their work recently has involved breeding a darker beet used for pigment extraction, however beetroot juice for pigment extraction cannot be concentrated in the USA due to food regulations, so the market is much larger in Europe where this function can be performed. This colouring is used as a food colouring for natural products including yoghurts, ice cream and also pharmaceuticals & cosmetics however the colouring is not suitable for acidic products.



Some of the varieties bred here include Ruby Queen (op) and Red Ace (hybrid) which are used widely for USA beet production. Ruby Queen is the most popular op seed used by US canners. Both of these varieties are derivatives from Big Red, canned samples of this variety were sampled by the group and found to be quite sweet as a finished canned product.

The program is now mostly focusing on demand for fresh market beetroot and Beetroot leaf for salads.

We discussed our issue of varieties not performing as we would expect, and it was stated that poor selections by seed suppliers can lead to poor seed quality and integrity. Suggestions were made that we should make the selections for seed production from beets in our environment and therefore tolerant of our conditions and environmental conditions.

5.6 Summary

The information gathered will allow the industry to be more diligent when it comes to quality and service and price expectations from the different seed companies. The industry now has a raised expectation in regards to the support it receives from seed companies, over time the companies that deliver better value to the industry will reap the rewards by way of seed purchases.

We have ordered seed of all varieties identified for trial in Australia and we are now in the process of planning variety trials for 2005 to test product integrity and timing of production.

The closer relationship with each of our suppliers will allow us to focus better on issues and improve our ability to drive improvement.

6. Report 2 – Investigation into the Availability of New Varieties More Suited to the Australian Environment

6.1 Bejo

Variety displays

The field days visited are held yearly by Bejo to show customers all current and new varieties, customers come from all over the world for the event and the attention to detail shown in the processing was also evident in the trial displays. Each plot was about as perfect and consistent as you could expect and all different crops and varieties showed the same consistency which again emphasised the company's attention to detail and quality.

Varieties of Interest

Beetroot Trials were incredibly well presented with a good selection of both round and cylindrical Beetroot.

The round varieties displayed were Pronto, Regala, Bikores, Moneta, Wodan, Action, Pablo, Boro, Cornell, Red Cloud, Rhonda, Red Ace, Redondo, Alto

The following varieties we believe need to be selections for trial in Australia:

- Wodan
- Large size
- Slightly Misshapen
- Quick growth
- Designed for warmer climate

- Redondo
 - Grows to large spec
 - Designed for harsher climate – dry and warm

- Boro
 - Updated strain of Pablo
 - Designed for improved top/leaf

- Rhonda
 - Nice round shape
 - Size similar to red cloud
 - Impressive internal colour and ideal rings





Bejo variety displays

We were able to discuss the different varieties with the Bejo plant breeder, general information on the history and requirements of the different varieties was shared. The request for data sheets on the characteristics of each variety was considered and believed to be available for many of the varieties.

Bejo are not breeding new beetroot varieties and have no intention in the near future, they are however continuously trying to improve the current lines they sell and are happy to select for specific traits.

6.2 Signet Variety Displays

Syngenta do not have a Beetroot breeding program focusing on new varieties, the only work they are doing in Holland is to continue to improve their current varieties by a selection process as per Bejo. They did however have some lines for us to inspect in the ground and these were variants on the 4 varieties they still produce commercially, these being Detroit Dark Red, New Globe, Boltardy and Little Ball.

Varieties of Interest

Of these varieties Detroit dark red and New Globe are well known to us as they have been the main Beetroot varieties used in our industry, however it's interesting to note that we have never heard of Boltardy or Little Ball and all are open pollinated lines. Boltardy is still used a lot in the UK and Europe however Little Ball apparently is not as commonly used. If suitable for our use seed of both varieties can be produced for our requirements. Following is some of the characteristics supplied.

- Little ball
 - Baby beetroot variety designed to be small
 - White rings in large sizes
 - Very quick harvest
 - Late sowing
 - Similar to new globe

- Boltardy
 - Slice Beetroot variety, updated strain of DDR
 - Most widely used S & G seed in Europe – unknown to Australian producers
 - Early quick harvest

Apparently breeding notes are available for these varieties and it was suggested we should access this information to help and marry into our conditions.

