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Quality Assurance Certification and Implementation: Growers' Costs and Perceived Benefits

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Abstract[1]

This study reports findings from a mail survey of Western Australian broadacre farmers participating in quality assurance (QA) accreditation. A 50 percent response rate generated a sample size of 78 usable replies. The average farm in the survey spent $13,470 gaining QA accreditation, upgrading facilities and implementing the QA system. Most of these costs were set-up costs incurred in the first year of QA training. Almost half of all farmers in the survey considered QA accreditation and implementation to be value for money. A further 39 per cent were unsure of its value. Only 13 per cent of respondents felt it was not a worthwhile investment. Most respondents agreed that there were benefits, apart from price premia, in applying a QA system and 84 per cent of growers viewed QA accreditation as the start of greater regulation of grain production.

Even if no price premium was available for QA grain, 39% of respondents indicated they still believed QA to be worthwhile. However, this same group of farmers also indicated that if the premium for QA grain was less than $8.9 per tonne they would begin to question the value of implementing the QA system on their farm. Overall, farmers in the survey suggested an average premium of $12.3 per tonne was required to prevent them questioning the merits of QA.

A simple investment model suggested that to exactly offset the cost of QA accreditation and implementation a price premium of $11.7 per tonne was required. This premium was very close the price premium of $12.3 per tonne identified by growers as being required before they would doubt the worth of adopting a QA system.

[1] The support of the Grain Pool and the kind participation of scores of farmers made this study possible. Alexandra Edward, Kim McCoy, Peter Portmann and Nicole Kerr provided assistance.

Introduction

Highly publicised food safety breakdowns and the emergence of genetically modified food ingredients have fuelled consumer concerns over food health over the past several years. Governments have responded to these consumer concerns by increasing the regulation of the production, processing and importation of food (CAC 2000). Retailers also have responded, particularly in Europe and North America, by implementing production contracts, identity preservation systems and quality assurance systems that effectively guarantee food quality across the food supply chain (Caswell et al 1998, Sterns et al 2001).

Increasingly, individual farmers and whole agricultural industries are introducing quality assurance systems so that the quality and safety of their product more closely matches consumer requirements (Unnevehr et al 1999, Westgren 1999). In Western Australia grain producers, grain marketers and government agencies are collaborating in establishing quality assurance systems for grain production (Portmann 2002).

This paper outlines the costs incurred by Western Australian farmers in gaining quality assurance certification and their perceptions of its benefits. Section One of the paper outlines the data collection methodology. Section Two outlines the nature of quality assurance certification experienced by farmers and Section Three presents main findings, followed by a set of conclusions.

Section One : Methodology

In 2001 the Grain Pool called for expressions of interest from farmers to supply Hi-Pro lupins. The Grain Pool then contacted growers who expressed interest. They were asked about their preparedness to gain quality assurance (QA) accreditation for supply of the Hi-Pro lupins and were also asked if they would be willing to participate in a study of the costs and benefits of QA for grain growers.

Of the 178 farmers who wished to deliver Hi-Pro lupins and who were either QA accredited or who signed up for QA training in season 2001, 157 also expressed a preparedness to participate in a study of the costs and benefits of QA. Accordingly during 2001, letters and a survey questionnaire (see Appendix one) were sent out to this latter group of growers near harvest.

Prior to design of the questionnaire eight farmers from the northern agricultural region were visited and were interviewed about their experiences and expectations of the QA accreditation program. From these interviews a questionnaire was developed, pilot tested and was further subject to review by staff of the Department of Agriculture and the Grain Pool.

A letter explaining the need for the study accompanied a two page questionnaire (see appendix one) and was mailed to the growers. Reply-paid envelopes were supplied to all growers. Grower confidentiality was assured as no names or specific farm location details were recorded on the survey form. Useable responses were received from 78 growers representing a wide geographical spread (see Table 1). The questionnaires were received by farmers close to harvest, so to achieve the response rate of 50 per cent in a mail survey at that busy time was very reasonable.

Section Two : QA Certification

The QA certification process examined in this study involved joint delivery of Great Grain and SQF 1000^{CM} certification. Farmers were required to participate in:

- two days of group training,
- mock audits involving individual farm visits and
- certification audits.

In addition to the training days, growers also needed to:

- complete the writing of their QA manual.
- gather information such as:
    - Material Safety Data Sheets – some chemical resellers provide this information to their clients. However, some growers had difficulty obtaining these sheets from some resellers.
    - raw material specifications (eg. fertiliser and seed analysis statements). Most growers already receive this information as part of their cropping management and preparation.
    - finished product specifications (eg. GPWA and AWB receival standards)
    - training certificates for staff.

