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Participation in Quality Assurance Programs in the Apple Industry

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Abstract

There are several quality assurance (QA) programs operating in Australia for horticulturalists. The documentation of orchard activities and decision making are key features of any QA system. Activities of interest are management of pest and diseases, irrigation, fertiliser management, and fruit production and packing. This documentation provides a means of tracing product flow and is evidence that growers are acting in an environmentally responsible manner to help achieve food safety. QA systems are also often a means to assist growers in their production decisions and in some situations participation in QA is a precondition for supplying fruit to some markets.

In this paper we present the findings of research designed to obtain insights into apple growers' participation in QA programs. The research involved in-depth interviews with growers as well as analysis of a mail survey.

In relation to market access, growers observed that they could supply fruit to domestic and (some) exporters and export markets without participating in a QA scheme, provided they could supply spray diaries. Hence, non-participation in a QA program did not necessarily mean exclusion from markets.

In the absence of a premium for participation in QA, or exclusion for non-participation, the main benefits to participating in a QA program were the advantages made possible by record keeping, such as improved orchard management. Unfortunately, most growers believed that, apart from using spray diaries to assist in pest and disease management,

there were limited benefits in keeping records. Growers therefore were inclined to treat any claims regarding QA programs with suspicion.

Introduction

A few quality assurance (QA) programs operate in Australia for horticulturalists. The programs are generally based on assuring food safety and product quality, although this can differ, depending on the system (Lockie 1998; McBride 2002). Two such schemes, the SQF 2000™ Quality Code and the Woolworths Vendor Quality Management Standard® are outlined in detail in Peters (1998). The SQF 2000™ Quality Code was developed in Western Australia by the Department of Agriculture and Food for apple growers whereas the Woolworths Vendor Quality Management Standard® was developed by Woolworths for their suppliers.

A key feature of any QA system applying to the apple industry is the documentation of orchard activities and decision making, especially in relation to management of pest and diseases, irrigation, fertiliser management, and fruit production and packing. The documenting of orchard activities and decision making provides a means of tracing product flow to resolve food safety concerns, and provides evidence that apple growers are acting in an environmentally responsible manner. The documentation can also assist growers in their decision making.

To date, the only QA requirement generally applicable to all apple growers in Australia is the maintenance of spray diaries. However, many growers have participated in QA programs of various kinds, each program with its own particular reporting and auditing requirements. There has been little work on the usefulness to growers of QA systems and the record keeping that is part of these processes.

In this paper we present the findings of research designed to obtain insights into apple growers' participation in QA programs and their views on record keeping and documentation, both essential elements of QA systems.

Methods

The research was conducted in two stages. In the first stage we conducted in-depth interviews with 40 apple growers from across Australia in the latter half of 2003. Some of the data gathered during the interviews is presented here, however names have been changed to preserve the anonymity of growers. We asked growers about their experiences with QA and record keeping.

In the second stage of the research a questionnaire was designed to collect quantitative data on growers' participation in QA programs and their views on record keeping. For a copy of the questionnaire, please contact the corresponding author.

The questionnaire was piloted with three to six growers in each state. The questionnaire was mailed, together with a cover letter and reply paid envelope, to all apple growers listed as members of the Australian Apple and Pear Association in November 2003. A reminder, in the form of a postcard, was posted four weeks later.

Results

In-depth interviews

In-depth interviews were held with 40 apple growers across Australia to ascertain their views and experiences regarding QA. Most growers held very strong views on QA, and its impact on their businesses. The views ranged from generally favourable among growers who packed fruit through to very unfavourable, especially among growers who did not pack fruit. Generally growers appreciated the need for product flows to be traceable and accountable in terms of food safety. However they questioned whether or not QA systems contributed to better food safety and orchard management. Many growers saw no causal link between food safety and the records they were required to keep and the processes they were required to follow.

All growers were aware that random tests to check compliance with Maximum Residue Limits were carried out and some growers were able to relate instances where their fruit had been checked. For example:

Terry runs an orchard in Lenswood South Australia, growing fruit for the domestic market. He has a large packing shed that has a HACCP system in place, although it is not accredited. They have been audited by the agent to whom they supply fruit. Terry keeps chemical records, spraying, dipping and residue testing records. One year there was a problem with the dipping where the chemical concentration got too high. The fruit had been tested for residues and although Terry wasn't over the allowable limit, it was higher than normal. Terry got a call to ask what was happening. Since then he has been extra careful with the dip records and even carries out titrations to ensure that the dip chemicals are at the right levels.

