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Business aims, industry priorities and farmer association roles in the Queensland Redclaw crayfish industry

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ABSTRACT

This paper presents the results of a survey of the Queensland Redclaw crayfish industry. Redclaw crayfish farming is an emerging Queensland industry with typical infant industry problems of insufficient reliable information on important matters such as: current and future production and investment, farmer aims; industry priorities for R&D and other activities, and roles for farmer associations. To help fill these, and other, information gaps the Queensland Crayfish Farmers Association undertook a postal survey of all Queensland farmers in early 2001. Over 50% of the active farmers, accounting for over 80% of production, provided information. The main results were: most farmers plan to increase output greatly by 2002-03 (primarily by increasing output/ha) and to invest more capital; industry estimates suggest that the total area farmed could increase from 119 ha in 1999-00 to 188 ha by 2002-03 and total sales from 120 tonnes to 339 tonnes; the highest priority business aims for most farmers were *increasing productivity of existing ponds and increasing output*; the top industry R&D priority was *breeding for faster growth*; r*epresentation and information provision/exchange* were the main services required from industry associations; and the importance of some aims, needs, etc was different for small and large farmers however there were fewer differences than expected.

Key words: industry development, farmer associations

INTRODUCTION

The roles of industry associations in the agricultural sector and the challenges and opportunities for such bodies have been examined by the author in previous papers – see Jarratt (2001) and Jarratt and Franco-Dixon (2000 and 1998). Usually, the activities of industry associations can be categorised as either **representation** (mainly influencing the actions of others eg government policies and resource allocation), **member services** (mainly providing services to association members eg newsletters, meetings, and insurance) or **industry development** (mainly participating in activities which contribute to industry development eg industry planning, training courses, accreditation schemes, and statistics collection). However, boundaries between roles are frequently blurred and some activities may occur within more than one role. Importantly, and with major implications for association roles and resources, the benefits arising from many association roles/activities can often not be confined to association members so the scope for "free riding" by non-members is often considerable.

High quality information about the industry output, investment, business aims, priorities etc assists industry associations to undertake a variety of activities including; representations to government, preparation of industry plans and identification and prioritisation of association activities. Frequently, such information is essential for the successful development of infant industries. However, such information is not available for many infant industries and their associations often lack the skills or resources to collect it. During the last 4 years, in response to this market failure, DPI has assisted several industry associations to undertake industry/member surveys, eg oysters, barramundi, flowers, and papaya.

This paper reports the results of a survey of Queensland Redclaw crayfish farmers undertaken by DPI in early 2001 for the Queensland Redclaw Crayfish Farmers Association (Jarratt and Keast, 2001).

BACKGROUND

The commercial farming of Redclaw crayfish began in Queensland in the 1980s and occurs mainly in open freshwater ponds along coastal Queensland. At present, production in other states is not significant. Although identified by ABARE and others as new industry with considerable potential for success, in Queensland the number of farmers, and the value and volume of output have not expanded as rapidly as several other aquaculture industries, eg prawns and barramundi. In 2001, DPI licensing statistics indicated that although 280 properties were licensed for crayfish farming there were only around 100 active farms with about 159 ha of ponds producing only about 70 tonnes of product. Redclaw crayfish farming has been adopted mainly by existing farmers for diversification and by new entrants to farming, often as a spare/part time activity.

There are 4 regional crayfish farmer associations located in: north Queensland, central Queensland, the Bundaberg area and south-east Queensland. Each local association is affiliated to the Queensland Crayfish

Farmers Association (QCFA). The local associations focus on meeting the needs of members at local level for information sharing, local R&D, etc. The QCFA deals mainly with State level issues and needs, especially representation to the Queensland government on legislation and industry development needs. It also works closely at state level with other aquaculture industry associations to achieve agreed common objectives.

During 2000, the QCFA and the local associations undertook an industry and association planning exercise to assist them to identify industry and member needs, to examine alternative structures for their industry bodies, and to better represent the industry's interests and potential to governments. This planning exercise revealed that more comprehensive, reliable and current information on the industry's current and future size, and on producer aims and needs would greatly facilitate the achievement of the goals etc in the plan. Consequently, the QCFA sought and obtained help from DPI to obtain this information via a postal survey of farmers.