- make changes on their farm such as:
    - purchase of or improvement of their chemical shed that was required to be locked with appropriate signage, properly ventilated, with water and hydrated lime close at hand for spillages.
    - signage on grain silos and labels for storage areas of fertiliser and seed.
- develop work instructions or protocols for work practices as required eg. calibration of their spray rig, cleaning protocols, seeding and harvest procedures.
- prepare and maintain records including:
    - noting batch numbers of chemicals in a chemical inventory for the chemical shed or in a spray diary.
    - maintaining detailed spray records of spraying dates, chemicals applied, rates, paddocks or crop type, target weed or pest and signature or initial of the spray operator.
    - formulating a staff training register for all staff.
    - keeping calibration records for spray equipment.
    - developing a document register to track all documents.
    - instituting a product trace eg. applying the appropriate paddock name for each load of grain leaving the property.
    - recording details of machinery maintenance and hygiene.
    - recording fumigation treatments of stored grain or seed.
    - maintaining specific QA records – eg corrective actions, internal audits
- compile an approved suppliers' list. This included gathering information from suppliers about their qualifications and commitment to industry codes of practices or quality assurance systems.
- where necessary, conduct a chemical residue test on harvested grain.

Section Three: Farm Survey Findings

Characteristics of Respondents

The 78 respondents came from several broadacre cropping regions of the State. A majority of respondents were from the medium rainfall region (regions M1 to M5) where average annual rainfall varies from 325mm to 450 mm. Table 1 lists the regions and proportions of respondents in the sample that came from each region.

Map 1 shows the location of the various regions while map 2 shows the distribution of lupin production across the State. Note that lupin production is widespread, although the major production regions are northern and central medium and low rainfall environments (regions L1, L2, L3, L4, M1, M2, M3 and M4). Only 12 per cent of respondents were from the higher rainfall regions (H1 to H5) where lupin production is not dominant. Also only 21 per cent of respondents were from the southern zone 5 (L5,M5 and H5) where lupin production is also less dominant.

Table 1: Geographical spread of the sample of respondents

Region	Proportion of respondents
L1	3.0%
L2	7.5%
L3	7.5%
L4	1.5%
M1/L1	1.5%
M1	9.0%
M2/L2	1.5%
M2	9.0%
M3/L3	1.5%
M3	11.9%
M4	17.9%
M5	9.0%
M5C	1.5%
M5E	4.5%
M5W	1.5%
H1/M1	1.5%
H1	4.5%
H3	1.5%
H5	1.5%
H5E	3.0%

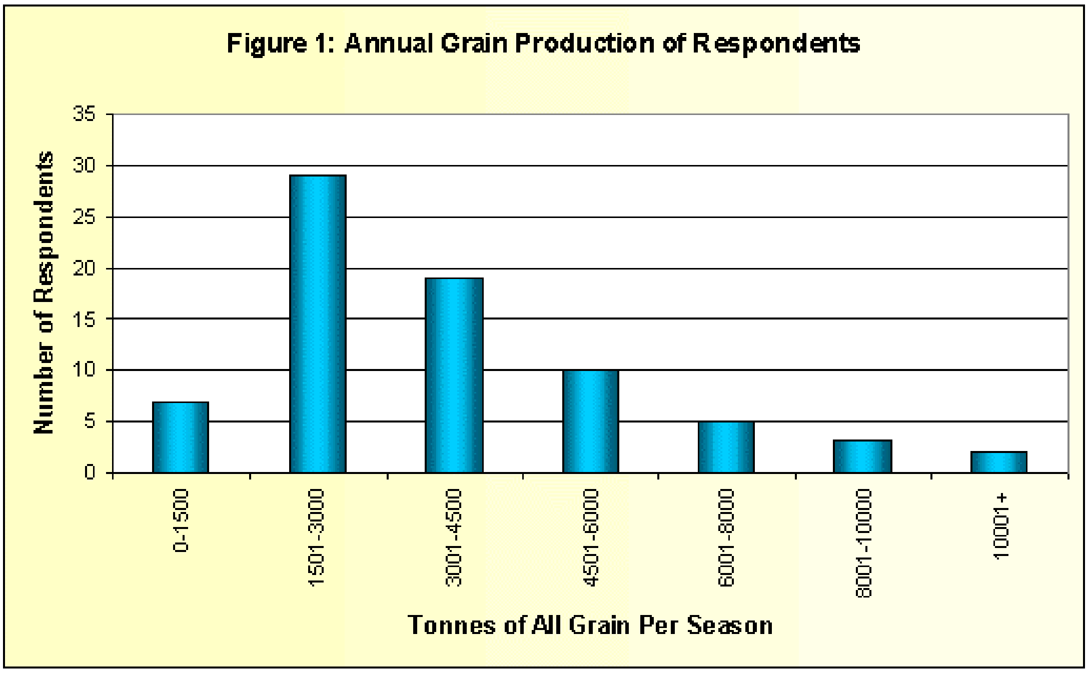
Map 1: Major grain growing regions of Western Australia