Many growers we spoke to had tried a particular QA system but had found that the process was demanding in terms of their time and they felt there were no obvious benefits, particularly if they did not pack fruit. The response from these growers in Western Australia was typical:

Hans and Victoria obtained SQF2000 certification when the system was first promoted, however they have been disappointed with the results. They felt it was a lot of work with no return to them. They have discontinued their certification and this has had no effect on their ability to sell their fruit. They don't see the need for a QA system at the moment. They keep spray records which are sufficient for their buyers' requirements.

A grower in Tasmania took a similar view:

Ewen and his brothers run 60 hectares of orchard at Huonville in Tasmania. Roughly half of the apples they produce are sent for export, the rest are sold on the domestic market. They pack their own fruit so have a QA system (SQF 2000), which was forced on them because of the supermarkets in Australia. Ewen says it's really all about traceability. But they [the growers] carry the cost of the QA system but don't get paid enough for their fruit. "A few more dollars per kilo and it would make a huge difference."

One grower from the Adelaide Hills was blunt in their assessment:

"[Quality assurance is] a real dog's breakfast. There are too many systems and they're very expensive."

Questionnaire response rates

The questionnaire was distributed to growers in New South Wales, Victoria, South Australia, Queensland, Tasmania and Western Australia. A total of 1313 questionnaires were mailed. Of these 278 were completed and returned by growers. Some 243 questionnaires or reminder notes were returned by respondents who no longer grew apples or whose questionnaires were incorrectly addressed. On the basis of this data we estimated that the response rate to the survey was 26 per cent. Discussions with extension staff from each state indicated that they believed we had consistently obtained a response rate of approximately 30 per cent in each state.

Demographics and general characteristics

For the sample as a whole the average orchard area was approximately 24 hectares, ranging from a minimum of 0.2 hectares to a maximum of 555 hectares. The average area of orchards was not statistically significantly different across the states. The average age of the growers in the sample was 52 years, ranging from a minimum of 29 years to a maximum of 80 years. There were no statistically significant differences among the states in regard to the age of growers. Only six per cent of the respondents participated in a benchmarking program.

Assessing the representativeness of the sample was a difficult task as little national data is available on the demographic characteristics of apple growers. The age distribution of respondents in our sample is broadly consistent with those obtained in other studies such as the Australian Bureau of Statistics (2003).

Participation in QA programs

The results from the qualitative interviewing indicated that growers who packed fruit and those who exported fruit were more likely to participate in a QA program. In order to test this we classified growers into four segments depending on whether they supplied an

export market and whether they packed and stored fruit following harvest. We expected the proportion of growers who adopted or participated in QA programs to differ across these segments. The segments are outlined in Table 1 and their participation in QA schemes is reported in Table 2. There were significant differences between these segments.

The first segment consisted of growers who exported but did not pack and store fruit. Many of these growers would require QA in order to export. An example is Julian from Manjimup:

Julian used to be a fruit packer and so had a QA system in place, but now that he no longer packs and just grows for exporters he doesn't have one. He says the records you were required to keep were ridiculous. And he did not feel it had much to do with food safety. As long as he meets the residue limits and provides his buyer with a spray diary he can sell his fruit.

The second segment consisted of growers who grew and packed fruit for both the domestic and export market. These growers were the most likely to have a QA system however the benefits the system offered depended on the export market they were targeting. This segment had the highest rate of participation in QA programs. A typical illustration is Richard near Grove in Tasmania:

Richard runs a 70 hectare orchard of apples and cherries. He sells both domestically to the supermarkets and also exports. He packs for some of the local growers in the area as well. He has two QA systems, SQF2000 and a supermarket specific system. He says, "It's a necessary evil because supermarkets think it's decreasing their risk..." The export markets for Tasmanian apples though are mainly the Indian sub-continent and Asia. They are not demanding QA systems at this stage.

The third segment consisted of growers who packed and grew fruit primarily for the domestic fruit market. These growers were more likely to have a QA system if they were supplying a supermarket. An example is Matt near Manjimup in Western Australia:

Matt runs a 280-acre apple orchard and sells his apples via Sydney mainly and into Coles supermarkets. He is in the SQF2000 QA scheme. Matt says it is pretty daunting and a waste of time sometimes. It's good for keeping track of chemicals and being able to trace back, however he has always kept chemical records.

The fourth segment consisted of those growers who did not export or pack fruit and who felt therefore, that there was less of a need for QA. A typical example of a grower from segment four was Sam from Grove in Tasmania.

Sam is sceptical about the value of QA programs and doesn't have one. "It limits your markets, but it's too much hassle for the amount of apples we grow. It's the same amount of work, no matter what size you are," says Sam. "The bigger orchards can employ a separate person just to do the quality assurance." Sam argues that he has an inbuilt QA

system. If you don't do a good job now then you won't be selling any fruit the next year. You have to supply what the market wants or you won't sell fruit. Sam has to forward his spray diary to the packing shed for their records, but that's all the requirements he has.