METHODOLOGY

After the main aims of the survey were clarified, a draft postal questionnaire was prepared in conjunction with industry leaders and DPI extension officers using a format and approach which had worked well in other industries (eg a scoring scale of 1-5 where 5 = very high importance, 4 = high importance, 3 = medium importance, 2 = low importance, and 1 = very low importance, to obtain views on listed possible aims/needs/activities).

After pre-testing and modification, the questionnaire was posted to 280 licence holders (many of whom were known to not be farming) with a letter from the president of the QCFA encouraging participation. A reminder letter was sent out 2 weeks later. The questionnaires were returned to DPI which provided data entry and analysis services for the project. Only DPI officers saw individual responses and the results were presented so that no individual could be identified. For aims/needs/activities information, the proportion of the responses scored 4 or 5 was used to indicate importance to respondents. The statistical significance of differences in these proportions for all responses was assessed from the standard error of the difference between the proportions. Statistical differences in the proportions between large and small farms were assessed using the Chi Square test.

A summary of the main results was posted to each licence holder and copies of the full report on the survey were provided to the QCFA and each local association for distribution as needed/requested.

RESULTS

Responses

The response was excellent. 55 survey questionnaires were returned in time for analysis from farmers in all regions and of all sizes (pond area, sales, and capital investment). The 50 farmers who provided area information accounted for about 53% of all farms with ponds in 1999-00 and for about 46% of the industry's total pond area. The 41 farmers who provided sales information accounted for about 55% of all farms with sales during 1999-00 and for about 84% of the industry's sales.

The high response rate probably reflected: a high level of producer interest in industry development; the simple questionnaire; the use of an independent party (DPI) to conduct the survey and analyse results; assurances regarding confidentially of information provided; encouragement to participate by association officials; sending out a reminder note; and the availability of an accurate and comprehensive mailing list.

Estimated industry area, sales and investment

The information provided by survey respondents was used to calculate whole of industry estimates of pond areas, sales and investment. This was done by adjusting the information from each pond area size group to take account of the total number of farmers in each size group in the industry. DPI Fisheries provided the latter information.

Due to the low number of responses in the largest size group (4 ha and over) two estimates were made, using either 4 or 3 size groups. For the estimates with only three size groups, the data in the 2 size groups of farms of 2 ha and over was combined whereas they were kept separate for the estimates from four size groups.

The resultant estimates obtained for the two methods and the average are presented in Table 1. The estimates of the 99-00 area are substantially **lower** that the 159 ha from the DPI Fisheries census. However, the estimates of industry sales in 99-00 are substantially **higher** than the DPI Fisheries figure of 70 tonnes.

Note: The estimates for 02-03 are also based on the information provided by respondents only (ie they do not take any account of the plans of any new entrants to the industry) and are also built up from the DPI's data on the distribution of all farms by area in 1999-00.

Table 1: Estimated total industry area, sales and investment

	Estimation method		
	Four pond size groups	Three pond size groups	Average
Area (ha)			
99-00	133	105	119
Expected 02-03	210	166	188
Sales (kg)			
99-00	150,382	89,458	119,920
Expected 02-03	386,107	291,465	338,786
Investment ($'000)			
Actual to 99-00	11,212	8,659	9,935
Expected 99-00 to 02-03	4,806	4,806	4,806
Total actual and expected	16,018	13,465	14,742

Current and future area farmed

The 50 respondents who provided information about farm area (ha), farmed a total area of 72.6 ha in 1999-00. The 48 respondents who provided information about future farm area expect to farm a total of 102.5 ha by 02-03.

To facilitate assessment of possible changes in area farmed, Table 2 shows information on area farmed in 99-00 and expected by 02-03 for the 48 respondents who provided information on both matters.

