



final report

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Enhancement of remote area surveillance systems throughout Australia

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Abstract

The underreporting of disease events in livestock has been identified in various studies. The aim of the project was to develop and implement systems that enhance reporting in regional Australia. The results of this project have shown that while there is an unwillingness of producers to report animal health problems and to consult veterinarians, there is a genuine interest in participating in disease surveillance activities. This is not an inconsistent observation but rather highlights the complexities and challenges of enhancing reporting in rural Australia. The major challenge is to develop low (opportunity) cost tools and systems that facilitate producer participation. The outcome of these surveillance processes should be to provide valuable information to producers as well as providing information on our national livestock health status.

Executive Summary

Effective surveillance is essential for early detection of new and exotic diseases, management of disease outbreaks, and endemic disease control. Access to international markets is becoming increasingly dependent upon the ability of the exporting country to provide evidence that products are produced in an environment that is free from particular diseases. Hence, a further surveillance requirement is to collect information on the health status of Australian livestock. In this regard, a number of critical gaps have been identified in Australia's surveillance capacity; including the provision of reliable surveillance data where none currently exists; the gathering of new and existing data into readily useable and broadly accessible information systems; and the provision of tools for the analysis of surveillance data.

The broad objective of this project is to evaluate different strategies for encouraging producers to report animal disease events, and to enhance the quality of the information through the use of appropriate technology.

The primary observations and outcomes of this project are:

1. Producers are still predominately male third-generation farm owners,
2. There is a high level of access to information technology,
3. Frequently livestock deaths are not reported and veterinarians not consulted even in the face of uncertainty,
4. The hands-on managers of livestock are often not able to access computers for a variety of genuine reasons,
5. Producers have a genuine interest in participatory surveillance,
6. There was strong enthusiasm and response to field workshops where autopsy processes were demonstrated,
7. There is a clear lack of trust of government disease managers,
8. The lack of trust in government disease managers, together with overconfidence in farmer livestock disease diagnosis may be cause for concern.

It is clear that a collective industry and government approach to improving surveillance and biosecurity is required. While this occurs to some extent at the moment, the recent trends in information requirements suggest that this will be inadequate in the future. Further dialogue between producers and government is required to determine the amount and type of information required. Decisions are also required regarding the relative emphasis on a proactive approach to information collection, compared with reactive response oriented activity.

The collection of livestock health information will require the development of increased trust between producers and government. This will be difficult to achieve in the short term at the farm level. Further research is required to develop cost-effective tools and systems to collect the required information. This research must involve producers very early in the planning stages in order to identify the systems and tools that are of low opportunity and participatory cost to producers, but which will still generate the required livestock health information.

The data showing lack of trust between government disease managers and individual producers is undergoing further analysis. However, the preliminary indications are of some concern. One possible implication of this lack of trust is that biosecurity messages from government disease managers may not be heeded.

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To date, the work in this project suggests that livestock health surveillance is regarded as very important by individual producers. However, there appears to be a lack of connection between the collection of data at farm level and the need to meet national imperatives.

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1 Background

Under-reporting of disease events in farm animals has been identified in numerous studies, including the *Review of Rural Veterinary Services* and a pilot study undertaken by the Department of Agriculture Western Australia. Such under-reporting may be detrimental to the maintenance of export markets, and certainly reduces our capability for early detection of emerging disease problems. Further, under-reporting by producers potentially jeopardises many of the other AB-CRC projects that aim to enhance reporting through the use of innovative technologies.

The main nationally and internationally recognised sources of animal health surveillance information are veterinary laboratories, but these sources represent only a small proportion of animal disease events. Further, the relationship of laboratory accessions to actual disease occurrence is not clear.

Australia's claims of freedom from a variety of livestock diseases (notably World Organisation for Animal Health (OIE) List A diseases), and also our ability for early detection of incursions of exotic disease, are dependent on a reliable disease reporting system. It is fundamentally important for each of these purposes that there is recognition of as many occurrences of disease of all sorts as possible. This includes endemic diseases and production limiting diseases as well as occurrences of suspected exotic disease.

In addition to this, a number of important research questions have arisen in the area of disease surveillance. It has already been demonstrated that livestock producers are able to report disease events on a regular basis. However, both the accuracy and completeness of producer reports require independent evaluation. A variety of approaches have been proposed to improve the detail and quality of information reported by farmers, including basic training in autopsy techniques, the provision of basic autopsy kits, as well as using different modes of communicating disease information such as digital imaging and live telephone links to experienced veterinarians. An additional important issue is the long-term sustainability of this approach to surveillance.