Table 1: Segments indicating participation in QA systems
(% of growers in each segment)

	Segment one	Segment two	Segment three	Segment four
Segment size (proportion of respondents)	18.3	21.9	31.7	28.1
Supply export markets*	100.0	100.0	0	0
Pack and store fruit*	0	100.0	100.0	0
Store fruit only*	27.5	0	0	16.7
Pack fruit only *	9.8	0	0	15.4
No packing or storage facilities*	60.8	0	0	55.1

* denotes statistically significant differences in proportions across segments ($p < 0.05$)

Table 2: Profile of post-harvest segments by quality assurance
(% of growers in each segment)

	Segment one	Segment two	Segment three	Segment four
Audited scheme (e.g. ISO9000)*	44.0	65.6	36.4	25.6
Approved supplier certificate*	17.6	14.8	23.9	23.1
Never had audited quality assurance *	29.4	8.2	27.3	32.1

* denotes statistically significant differences in proportions across segments ($p < 0.05$)

In Table 3 the reasons growers gave for participating in an audited QA program are reported. Most growers that had audited QA had clearly adopted the system in order to meet buyer requirements. Interestingly, the main reason growers without an audited QA gave for not having an audited system was that they could sell their fruit without it (34 per cent of the growers in our sample had no QA certification).

We found statistically significant differences in the distribution of the segments across the states (see Table 4). Most notably:

- A relatively high proportion of growers who supplied apples to the domestic market (segments three and four) were located in New South Wales.

- A relatively high proportion of growers who did not pack and store (segments one and four) were located in Victoria.
- A relatively high proportion of growers who export (segments one and two) were located in Victoria, Western Australia or Tasmania.

We also found significant differences among the segments in the varieties of apple trees grown (see Table 5). Key findings were:

- A relatively high proportion of growers who export (segments one and two) grew Pink Lady, Lady Williams, and Sundowner varieties.
- A relatively high proportion of growers who did not export (segments three and four) grew Red Delicious, Jonathan and Bonza varieties.

Table 3: Profile of segments by reasons for adopting quality assurance (% of growers in each segment)

	Segment one	Segment two	Segment three	Segment four
Requirement to supplier buyer	90.9	77.5	90.6	100.0
Requirement to supplier exporter *	63.6	42.5	6.3	5.0
Managing packing operation*	0	25.0	18.8	5.0
Systematic method for record keeping	40.9	32.5	28.1	20.0
Buyer recommendation	0	10.0	21.9	10.0

* denotes statistically significant differences in proportions across segments ($p < 0.05$)

Table 4: Profile of segments by location
(% of growers in each segment)

	Segment one	Segment two	Segment three	Segment four
New South Wales*	3.9	6.6	30.2	34.2
Victoria*	31.4	21.3	46.5	28.8
Queensland*	3.9	4.9	4.7	4.1
South Australia*	19.6	13.1	5.8	23.3
Western Australia*	21.6	34.4	9.3	5.5
Tasmania*	19.6	19.7	3.5	4.1

* denotes statistically significant differences in proportions across segments ($p < 0.05$)

Table 5: Profile of segments by apple varieties
(% of growers in each segment)

	Segment one	Segment two	Segment three	Segment four
Gala	80.4	88.5	80.7	70.1
Fuji*	60.8	72.1	78.4	52.6
Red Delicious*	54.9	59.0	75.0	57.7
Pink Lady*	88.2	88.5	75.0	69.2
Lady Williams	27.5	26.2	23.9	11.5
Jonathan*	25.5	18.0	50.0	35.9
Braeburn	7.8	11.5	18.2	21.8
Bonza*	3.8	11.5	21.6	29.5
Sundowner*	64.7	68.9	36.4	38.5
Golden Delicious	56.9	55.7	52.3	43.6
Granny Smith*	62.7	80.3	83.0	66.7

* denotes statistically significant differences in proportions across segments ($p < 0.05$)

Table 6: Profile of segments by other tree crops grown
(% of growers in each segment)

	Segment one	Segment two	Segment three	Segment four
Pears*	39.2	52.5	62.5	35.9
Nectarines*	19.6	37.7	30.7	12.8
Peaches	25.5	41.0	40.9	25.6
Cherries*	13.7	42.6	25.0	17.9
Plums*	27.5	49.2	31.8	21.8
Apricots	15.7	24.6	21.6	12.8

* denotes statistically significant differences in proportions across segments ($p < 0.05$)

We also found significant differences among the segments in the varieties of tree crops grown in addition to apples (see Table 6). The most notable results were:

- A relatively high proportion of growers who pack and store fruit (segments two and three) grew pears and nectarines in addition to apples.
- A relatively high proportion of growers who export as well as packing and storing fruit (segment two) also grew cherries and plums in addition to apples.