Table 2: Area farmed* 1999-00 and 2002-03

	Size group (ha)			
	0 to 0.99	1 to 1.99	2 and over	Total
Farmed 99-00				
Number of farms	19	18	11	48
Ha	8.2	21.8	37.2	67.2
Expected 02-03				
Number of farms	10	18	20	48
Ha	4.2	21.2	77.1	102.5
% change 99-00 to 02-03				
Number of farms	-47	0	82	na
Ha	-49	-3	107	53

na = not applicable

* only by farmers who provided information for both years

The total area farmed by the 48 farmers is expected to increase by 53% to 102.5 ha in 2002-03. The increase will come mainly from a major expansion (from 11 to 20) in the number of farms with 2 ha and over of ponds. These farms will account for 77.1 ha, 75% of the total. Farms 4 ha and over will account for 48.9 ha. This expansion in the number of larger farms will result in a large decline in the number of smaller farms and in their area.

Expected changes in the distribution of farms by size group from 99-00 to 02-03 are shown in Table 3.

Table 3: Numbers of farms by current and future area size group

	Size group (ha)			
	0 to 0.99	1 to 1.99	2 and over	Total
Farmed 99-00	19	18	11	48
Expected 02-03				
0 to 0.99 ha	10	0	0	10
1 to 1.99 ha	5	13	0	18
2 ha and over	4	5	11	20

As shown in Table 3, 9 of the smallest farms expect to move into larger size categories by 2002-3 as also do 5 of the medium sized farms.

Current and future sales volume

The 40 farmers who provided information on their sales in kg during 1999-00 sold a total of 58,363 kg. The 37 farmers who provided information about future sales expected to sell a total of 170,650 kg by 02-03.

37 farmers provided both current and expected future sales information and this is provided in Table 4 by sales size groups. This data facilitates detailed comparison of current and future sales.

Table 4: Sales* 1999-00 and 2002-03

	Size group (kg)			
	0 to 999	1000 to 2499	2500 and over	Total
Sales 99-00				
Number of farms	25	6	6	37
Kg	4,836	10,300	43,000	58,136
Expected 02-03				
Number of farms	6	9	22	37
Kg	2,150	15,000	153,500	170,650
% change 99-00 to 02-03				
Number of farms	-76	50	267	na
Ha	-56	45	257	194

na = not applicable

* only by farmers who provided information for both years

As can be seen from Table 4, the number of farms selling less than 1000 kg is expected to decline greatly (from 25 to 6) and the number selling 2500 kg and over is expected to increase substantially (from 6 to 22). The latter group's total output is expected to increase by 257% to 153,500 kg and the group to account for 90% of the sales.

Expected changes in the distribution of farms by sales size group from 99-00 to 02-03 are shown in Table 5.

Table 5: Numbers of farms by current and future sales size group

	Size group (kg)			
	0 to 999	1000 to 2499	2500 and over	Total
Sales 99-00	25	6	6	37
Expected sales 02-03				
0 to 999 kg	6	0	0	6
1000 to 2499 kg	8	1	0	9
2500 kg and over	11	5	6	22

Most of the farms currently selling less than 2500 kg expect to move up into high sales size categories by 2002-03.

Current and future sales/ha

The 1999-00 sales in kg/ha could be estimated for 38 farms. The average was 581 kg/ha, and the range was from 0 to 2500 kg/ha. The expected 2002-3 sales /ha could be calculated for 37 farms and the mean was 1675 kg/ha with a range from 300 to 3000 kg/ha.

For the 35 farms which provided both sets of information, the average sales/ha in 1999-2000 was 618 kg/ha and the average expected in 2002-03 was 1690 kg/ha. Details of the total numbers and distributions of these farms by kg/ha size groups are provided in Table 6.

Table 6: Number of farms by current and expected sales/ha

	Size group (kg/ha)					
	0	1 to 499	500-999	1000-1999	2000 and over	Total
Totals						
99-00	7	14	3	8	3	35
Expected 02-03	0	1	5	15	14	35
Movements between size groups 99-00 to 02-03						
0	0	0	0	0	0	0
1 to 499 kg/ha	0	1	0	0	0	1
500-999 kg/ha	1	3	1	0	0	5
1000-1999 kg/ha	3	7	1	4	0	15
2000 and over kg/ha	3	3	1	4	3	14

If the farmers achieve their expectations, the distribution of the farms by kg/ha category is likely to change markedly by 2002-03. Almost all the farms with nil or low sales/ha (1 to 999 kg/ha) expect to move into the 1000 kg/ha and over category and several expect to reach the 2000 kg/ha and over level. Also, half the farms in the 1000–1999 kg/ha bracket expect to have moved into the 2000 kg/ha and over category. Overall, the number of farms selling less than 1000 kg/ha is expected to decline greatly, from 24 to 6, and those selling 1000 kg/ha and over is expected to increase from 11 to 29. The increase expected in the 2500 kg/ha and over category, from 6 to 22 is particularly great.