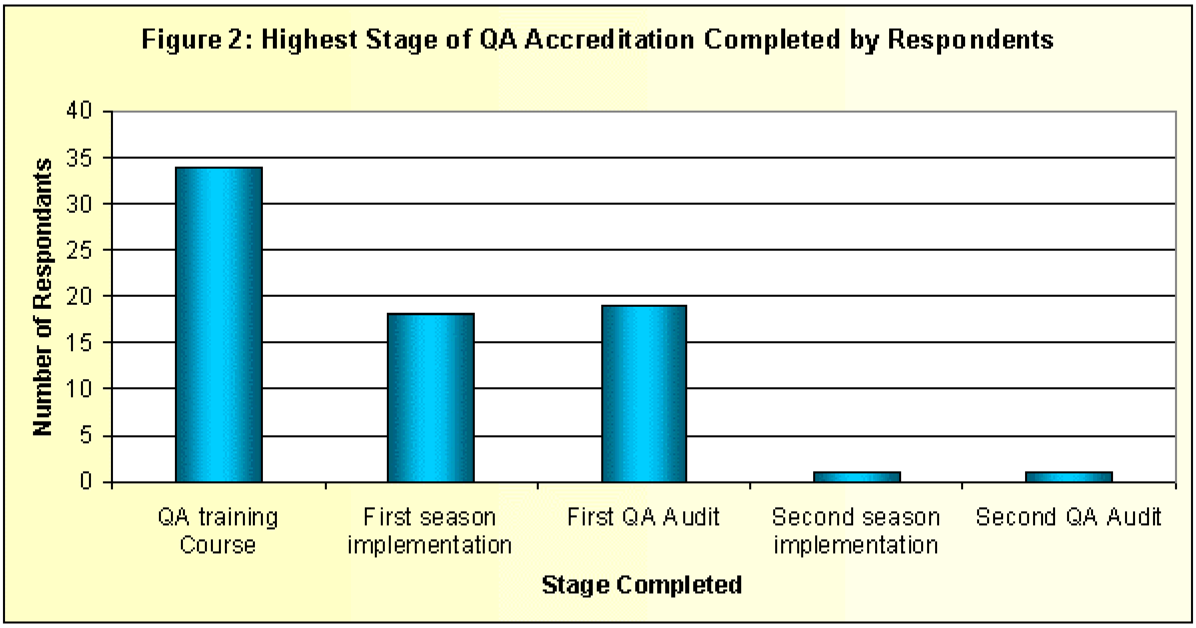
See Separate Document

Map 2: Distribution of lupin production

See Separate Document

There was a range of grain production represented by the sample of respondents, as shown in Figure 1. Most farmers produced over 1500 tonnes of grain each year with the modal groups producing between 1500 to 3000 tonnes and 3000 to 4500 tonnes of grain annually.





The initial selection criteria for respondents, combined with QA certification being in its infancy for graingrowers in 2001, meant that most respondents were new to the concepts of QA. Hence, as shown in Figure 2, only a tiny proportion of respondents were in their second season of QA implementation.

Costs of QA Training and Implementation

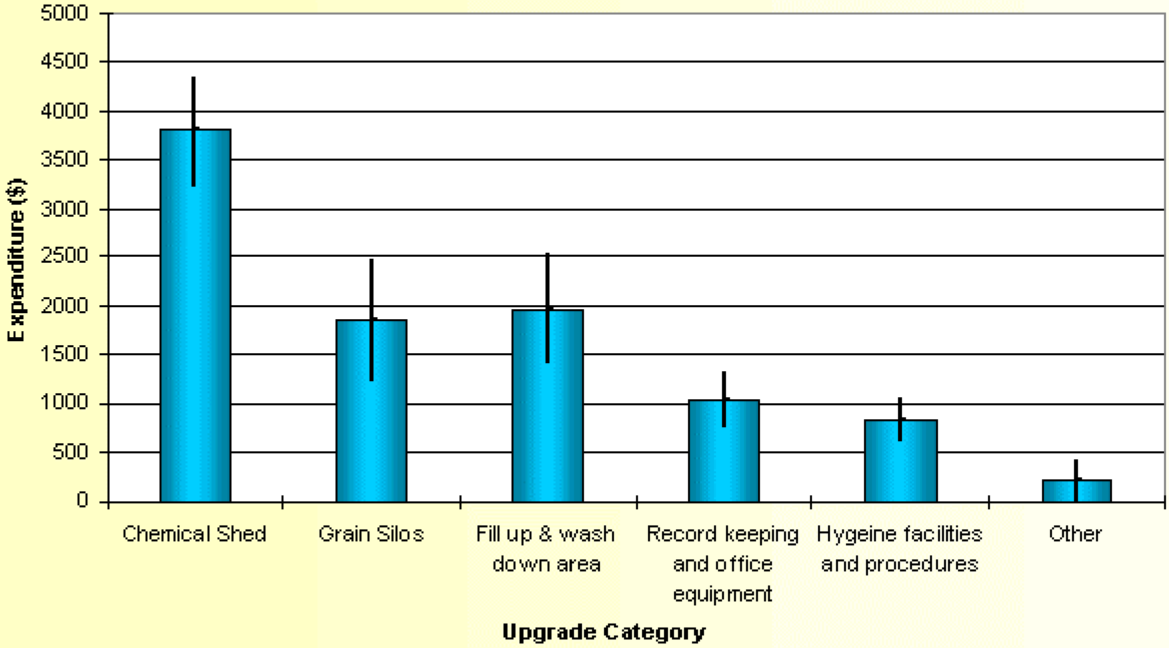
Most respondents indicated that participation in QA certification has required upgrades to their chemical shed and office equipment and improvement in their record-keeping procedures (see Table 2). Almost half the sample of farmers also indicated upgrades to their grain silos were necessary. Of lesser importance were upgrades to fill up and wash down areas and hygiene facilities.