Farmer reporting provides access to disease information in areas where veterinarians are not readily available. However, research in Australia and internationally has shown that establishing an effective farmer reporting system is not simply a matter of putting in some training and giving farmers a form to fill out. Viability and sustainability relate to a range of factors, not the least of which is direct benefit to the producer, and ongoing 'service' of producers by the agencies requiring or using the data.

Ongoing inputs by animal health authorities are required to maintain farmer participation. This project aims to quantify the inputs into the system and assess the long-term feasibility of the system from an economic point of view.

Identifying reasons for under reporting could assist in the development of strategies to enhance reporting. It is imperative to understand the reasons for under-reporting, which are likely to be embedded in the 'culture' of farmers and their relationship to state agriculture departments and other channels by which animal health and disease information is managed. While some work exists in the area of the culture of decision-making amongst farmers, there is a clear gap in our understanding of the management of decision-making regarding livestock disease.

2 Project Objectives

The objective of this project is to evaluate different strategies for encouraging producers to report animal disease events, and to enhance the quality of the information through the use of appropriate technology.

The specific aims of the project are to:

- 2.1 Establish a series of five pilot surveillance groups in regional/remote areas across Australia, and determine social profile of participants
- 2.2 Coach producers in the value of reporting, the process of syndrome reporting, and use of relevant technology
- 2.3 Evaluate the quality and quantity of data collected through each of the five groups
- 2.4 Evaluate techniques to improve the quality of data provided
- 2.5 Evaluate systems to improve sustainability of the surveillance system by providing more benefits to participating producers
- 2.6 Establish inputs required to maintain such systems in the future as a routine part of Australia's surveillance activities

3 Methodology

3.1 Establish a series of up to 5 pilot surveillance groups

Surveillance groups of five to fifteen producers will be established in Queensland, Northern Territory and Western Australia. All sites will be remote from major cities with limited access to private veterinary services. Willingness to participate will be a major consideration. It should be noted that there will be no specific effort to select producers at random. A social profile questionnaire will be administered to each participant.

3.2 Coach producers

Participants will be provided with basic information on the value of animal health and disease reporting, trained in the process of syndrome reporting, and use of relevant technology.

3.3 Data collection and evaluation of data quality

A subset of the producers will be asked to provide details of all sickness and deaths in sheep and cattle over the period of the study. This will provide the baseline against which to determine the overall reporting rates. Producer reports will be compared with state laboratory data, and any differences noted. Where feasible, additional opportunistic sampling of diseased animals will be undertaken, and specimens submitted to laboratories.

3.4 Evaluate techniques to improve the quality of data provided by producers

Quality of information will be enhanced by training in basic autopsy techniques, and the provision of simple autopsy equipment, along with specimen submission kits to selected groups. Digital cameras will be provided to selected participants, who will be coached in their use to provide clear views of relevant aspects of sick or dead animals. In each case, submission of information will be enhanced through the use of internet capacity (email and/or direct access web pages). A web-based library of resources, such as standard autopsy findings, photographs etc. may become

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available through allied projects. Such a resource, if available, would enhance the quality of reporting.

3.5 Evaluate systems to improve sustainability of the surveillance system

It is important to remember that disease reporting, with the exception of notifiable diseases, is a voluntary activity. With all voluntary activities, sustainability tends to be based on the reward received (“behaviour that is rewarded is repeated” – Skinnerian principle), in relation to the effort required. In this project it is intended to minimise paperwork, through the use of internet based reporting systems, and pre-labelled submission material etc. Rapid feedback, and personal involvement (telephone contact, farm and group visits) will be provided so that participants have access to expertise that may otherwise be unavailable, or too costly to arrange commercially.

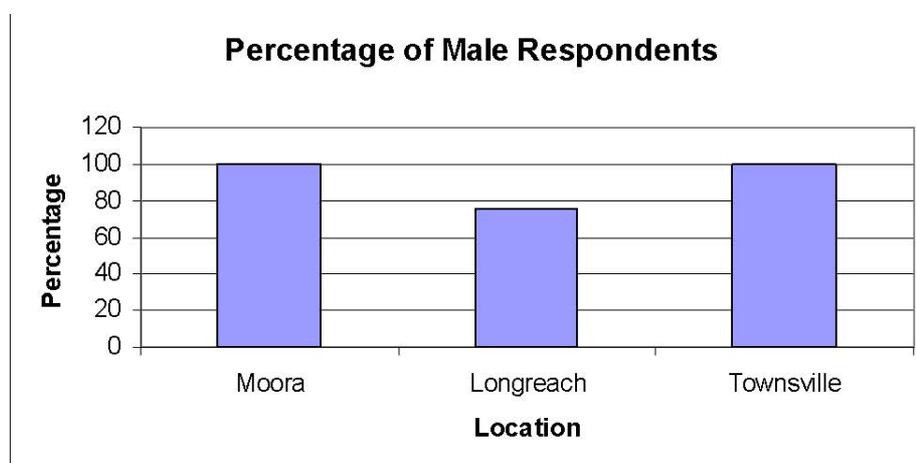
3.6 Ascertain what inputs are required to maintain such systems in the future as a routine part of Australia’s surveillance activities