Current and future capital investment

(Note: most respondents only included capital invested in ponds, equipment, stock, etc but a few may have also included investment in land and housing. This must be taken into account when interpreting the results.)

The 41 respondents who provided information about the amount of capital invested in their crayfish enterprise had invested a total of $4.742 million to 1999-00, an average of $116, 000 per farm. The 33 respondents who provided information about expected capital expenditure between 1999-00 and 2002-03 expect to invest a total of $2.391 million.

To facilitate assessment of possible changes in investment during the next 3 years, Table 7 shows information on investment to 99-00 and expected by 02-03 for the 33 respondents who provided information on both matters.

Table 7: Capital investment* to 1999-00 and from 1999-00 to 2002-03

	Size group ($'000)				
	0 to 19.9	20 to 49.9	50 to 199	200 and over	Total
Investment to 99-00					
Number of farms	6	9	11	7	33
Total investment ($'000)	52	227	986	2,706	3,971
Average investment ($'000)	9	25	90	387	120
Expected investment 99-00 to 02-03					
Number of farms	16	6	5	6	33
Total investment ($'000)	47	170	410	1,764	2,391
Average investment ($'000)	3	28	82	294	72
Actual and expected investment					
Total investment ($'000)	99	397	1,396	4,470	6,362

* only by farmers who provided information for both years

As shown in Table 7, the 7 farmers in the $200,000 and over category had invested $2.7 million to 1999-00. This was 68% of the total investment of $3.97 million by all responding farmers. The average investment of these seven farmers was $387,000. The average investments by other farmers were considerably lower. The investment plans to 2002-03 suggest that again most of the investment will be by a few farmers, 6 farmers plan to invest an average of $294,000 per farm. Their total investment of $1.76 million represents 74% of total investment planned by all responding farmers. The total actual and expected investment of the 33 farmers is $6.362 million, an average of $193,000 per farm.

Expected changes in the distribution of farms by past and future investment are shown in Table 8.

Table 8: Numbers of farms by past and future capital investment size group

	Size group ($'000)				
	0 to 19.9	20 to 49.9	50 to 199	200 and over	Total
Investment to 99-00	6	9	11	7	33
Expected 99-00 to 02-03					
$0 to 19.9k	5	4	3	4	16
$20 to 49.9k	1	4	1	0	6
$50 to 199k	0	1	4	0	5
$200k and over	0	0	3	3	6

Table 8 shows that several of the farmers who have already invested $50,000 and above plan to undertake further substantial capital investments.

Individual business aims

The scores for the individual business aims of all respondents and those with various pond areas are shown in Table 9. Pond area rather than sales was used to sub-divide responses mainly because more farmers provided information about pond area than sales. The scores for some aims differed greatly between the size groups. However, only some were statistically significant and these are marked ** in the table.

Table 9: Importance of individual business aims

Aims	% of responses scored 4-5*		
	All responses	Farms <1ha	Farms 1ha and over
• Increase output/pond (kg/ha)	85	90	83
• Increase total sales (kg)	83	95	80
• Increase demand in existing markets**	63	79	48
• Increase sale price/kg	58	68	53
• Enter new markets	47	53	43
• Improve marketing skills**	46	60	36
• Improve business management skills**	43	60	31
• Reduce input costs	43	58	37
• Apply new technology**	36	50	23
• Improve technical skills**	36	50	24
• Improve product quality	33	42	27
• Change product type	28	33	25
• Change product size	15	21	12
• Employ appropriately skilled labour	10	0	12
Number of responses	*(42-55)*	*(13-20)*	*(26-30)*

*Scores 4-5 = high and very high importance.

** Differences between size groups are statistically significant at the 10% level

Notes: 1. Sorted in descending order of all responses.

2. For the all responses column, unless the difference between the percentages for any 2 aims is more than 10% assume they are identical.