Table 2: The proportion of respondents indicating upgrades to particular items

Items Upgraded	Percentage of Respondents
Chemical shed	75%
Grain silos	45%
Fill up & wash down area	24%
Record keeping procedures and office equipment	70%
Hygiene facilities and procedures	20%
Other	16%

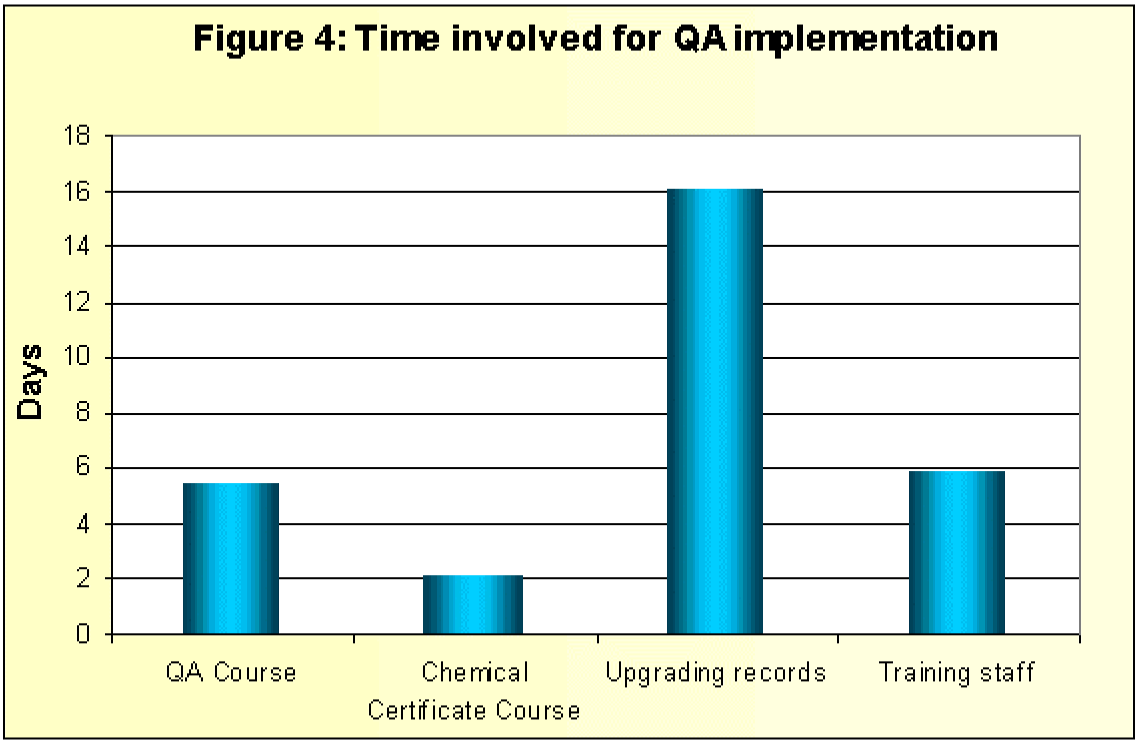
The mean expenditure by respondents for each upgrade category is shown in Figure 3. The vertical black lines specify the 95 percent confidence interval for the mean expenditure in each category. Most expenditure occurs in upgrading the chemical shed, although a few thousand dollars are also spent on upgrading silos and the fill up and wash down areas.

Figure 3: Mean expenditure on upgrading each item



In constructing Figure 3, blank responses were ignored and were not assumed to be zero values. Accordingly, average values risk being over-stated where non-response is more properly interpreted as nil expenditure. Where non-response or blank values are treated as zero values then the overall average cost of expenditure on all these items is $6010.

Besides expenditure on equipment and the upgrade of existing facilities, participation in QA training and implementation also involves an investment of time by farmers. Farmers indicated the time commitment to QA training and implementation and mean responses are shown in Figure 4. By far the largest commitment of time was for record-keeping. An increase of 16 days of record-keeping, on average, was required to implement the QA system. Additional training of staff also represented an associated time cost of QA implementation.