We are a considerable customer of theirs and will happily work closer with us in the future.

They are happy to communicate directly on all seed quality or plant characteristics requests.

6.3 Christenson Seeds Variety Displays

On notification of our visit the company planted a specific block with all varieties they believed we may have interest in for us to view on arrival, Detroit was displayed as the main line produced for Australia. Christenson is the world's largest Beetroot breeder and supply lines to most of the seed producing companies. They are continually breeding new Beetroot varieties, and a range of varieties that we have not had access to in the past were displayed, as well the latest breeding that may suit our requirements.



Alf Christenson seeds – Variety display planted for the Tour group

Varieties of Interest

The display was well presented and our ability to pull and cut as much as required allowed us a very close inspection of each variety.

Many of the varieties were obviously not suited to further appraisal, gold varieties were also displayed for interest purpose only, these are being bred for a fresh marketing business in the UK. Currently they are not suitable for processing.

The following varieties were identified by the group as varieties we need to consider for trial in Australia.

- Merlin – BT 0085 shape was round, only medium size, good internal colour
- Osprey – BT 0083 nice round shape, medium size, minimal internal colour and smaller tops
- Kestrel – BT 0084 (was trialled as a baby previously but suggest to trial as a slice beetroot)
- Red Ace – size was good up to 4” beets, slight heart shape in bigger beets, white rings apparent in larger beets



Alf Christenson Seeds – Variety displays

Very good discussions were had re Australian requirements; the company is looking to visit with a view to selecting specifically for Australian conditions.

We discussed the issues we have had with seed to date particularly Detroit dark Red, it was explained to us that selections for Detroit Dark Red seed production are made from smaller beets and from beets which are grown in ideal conditions. Breeding was conducted for the USA market with nil selections made for our market hence no selections for a 4” beetroot.



The beet breeder suggested that he will now make selections from larger beets which will be grown on a trial plot in east Washington with similar warm dry conditions as to what we are facing in the Lockyer valley. A climate information sheet was provided to the breeder to assist him with this process.

Suggestion was made that we should trial primed seed which are mainly used in areas with adverse weather conditions (eg California). Advantages as follows:

- Shortens germination period
- Creates more uniformity
- Reduced irrigation to bring seed up
- Decreases susceptibility to disease

This priming is a patented technology conducted by the Sakata group in California and Syngenta seed agent Barry Donohue will arrange for some trial samples to be delivered to us.

Detroit Dark red was stated to be one of the oldest varieties and there are much more tolerant varieties around.

There has not been any further work completed on improving disease resistance to OP seeds due to lack of legislative protection on OP seed. All disease tolerance and resistance breeding and funding is channelled into the hybrids due to the protection of these varieties.

Rhizoctonia resistance is currently being bred into beet seed but commercial production is approx 5 – 6 years away.

Their Sales Manager stated that Red Ace is their no 1 beetroot variety, and is sold in quantities to the USA, France and South African markets.

6.4 Summary

All seed companies were only to welcome to assist us in improving our productivity from beetroot. What was evident was the lack of understanding and knowledge by seed companies in the requirements of Australian beetroot production. Vice versa was the lack of understanding and knowledge of the capabilities and requirements of the seed producing companies by Australian beetroot producers. As a result of the Tour the industry now has a more direct association with the major seed companies, and the net working ability will now break down this issue and lead to a better understanding by both parties and greatly increase our ability to resolve our seed issues.

All of the varieties identified for trials in Australia have either arrived or are in the process of delivery and will be included in variety trials this year, and all seed companies are now more active in working with the industry.

7. Report 3 – Compare and Contrast Operational Activities of Beetroot Production in America and UK with Australia’s Beetroot Production Activities

7.1 Planting

Planting ratios of seed did differ greatly between the three countries which were mainly attributed to the demand of the customer and the end product required. The UK plant beetroot with a seed density to achieve a smaller beet diameter 25 – 40mm. These are mainly used in short shelf life punnets, long life vacuum packs and glass jar of whole beets. Beetroot with a diameter of 60mm are mainly unwanted in the UK although there is a smaller demand in Europe for this specification of beet.