Overall, the scores for aims ranged greatly. The most important aims were *to increase output/pond* and *to increase total sales*, each being rated highly by over 80% of farmers. These were followed by *increase demand in existing markets and increase sale price/kg*, around 60%. There were then a large number of aims scored highly by 30-40 % of farmers. The lowest rating aims were *employ appropriately skilled labour* (only 10%) and *change product size* (15%).

The differences between the scores of the small and large farmers for several aims suggest that more larger farmers consider they have satisfactory technical, management, and marketing skills. More of these farmers also appear to be satisfied with the current level of demand in existing markets.

The low importance, to both small and large farmers, of employing skilled labour probably reflects a current predominant focus on using farm family labour.

General industry changes

The scores of all respondents, and those with various pond areas, for the industry changes needed are shown in Table 10. The scores for some changes differed greatly between the size groups. However, only some were statistically significant and these are marked ** in the table.

Table 10: Importance of general industry changes

Changes	% of responses scored 4-5*		
	All responses	Farms <1ha	Farms 1ha and over
• More effective research, development and technology transfer	66	65	63
• More effective representation to governments etc	65	60	67
• Development of existing and new markets	62	70	55
• Better market information**	60	75	52
• More effective pest and disease control/prevention programs	54	60	53
• More general promotion of Redclaw	54	65	43
• More collaborative grower marketing activities	53	70	48
• Well located processing plants	52	60	46
• Voluntary code of on-farm practice developed and implemented	40	37	43
• An effective food safety program	36	37	37
• More effective training programs	33	45	23
Number of responses	*(50-54)*	*(19-20)*	*(26-30)*

*Scores 4-5 = high and very high importance.
** Differences between size groups are statistically significant at the 10% level
Notes: 1. Sorted in descending order of all responses.
2. For the all responses column, unless the difference between the percentages for any 2 changes is more than 10% assume they are identical.

Overall, the range in scores was smaller than for individual business aims. Generally each of the changes needed was rated as very high or highly important by 50-60-% of the farmers. The 3 lowest rated changes were *more effective training programs* (33*%), an effective food safety program* (36%), and *voluntary code of on-farm practice developed and implemented* (40%).

Fewer larger farmers seemed to require better market information than smaller farmers, but this was still important to many larger farmers.

Industry research and development needs

Respondents were asked to score numerous specific possible industry R&D needs in the following subject areas: feeding and nutrition, pond productivity, post harvest, and pests and diseases.

The scores of all respondents and those in various pond area groups for all the listed R&D needs are shown in Table 11. The single most important topic was *breeding for faster growth* (88%). This was followed by 8 needs, mainly relating to pests and diseases, and improved crayfish growth, with support levels ranging from 78% to 68%, and *low cost feeds* on 61%. The scores for some needs differed greatly between the size groups. However, only some were statistically significant and these are marked ** in the table.

Table 11: Importance of specific industry research and development subjects

Changes	% of responses scored 4-5*		
	All responses	Farms <1ha	Farms 1ha and over
Feeding and nutrition			
• Better nutrition feeds**	69	84	53
• Low cost feeds	61	68	63
• Pellet properties	57	58	53
• Improved feeding guidelines	56	68	50
• Feed and aeration level relationships**	51	70	43
Pond productivity			
• Breeding for faster growth	88	100	79
• Breeding for more uniform growth	78	89	71
• Breeding for disease resistance	72	68	75
• Develop cost effective habitats	69	74	71
• Improved aeration methods	53	65	47
• Control of reproduction	42	56	38
• Polyculture	36	40	30
Post harvest			
• Causes of post harvest mortality	58	60	54
• Optimise packaging for live transport**	58	70	45
• Optimise purging**	56	92	35
• Optimise processing methods	45	55	37
• Improve flow trapping	42	50	36
• Improve bait trapping	32	42	22
• Develop size grader	29	25	31
Pests and diseases			
• Investigate disease control methods	76	70	87
• Identify, and develop tests for, existing viruses	73	68	80
• Investigate transmission pathways	70	68	75
• Establish harmfulness of various pests	68	70	71
• Develop identification aids (eg posters)	54	56	57
Number of responses	*(32-55)*	*(12-20)*	*(20-30)*

*Scores 4-5 = high and very high importance.