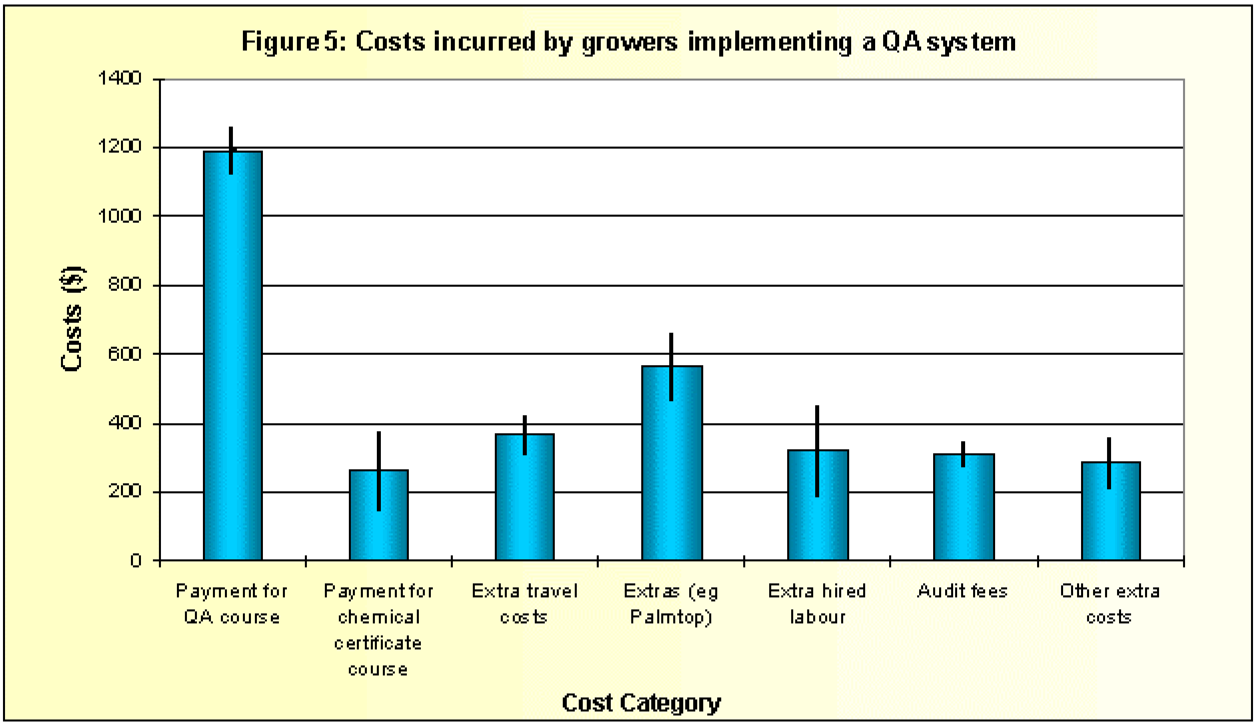
Besides the commitment of time, all growers incurred other costs in gaining QA certification and implementing a QA system on their farms. As shown in Figure 5 the commitment to QA, with its additional record-keeping, has resulted in a range of new expenses.

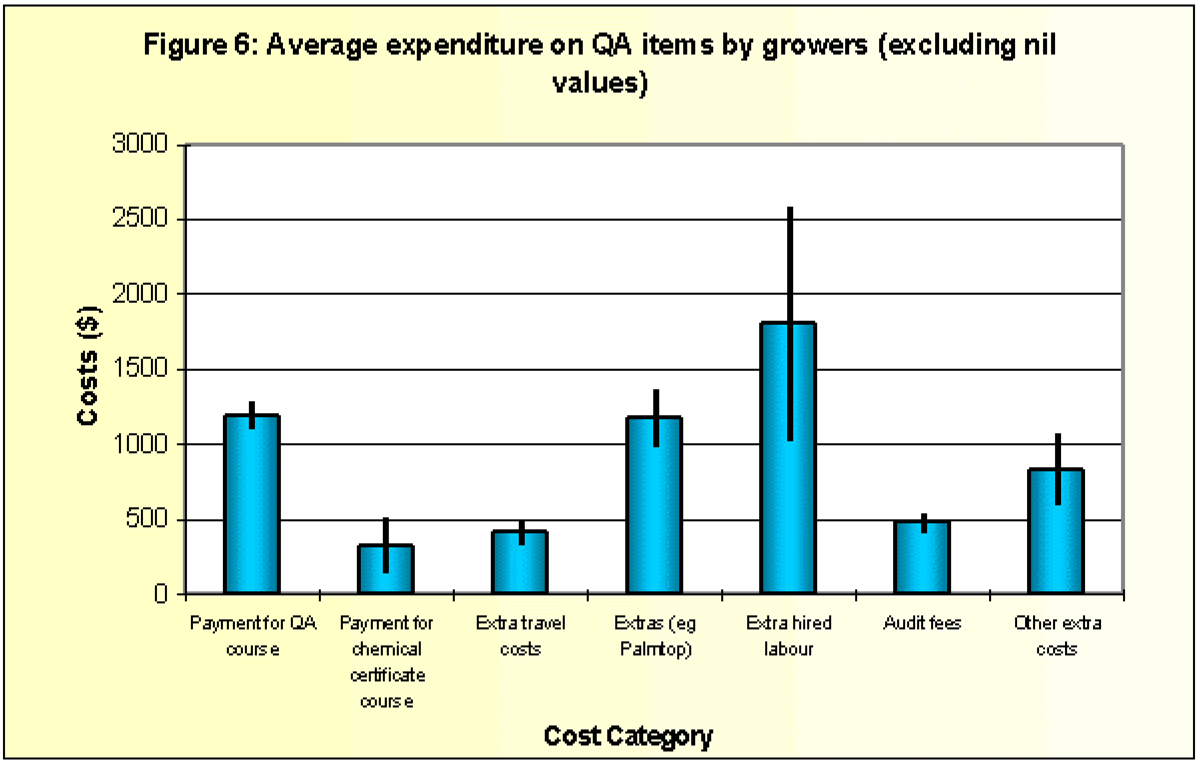
The costs shown in Figure 5 are average expenditures for each item. Blank responses were interpreted in most cases as nil expenditure. Most growers specified the costs they incurred for the QA course, the chemical certificate course, and travel and audit fees (see Table 3). Overall, the average cost of all fees, charges and expenses associated with gaining QA certification for farmers was $3255.