The interesting difference is the way in which the UK growers measure their densities, that is by way of seed count per hectare, this was standard practice and made it difficult to compare our farm practice to theirs. The more significant growers measured the seedling count per square meter in each block so as to assess yield and timing for harvest.



The American market is very similar to the UK with demand mainly for beets with a diameter of 25 – 60mm, although there is a greater demand for sliced beetroot than that of the UK and therefore enables planting for a larger size specification.

The Australian market is mainly grown for a larger beet due to the higher demand of large sliced beetroot. Seed density for planting is lower than that of America and UK as a result with the main consumer market revolving around slice beetroot in cans from 450g to 3.2kgs. This enables Australian processors to take beetroot up to a diameter of 100mm.

UK suppliers mainly sourced their seed direct through seed agents while America and Australia rely on processors to stipulate seed variety to be planted and on most occasions processors dealt direct with seed agents and supplied seed to growers.

The main form of planting machinery was precision air planters of different makes and models. However in the UK due to most growers moving to shear lifting and narrower row spacing there are a number of growers now using standard broad acre grain air seeding equipment.

7.2 Productivity

Due to the difference in raw material size requirements, farm yields were difficult to compare however America and the UK were averaging in the vicinity of 15 – 18 tonne to acre, Australian growers when planting for whole baby beets are achieving 12 – 15 tonne acre. Australian yields when planting for slice beetroot were higher generally aiming to achieve 18 – 20 tonne acre.

7.3 Harvesting

Harvesting in the UK was predominately done with the use of shear lifting harvesters that dig and lift similar to what is generally used for potatoes and onions world wide. One reason for this is because they are trying to produce mostly a baby sized product they can get better quality and yield by having narrower rows and hence a more even distribution of seed. This narrow row spacing then makes it very difficult to use machines that pull by the leaves. It is also worth noting that the lighter soil profiles used by UK growers enables this option, if Australian growers had access to similar soils then this option could be considered and is worth investigating.



Stan White Farms UK - Shear lift harvester used for both Beetroot and Potatoes

America and Australia use the top lifting process which is based on lifting the crop by the leaves; this is considered a more gentle approach and also provides a more accurate and even topping process. Both methods prove effective but it is very difficult to utilise the shear lifting process in Australia due to the heavy soil types used. Harvesting is mostly done according to fruit maturity and processor demand, with wet weather causing issues with both methods of lifting.



Myron Kudics farm USA - Four row new ASA Lift top lift harvester

The size and capacity of harvesting equipment is worth noting, as per Australia this is generally dictated by the size of the operation. However it is fair to say most operations in both the UK and USA had more advanced harvesting capability than the average Australian operation. The USA would be the best model to compare with as they use pull type systems, where Australian growers can generally harvest 1 or 2 rows at a time USA growers are pulling 3 or 4 with the obvious increase in productivity.

7.4 Storage

Storage of unprocessed Beetroot prior to grading, washing and processing is a key difference between UK production and that of other countries. Due to several different tried and tested storage techniques and the climatic conditions in the UK, growers can store beets through winter for up to 10 months according to conditions. All beetroot is stored unwashed, and all methods try to achieve a temperature range of between 2 and 10 degrees with high ventilation and humidity levels. The ability to hold beetroot for long periods is determined by the growers control over the optimum storage conditions. There were three main methods used:

Traditional Pie Storage.

This is when Beets are harvested then tipped or raked into windrows in the field; these are then buried with a mixture of soil and straw. When required for grading and sale the grower digs the Beet out and the grading and washing process removes all straw and dirt ready for grading and sale. This is possibly the least effective method of storage however growers successfully hold beetroot for up to 6 months in this way; however quality is said to start deteriorating after approximately 4 months.