** Differences between size groups are statistically significant at the 10% level

Notes: 1. Sorted in descending order of all responses.

2. For the all responses column, unless the difference between the percentages for any 2 changes is more than 10% assume they are identical.

Some of the differences between scores of large and small farmers again suggest that more of the larger farmers are more satisfied with their current levels of skills/knowledge on several technical matters, eg feed and aeration level relationships, than smaller farmers.

Association activities

The scores for association activities of all respondents and in various pond area groups are shown in Table 12. The scores for some activities differed greatly between the size groups. However, only some were statistically significant and these are marked ** in the table.

Table 12: Importance of association activities for further industry development

Activities	% of responses scored 4-5*		
	All responses	Farms <1ha	Farms 1ha and over
Representation			
Queensland government	88	83	90
Local government	77	78	73
Federal government	65	61	67
Industry development			
Prioritise industry R&D needs	72	68	76
General promotion of Redclaw	67	75	63
Develop and implement codes of practice**	38	58	27
Develop/provide training**	30	53	13
Member services			
Information on industry issues	81	89	76
Opportunities for information exchange	77	85	76
Discounts on inputs/purchases	50	56	50
Training**	42	55	28
Advertising their business**	27	47	14
Number of responses	*(50-54)*	*(18-20)*	*(28-30)*

*Scores 4-5 = high and very high importance

** Differences between size groups are statistically significant at the 10% level

Notes: 1. Sorted in descending order of all responses.

2. For the all responses column, unless the difference between the percentages for any 2 activities is more than 10% assume they are identical.

The rating of association activities as very high or highly important varied greatly, from 88% to 27%.

The most important activities, with percentages of over 75%, were: *representation to the Queensland Government, information on industry issues, providing opportunities for information exchange, and representation to local government*. *General promotion of Redclaw* (67%) and *representation to the federal Government* (65%) were also rated quite highly. The other possible activities were rated much lower, the lowest was *helping members to advertise their business*, only 27%.

Generally, larger farmers tended to attach slightly lesser importance to association activities than smaller farmers, particularly so regarding *industry codes of practice, training, and advertising individual businesses*. However, many larger farmers did regard several activities as being of high or very high importance.

CONCLUSIONS

The high response rate (over 50% of active farmers accounting for over 80% of production), and the comprehensiveness of the data provided, resulted in a highly successful survey and results of great value to the industry associations, individual businesses and government agencies.

Estimates of total industry area and output from the survey results revealed that the official statistics may significantly under estimate industry output (119 tonnes cf 70 tonnes) and overestimate area (159 ha cf 119 ha). The investment estimates are new and suggest investment to date of around $10 million with further investment planned by many existing farmers.

A major finding is that industry output from existing farms could increase from around 110 tonnes in 99-00 to around 340 tonnes by 02-03 due mainly to increased output per ha and also to an increase in the total area farmed. New entrants could further boost these estimates. However, a cautious approach to these estimates is required since previous experience is that the industry often fails to achieve expected increases in output.

Industry sources suggest that this is due partly to low output/ha on many farms, which constrains output and further investment on existing farms and investment in new farms.

The comprehensive information on farmer aims, needs etc provided the associations and governments with valuable information being used in planning and resource allocation exercises. The critical importance of improving output/ha noted above was confirmed by the fact that the most important business aims for all farmers were increasing output/pond and increasing total sales, and the most important R&D need was breeding for faster growth. As expected, the most important requirements of industry associations were representation to governments, providing information and opportunities for information exchange and product promotion. The latter activity, currently undertaken on a very limited scale, could have significant funding and other implications for the industry and the associations. This will be particularly so while total production is low and industry codes of practice and product description systems are not in place, and if individuals and regions also wish to promote their own products.

The survey revealed much fewer, only 15 (25%), statistically significant differences than expected in the importance of aims, needs, etc between large and small farmers. If the threshold for significance is reduced from 10% to 5% the number falls to only 10 (16%). This result may be partly due to the small sample sizes but may also reflect greater than expected homogeneity of aims, etc in the industry. Most of the measured differences between the large and the small farms could be satisfactorily explained by variations in objectives and in farm/farmer development status.

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