Table 3: The proportion of respondents who indicated expenditure on QA items

Costs Incurred	Percentage of Respondents
Payment for QA course	93%
Payment for chemical certificate course	79%
Extra travel costs	76%
Extras (eg Palmtop)	39%
Extra hired labour	12%
Audit fees	70%
Other extra costs	13%

Where growers stipulated positive expenditure for an item then the average of those values is higher than where blank (interpreted as nil) and actual nil expenditures are included. If nil values are excluded then average expenditure on items is as shown in Figure 6. For example, where growers indicated their need to employ additional labour then the average expense is around $1800 and expenditure on incidental items such as palmtop computers is around $1200.





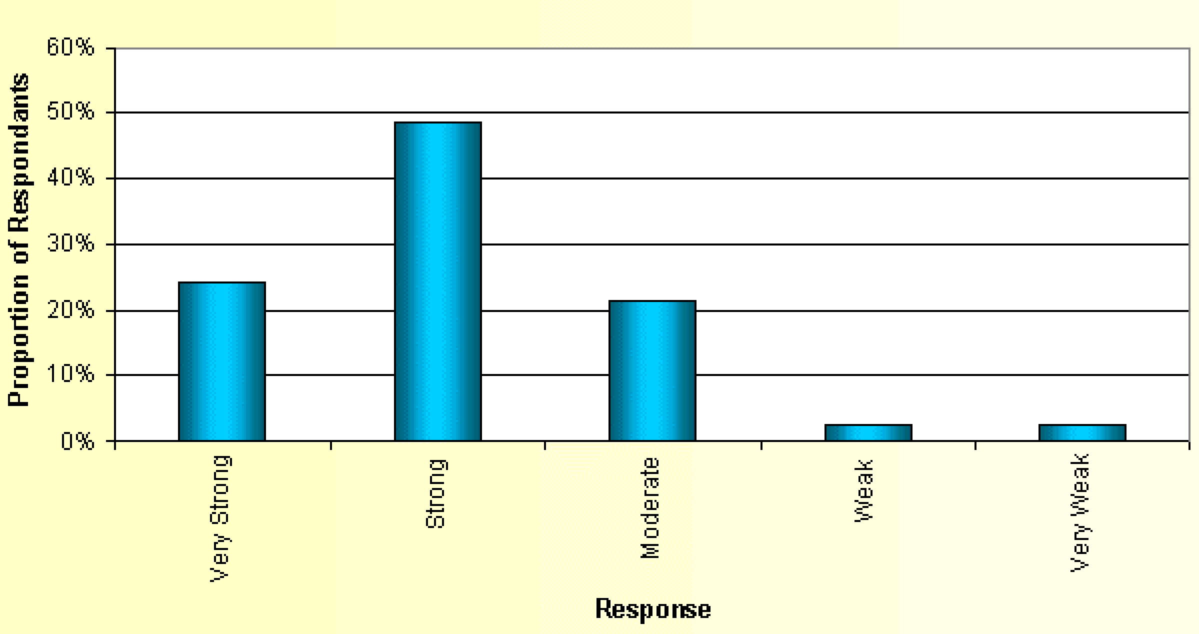
In summary, the average cost of equipment upgrade for farmers who participated in the survey was $6010; their cost of certification was $3255 and farmers invested on average about 29 days of their time in gaining and applying their QA certification. Assuming the opportunity cost of a farmer's time is about $145 per day then the imputed cost of their average time in QA certification and implementation is $4205. Hence, in the first year of introduction of the QA system onto a farm the average cost is approximately ($3,255+$6,010+$4,205) = $13,470.

Farmers' Opinions about QA

Most respondents indicated a strong commitment to QA as shown in Figure 7. Their level of commitment was expected because growers in the sample had self-selected to be involved in QA training and implementation.

When farmers in the sample were asked to rank the relative importance of various benefits associated with QA systems, most respondents identified ensuring future access to most markets and maintaining or improving access to premium markets as the chief benefits of QA systems. It would be interesting to re-survey these farmers in a few years to see if their views about the main benefits of QA systems remain unchanged. It may be that after a few years of implementing their QA system they find further benefits of adopting QA procedures.

Figure 7: Farmers' ranking of their commitment to QA



As shown in Table 4, many growers anticipated that QA would enable them to receive a higher price for their grain produced under a QA regime. Of lesser value to farmers was the role of QA in:

1. improving their management of staff,
2. improving the efficiency and effectiveness of their general farm management and
3. improving their management of grain production risks.

Table 5 summarises growers' reactions to a range of statements about QA. A large proportion of growers considered that QA would enable access to markets and was the start of greater regulation of grain production.