Traditional Pie

Advanced Pie Storage

Similar to traditional pie storage although beets are transported from the field to a storage area where bays are made from large square straw bales, the beet is then elevated in, in some cases primary grading will happen during this process. These bays have ventilation flues running under the Beet, once full the beet is then covered with a thick layer straw and then when night time temps fall the fans start and blow cold air through the beetroot to manage hydration. This night time venting is continued for the duration of the storage period.



Advanced Pie Storage

Cold Rooms

Beets are stored in 1tonne bulk wooden bins and washed condition, they are then held at approximately 3 – 5 degrees Celsius with maximum possible humidity and high ventilation. Again the use of ventilation fans is used to achieve this. This we were advised is the most effective method of storage to achieve quality material for up to 9-10 months.

American and Australian suppliers do not use any storage facilities for beetroot and mainly supply material direct to processor after harvesting.

USA processors do hold up to a weeks worth of processing on site in ventilated bays, in Australia this practice is limited due to the heat and so most Beetroot is processed within days of harvest.

There is an opportunity to look at the possible use of cold storage, this would be beneficial to processors during unfavorable climatic conditions and also to keep inventory levels low and produce on demand.

7.5 Washing & Grading

There was a large difference in the washing and grading process from all three countries. This is mainly a result of the demand of product of processors and also the design of processors equipment. In the UK, suppliers run their beets through an intensive size grading and washing process.



UK Beetroot pre grading prior to Cool Room storage

Processors demand strict adherence to size (diameter) of beets and therefore suppliers do have a large infrastructure set up for the grading, cleaning and washing purpose. Beets are supplied within a 10mm specification range in the UK with oversize beets generally destined for Eastern European markets or dumping. American processes had the most minimal grading and cleaning process as processors had the necessary equipment to run material through an intensive wash and grading cycle. Australian suppliers run their respective material through a dry clean and minor grading process to remove all excess soil and leaf matter and also eradicate oversized and undersize material and to a lesser extent some suppliers do wash their material. On a production perspective grading is a key for processors to achieve their maximum possible throughputs.

7.6 Quality

The quality trends of product are very similar in all three countries with the use of open pollinated seed decreasing due to its susceptibility to disease. In the UK there has been a strong push to switch to planting of hybrid seed as it has a superior tolerance to disease issues and better vigor in early plant stages. The change is also apparent in the USA and Australia with hybrids producing a better quality crop but due to the high cost of hybrid seed most suppliers still plant quantities of op seed but mainly during ideal planting conditions and planting windows. The acceptable quality of finished goods in the UK was slightly more relaxed in comparison with Australia and USA. Blemish on product was allowable in UK with greater emphasis on inspection and finished product quality apparent with USA and Australian processors.

7.7 Delivery

Delivery of raw material was in the same medium for all suppliers. 25 tonne trucks were used in all countries with the main variance being the type of trucks used. In the UK bin trailers with walking floors were used, which allowed the bins to be stored on site without the need for prime mover to remain, processor would then feed direct from bins into processing line and therefore minimizing damage and waste. In America and Australia tipper trucks were used and material was tipped either in bays or flume systems. In the UK and USA suppliers were responsible for organizing the freight of material into processors however some processors did supply trailers. In Australia the processor is responsible for organizing the freight from supplier.

7.8 Processing

Processes were very similar in the basics for all three countries although plant design and raw material supply were greatly contrasting. Both Australia and the UK use the concept of continuous cooking while the USA processors use the batch retort process of cooking in the can. UK processors receive their material size graded within tight specifications and therefore did not have any extensive grading process unlike that of USA and Australian processors who needed to be able grade raw material to relevant sizes and therefore have sufficient storage facilities to store graded material. All three countries use a steam peeler to peel beetroot with the UK and Australian processors utilizing grit rollers and polishers to clean peeled material vs the USA which use brush peelers post steam peeling. The continuous cook facilities of the UK and Australia required the beetroot to undertake a blanching, cooking style preparation in comparison with batch retort cooking of USA which required a short blanch to assist in peel removal. Two processors in the USA were using an optical sorter to remove material with surface blemish which proved to be very efficient and greatly reducing the volume of inspection labour required. All USA processors were using a rotary tumble style filling process and flood syruping to fill cans and jars while Australian and UK processors were using filler bowls. Direct inline labeling was used in both Australia and UK where the USA were storing their finished product bright (i.e. unlabelled) accumulating volume and then running their product through high speed labelers.