The sociological aspects of producer reporting will be investigated through surveys and interviews. The findings from that research in association with the research proposed here will form the foundations to sustainable reporting. It is expected that producer oriented extension and training material will result from these studies, and link in with other aspects of the CRC. Anticipated outputs would be in the form of material for producers, training material for animal health professionals, and recommendations to training, administrative and funding bodies for ongoing activities to support surveillance. The national trend to fewer animal health professionals in regional and remote areas is likely to continue in the foreseeable future. It is similarly unrealistic to expect private health professionals to conduct surveillance activities for any altruistic reason, when incomes and profits in rural practices are declining. Only by enhancing producer networks and facilitating disease reporting at the ground level will Australia be able to demonstrate ongoing freedom from exotic diseases, and detect emerging diseases and disease incursions at an early stage.

4 Results and Discussion

4.1 Producer Profiles

Sufficient returns for a preliminary analysis have been received from producers linked to three research sites: Moora, Townsville and Longreach. This information is summarized below.



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Figure 1: Percentage of male respondents at each locations.

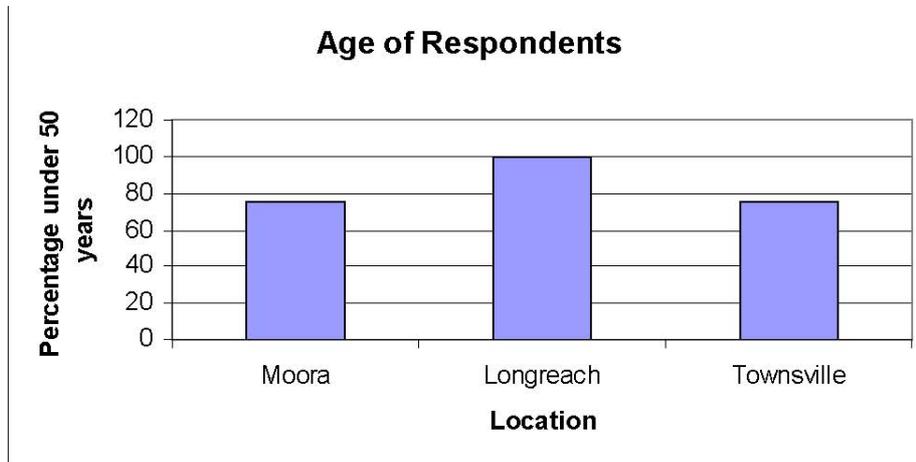


Figure 2: Percentage of respondents under the age of 50 years.