Growers in segment two (exporters with packing and storage facilities) had significantly larger orchards than did growers in other segments. The average area of orchards was 21, 50, 17 and 12 hectares respectively for segments 1 through 4 ($F=10.1$, $p=0.01$). There were no statistically significant differences among the post-harvest segments in terms of the age or education of growers.

Record keeping

In the interviews we sought growers' views on the importance to orchard management of record keeping and documenting decision making about orchard activities. We were particularly interested in identifying which records growers believed were useful to keep from the perspective of managing the yield and quality of fruit they produced. We discovered that, in the experience of most growers, the records required for QA were not very useful for day to day orchard management. Consider, for example, the following grower from Manjimup in Western Australia:

Frank packs both his own and others fruit. He was accredited with SQF2000 but left the scheme two years ago. It was costing too much and there were no financial benefits from it. He has to supply his spray diary anyway. Frank doesn't believe the documentation required helped him manage the orchard and it wasn't helping the workers. "Until he has to do it – he won't be doing it".

The only records most growers indicated as particularly useful in terms of orchard management were spray records, especially in relation to assessing the impact of their pest and disease management and thinning on yields or pack-outs. Some growers also regularly kept fertiliser records and a few maintained irrigation records. For example Julian, in Manjimup:

Julian finds his spray diary, fertiliser and irrigation records are the most useful records he keeps.

And from Harry in Shepparton:

Harry grows pears and apples on an orchard in East Shepparton in Victoria. He grows mainly for the fresh market. The most important records Harry has are his spray diaries. He watches what is happening in the orchard all the time.

Terry in the Adelaide Hills:

Terry runs an orchard in Lenswood, South Australia, growing fruit for the domestic market. Terry finds [spray] record keeping crucial, particularly for thinning.

These views were generally supported by the survey results. In Table 7 the proportions of growers keeping written records on various orchard activities are reported. The high incidence of record keeping in relation to pesticide and fertiliser applications and fruit packout was clearly evident. The incidence of record keeping appears lower among growers that did not export fruit (segments three and four).

Table 7: Profile of segments by documentation
(% of growers in each segment)

	Segment one	Segment two	Segment three	Segment four
Chemical spray applications*	100.0	100.0	95.5	91.0
Pest and disease monitoring*	78.4	70.5	61.4	53.8
Pumping hours*	62.7	44.3	27.3	46.2
Soil moisture monitoring*	41.2	37.7	21.6	23.1
Fertiliser applications*	88.2	91.8	76.1	73.1
Soil tests*	74.5	77.0	59.1	51.3
Yield*	94.1	75.4	72.7	76.9
Packout*	82.4	72.1	54.5	50.0

* denotes statistically significant differences in proportions across segments ($p < 0.05$)

Discussion and Conclusion

The documentation of orchard activities and decision making is a key element of QA systems in horticulture generally. The documentation provides growers, exporters and retailers with a means of tracing product flow to resolve food safety concerns. This documentation, depending on the QA system, may also be used as evidence to demonstrate that the grower is acting in an environmentally responsible manner (Morris 2000). Record keeping is also thought to assist growers in their decision making.

We have found that apple growers did not always believe these claims. Other work, such as that of Kingwell (2003) in the context of the grain industry, also suggests that a proportion of farmers are unsure of the benefits of QA schemes.

The work detailed here has provided insights into apple growers' reasons for being involved in QA programs. In relation to market access, growers observed that they could supply fruit to domestic and (some) exporters and export markets without participating in a QA scheme provided they could supply spray diaries. Hence, particularly for growers in segments two and three, their experience is that non-participation does not necessarily mean exclusion from markets.

In the absence of a premium for participation in QA, or exclusion for non-participation, the only benefits to participating in a QA program are the advantages that record keeping offers in terms of improving orchard management. Unfortunately, most growers believed that, apart from using spray diaries to assist in pest and disease management, there was limited benefit in keeping records. This can be explained as follows.

Generally speaking, it appears that fruit yield and quality is most sensitive to pest and disease management given adequate irrigation and fertiliser. In addition, pest and disease factors are both more complex and more variable within and between seasons than are

fertiliser and irrigation. In other words, fertiliser and irrigation management is reasonably straightforward and undemanding. Pest and disease management is complex and difficult. Consequently, the management of pests and diseases can benefit more from an understanding of past management actions than can the management of irrigation or fertiliser. This suggests that record keeping is quite valuable in terms of pest and disease management but of limited value in terms of fertiliser and irrigation management. Finally, the experience growers have had with QA programs has made them suspicious of any claims that a new program is likely to make in terms of creating exclusive access to markets or improving orchard management and profitability.

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