Table 4: Grower rankings of the perceived benefits of QA

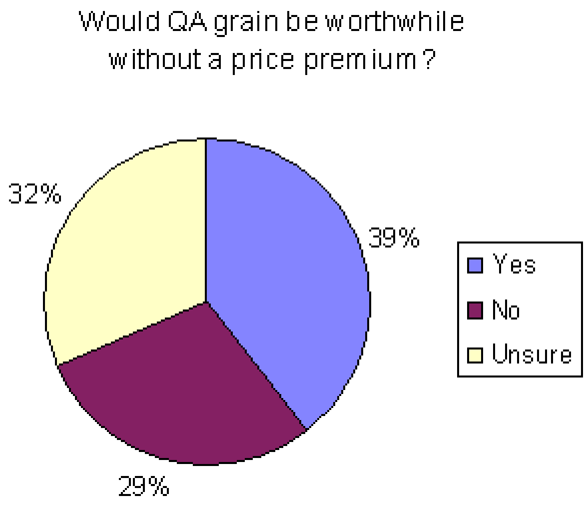
	Ensuring future access to most markets	Maintaining / Improving access to premium markets	Improving record keeping	Getting a higher price for QA grain	Improving my management of staff	Improving farm management efficiency	Improving management of production risks
Proportion of Responses	95%	93%	96%	95%	89%	95%	95%
Proportion who indicated a large benefit	64%	69%	33%	54%	15%	25%	24%
Proportion who indicated a moderate benefit	29%	25%	41%	35%	50%	40%	44%
Proportion who indicated a small benefit	7%	6%	26%	11%	35%	35%	32%

Table 5: Grower views about QA statements

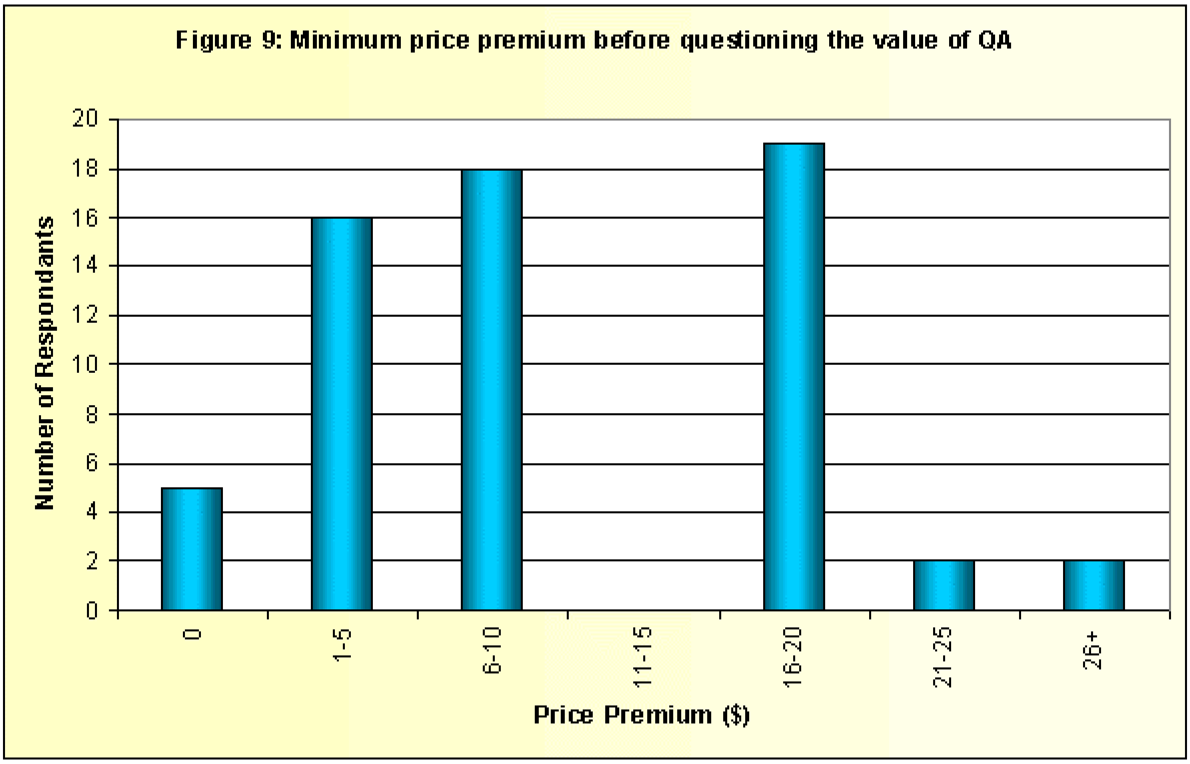
	QA helps ensure access to markets	QA training/ implementation gives value for money	QA Leads to fewer crop establishment mistakes	QA improves farm safety	Before undertaking QA I thought it would tell me how to run my farm	QA improves management of staff	QA is the start of greater regulation of grain production	QA gives me better control over my production systems to prevent problems	QA grain will regularly attract a price premium
Proportion of responses	99%	99%	97%	99%	97%	96%	97%	99%	97%
Proportion who strongly agree	32%	4%	5%	7%	1%	5%	27%	17%	8%
Proportion who agree	53%	44%	34%	61%	9%	36%	57%	51%	15%
Proportion unsure	11%	39%	26%	12%	19%	40%	9%	20%	65%
Proportion who disagree	4%	13%	35%	20%	70%	19%	7%	12%	12%

Growers' perceptions about the value of QA in fostering access to premium markets was further explored by asking them if producing QA grain would still be worthwhile, even in the absence of a price premium for that grain.