7.9 Packaging

All three markets were varied with end user packaging. Packaging is driven by consumer demands and in the UK demand is for long life vacuum packed beetroot, short life plastic punnets and glass jars. There was no canning of beetroot in the UK. USA were split mainly between canned product and glass jars with the Australian market predominantly canning with only a small demand for glass jars.

7.10 Summary

From an operations perspective there are many opportunities where we can improve our process and bring value into the supply chain. Main opportunities are

1. Washing, grading and processing

Consistent volumes of throughput in processing factory fail to be achieved as a result of variance in size of beetroot. To achieve maximum throughput you need to be aware of what size material you are to process. In UK processors are very strict regarding the variance in size and cleanliness of product, which can be supplied. In USA processors are very relaxed however processors possess a very effective washing grading and storage infrastructure that permits constant runs of certain size and specification beetroot. In Australia we need to improve our pre-grading and cleaning process with storage capacity of known size material. This would allow the processor to run exact sizes through the plant and therefore maximize efficiency and utilization of equipment.

2. Storage Possibilities

As we are limited to planting beetroot during the autumn / winter period due to our sub tropical climate, inventory holding is a huge cost to the business. With a key attribute of lean manufacturing being to process at the pull or demand of the customer, cold room storage may be a viable option to reduce cost to the business. Hydration and temperature would be the key to holding beetroot in cold storage but if managed well it could provide the opportunity to process all year round at the pull of the customer, allow processor to complete regular line maintenance when required, reduce substantial labor costs during the peak processing season and also have a source or bank of raw material during unfavorable climatic conditions for example during storm periods.

3. Packaging Opportunities

Although we have released a glass jar product in Australia with limited success, trends in UK and USA markets seem to be drifting away from canning. Long Life vacuum packs are a rapidly growing market in the UK and could provide Golden Circle with opportunities to increase market share. Short life plastic punnets are decreasing in sales volume in the UK but could provide an outlet for the customer who would like to purchase are ready to cook fresh product.

8. Report 4 – Compare and Contrast the Retail Display of Beetroot Products in the UK and America with Australia’s and Investigate and Analyse New Product Innovations

8.2 Introduction

Australia’s is considered a large per capita consumer of beetroot, this consumption is traditionally based on canned sliced beetroot, used as part of a salad or uniquely to Australia as an additive to hamburgers both at home and in the major fast food outlets.

In recent years the consumption of Baby Beetroot has grown and now consumes approximately 15% of the market in volume.

Packaging in cans is by far the most prevalent however glass jars are now growing particularly in the higher valued Baby beet market.

The market is growing however only at around 2% per year with the consumer demographic being a mix of all ages.

The market is supplied by 2 producers being Golden Circle and SPC, and in recent years a small amount of imports have entered the market.

8.2 UK Comparison

The UK beetroot market is going through a change in consumption patterns; originally the market was all canning however in recent years this has now converted to all retail sales being in Glass jars with only some industrial sales in cans.

The most prevalent sizes of glass jars available at a retail level were around the 400gm size, but there were also larger and smaller packs available.

Lately the there has been considerable growth in more user friendly ready to eat consumer packaging, these are either in plastic 10 day shelf life fresh cooked or in Krivac packs with 12 month shelf life.



UK innovative packaging

These new packs are apparently growing the market in the UK however possibly to the detriment of glass jar sales.

The new packs come in several different configurations and sizes and are packed for both retail and the industrial market.

The market consumes both slice and Whole baby beets with the distribution being approximately 60% Slice and 40% Whole baby beet consumption of the later being the growing market.