Figure 8: Responses to no premium for QA grain



As shown in Figure 8, 39% of respondents indicated they would still view QA as being worthwhile even when no price premium was available for QA grain. Figure 9 shows responses from farmers as to how low the price premium needed to be before they would question the value of implementing QA on their farm.



Further examination of the data in Figures 8 and 9 reveals that those farmers who believed QA was worthwhile, even in the absence of a price premium, nonetheless considered that, on average, if the premium was less than $8.9 per tonne they would begin to question the value of implementing the QA system on their farm. Those that responded as unsure in Figure 8 required a price premium of at least $10 per tonne, otherwise they would start to question the value of QA on their farm. Finally the group that considered a price premium was essential for QA to be worthwhile, suggested, on average, that if this premium was less than $19.6 per tonne, then they would question the value of implementing a QA system. Across all groups the average premium that was required before questioning of the merits of QA would occur was $12.3 per tonne.

What premium makes QA worthwhile?

From the data supplied by growers it is possible to estimate the average price premium required to make QA certification and implementation financially worthwhile. The estimation hinges on the following set of assumptions:

1. the average production of QA grain will continue to be 348 tonnes per year per farm. This was the average of farmers' responses for their anticipated annual production of QA grain.
2. gaining QA certification, upgrading facilities and implementing the QA system costs $13,470 per farm in the first year.
3. in subsequent years the annual cost is $2,754, with most of these costs being associated with record-keeping, the opportunity costs of the farmer's time and the need to hire or train additional labour.
4. the investment horizon is 10 years.
5. the real discount rate is 5 per cent.
6. the sole financial benefit of implementing QA is to receive a price premium.

Invoking these assumptions results in the net present value of the cost of implementing the QA system to be $31,468. The price premium that exactly offsets this cost can be calculated from the following equation:

Solve for *p* in:

$$\sum_{t=1}^{10} (q_t p_t - c_t)\left(\frac{1}{1+r}\right)^t = 0$$

where *p* is the fixed price premium (in constant dollar terms) for QA grain;

t is the year;

q is the fixed quantity of QA grain produced each year;

c are the annual costs (in constant dollar terms) associated with gaining and applying QA certification;

r is the real discount rate

The calculated premium is $11.7 per tonne, which incidentally is very close the price premium of $12.3 per tonne identified by growers as being required before they would doubt the worth of adopting a QA system. For the investment in QA to not just break-even but represent a 5 per cent real return on a farmer's investment in QA, the price premium needs to be $14.7 per tonne.

There are two ways of interpreting these premia. Either they represent the price premia growers expect in discriminating markets with contract specifications for grain to be quality assured. Or they represent the losses growers avoid by being forced to sell grain, that otherwise could become quality assured, in more price competitive bulk markets. In both cases, the farmer needs to be convinced that there is financial merit in adopting a QA system.

A shortcoming of determining the break-even premium is firstly, there is no allowance for other benefits associated with introducing QA. These benefits include better control over production systems, making fewer mistakes and improving the management of staff and farm safety. However, it seems that most growers, although being aware of these additional benefits, nonetheless primarily view the main advantage of a QA system as providing an access to premium markets. Secondly, the analysis makes no allowance for some extra costs associated with a QA requirement that farmers adhere to registered chemicals and preferably use label rates for chemicals. Often farmers use off-label rates and partially tested or untested chemical regimes in weed control (Portmann 2002) that often are more cost-effective than label rates[2].

[2] In Western Australia it is legal for farmers to use at or below label rates provided the chemical is registered.

Conclusions

The average farm in the survey spent $13,470 gaining QA certification, upgrading facilities and implementing their QA system. Most of these costs were set-up costs incurred in the first year. Almost half of all farmers in the survey considered QA certification and implementation to be value for money. A further 39 per cent were unsure of its value. Only 13 per cent of respondents felt it was not a worthwhile investment. Most respondents agreed that there were benefits, apart from price premia, in applying a QA system and 84 per cent of growers viewed QA certification as the start of greater regulation of grain production.

Even if no price premium was available for QA grain, 39% of respondents indicated they still believed QA to be worthwhile. However, this same group of farmers also indicated that if the premium for QA grain was less than $8.9 per tonne they would begin to question the value of implementing the QA system on their farm. Overall, farmers in the survey suggested an average premium of $12.3 per tonne was required to prevent them questioning the merits of QA.

A simple investment model suggests that the price premium that exactly offsets the cost of QA certification and implementation is $11.7 per tonne. This premium is very close the price premium of $12.3 per tonne identified by growers as being required before they doubted the worth of adopting a QA system. The growers in the survey may have considered a premium was required, if only because most were in the relatively expensive start-up phase for implementing QA. Many farmers in the survey were less than 6 months into their QA program. Start-up costs would have been prominent in their minds and so a focus on premiums as a form of cost-recovery is expected. Surveying the same group of growers in 1 or 2 years time, when system and production benefits may be more evident, might generate different views on desired premia.

Interestingly, only 23 per cent of farmers in the current survey considered that QA grain would regularly attract a price premium. Almost two-thirds of growers were unsure if QA grain would regularly receive a premium.

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