The syrup used in the glass packs in the UK is made with a vinegar base, this give the beetroot a pickled type of flavor profile which we found rather difficult to enjoy compared to what we are used to in Australia. This flavor profile we felt would be difficult for children to enjoy and possibly accounts for the fact that there glass market is declining. On allowing growers and other industry personal to try our product the general consensus was that it was a better flavored product and more palatable to a wider demographic.

Traditionally the market consumes the Beetroot cold in salads etc however the new packs are often served hot and some marketing programs promote this. Demographically the new packs are apparently capturing a younger audience whilst the bulk of the traditional packs are consumed by the older generation.



8.3 US Comparison

The US beetroot market is fairly traditional and is made up of a fairly even mix of cans and glass products; the consumer offering is in much the same size range as Australia and the UK being approximately 4 to 5 sizes ranging from 250 grams to 800 grams.

The market consumes both slice and Whole baby beets with the distribution being similar to the UK market with approximately 65% Slice and 35% Whole baby beet consumption.

The syrup used in US packs are again based on vinegar however they use corn syrup as part of the ingredient for sweetening, this provides a flavor profile that is much closer to the Australian flavor and the samples tasted by the group were met with a fair degree of satisfaction.

Whilst the market is dominated by slice and baby beetroot one product that was different to any thing we have in Australia was a wedged cut beetroot in thickened syrup. The consistency could be compared to thick gravy; the usage of this product was as a side dish served either hot or cold.

Overall we have a very similar flavor to that of their sliced beetroot however sweeter.

It appears that the market for beetroot is almost totally the older generation with apparently very little consumption coming from the younger demographic.

8.4 Summary

What is evident is that the Australian industry has been more successful then both the US and UK industries in continuing the consumption of beetroot across a range of consumers. Whilst in the UK and US markets the demographic is limited mostly to the older population, the ability of the Australian industry to have Beetroot included in the major fast food offerings helps to promote beetroot to a wider demographic. It should be noted however that the move to vacuum and short shelf life products in the UK is assisting that market in capturing a younger audience as well, and fresh should be considered by Australian producers as a possible new packaging range for this market. The other key point of difference was the higher use of glass for packaging, particularly in the UK were almost all offerings were in glass. We were not able however to identify if this was a positive to the marketing of Beetroot other than that in the UK consumers preferred glass to canned packaging.

9. General Discussion

Regarding seeds it seems that Australian producers have not been able to become actively involved in the seed production process nor have they received ongoing information regarding developments in new varieties and treatment techniques that the other producing countries are currently using as standard. However as a result of the Tour it is fair to say that this is well into the process of change. The growers themselves are now more actively involved in the process and seed companies are enjoying this input.

It is fair to say that for whatever reasons the industry has struggled to keep up to date with new varieties and seed treatments in recent years, however this has now changed as a result of the Tour all varieties identified for evaluation are included in trials growers are looking forward to the results. Seed companies too are now more active in understanding our requirements and so we are confident that this in process of inclusion at all levels will ensure the industry resolves some of the current issues regarding this topic.

The different growing and harvesting techniques witnessed were a real experience for all Tour participants. Some of the techniques and equipment will be able to be considered for Australian production however it is recognized that soil and environmental conditions in Australia will mean they require some adaptation prior to successful usage.

There was also much to be learnt from the different processing factories visited, however due to the inability to take photos in these establishments we were unable to show this graphically. In general there was no factory that was a standout in all facets of production however some were definitely better than others overall, each factory including Golden Circle had facets that did comparatively well with and some they don't. The challenge for the Australian industry is to work toward ensuring that they improving those parts of there operation that were identified as being done better else where.

The Australian marketing of Beetroot would appear to be ahead of OS competitor in regards to total consumption, consumer demographic and product availability via fast food outlets.

More work needs to done on innovative packaging and it would be fair to say that the UK is leading in this regard, the super market in store support of this new packaging will ensure its success and replication in the Australian market would appear to be an obvious opportunity for Beetroot and any other product with a similar usage. One obvious risk to all markets is the decline of the current major demographic being the aged population, the American market is well into decline and the ability to get Beetroot consumed by the next generation is a challenge for all producing countries.

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