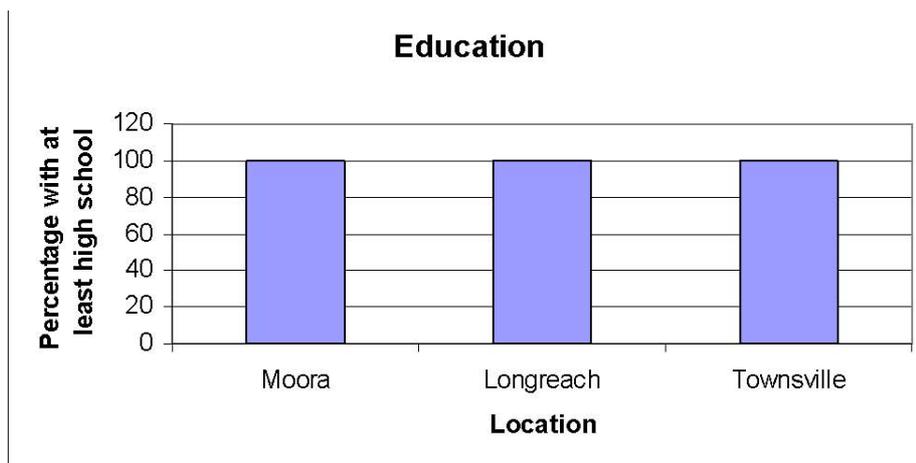


Figure 3: Minimum educational attainment of respondents

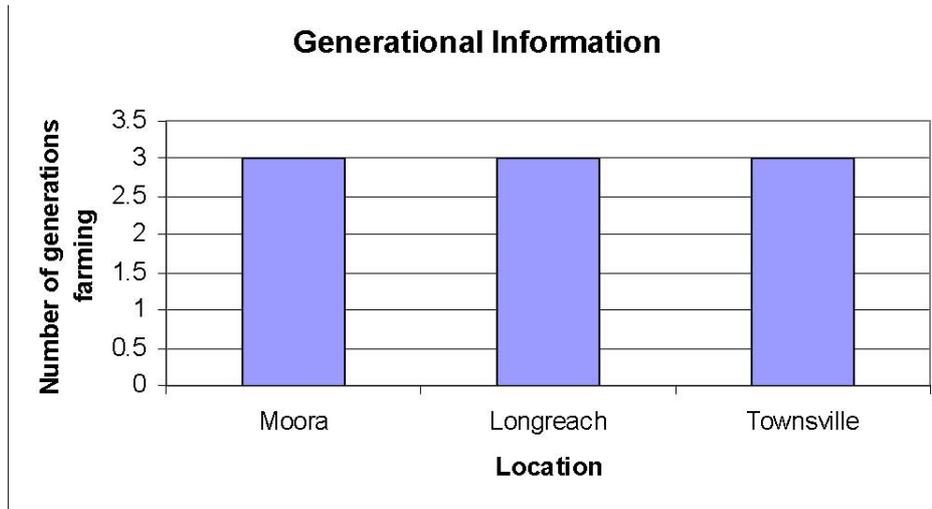


Figure 4: Number of generations that have been farming

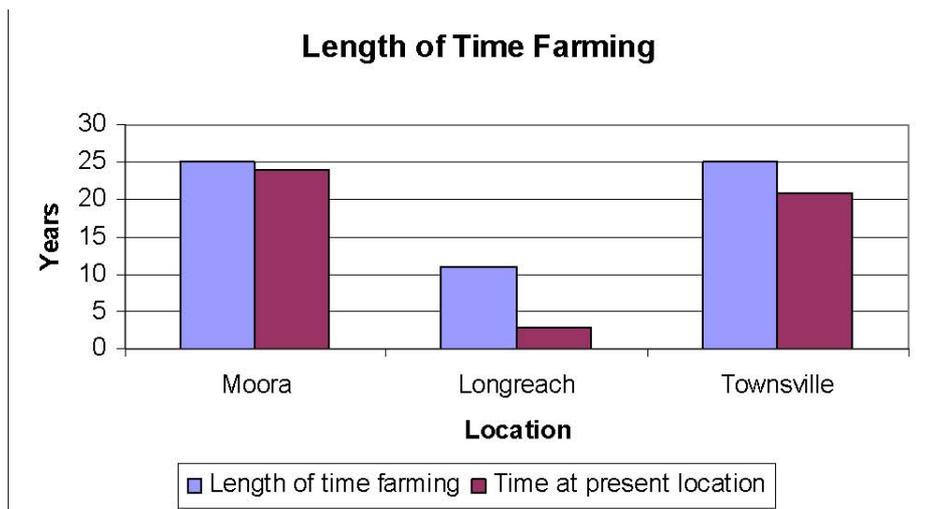


Figure 5: Length of time respondents have been farming

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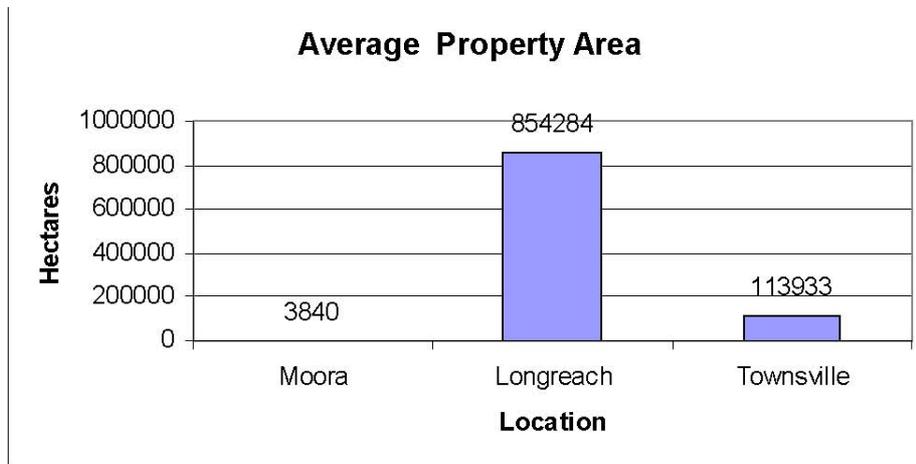


Figure 6: Average area of properties in each location

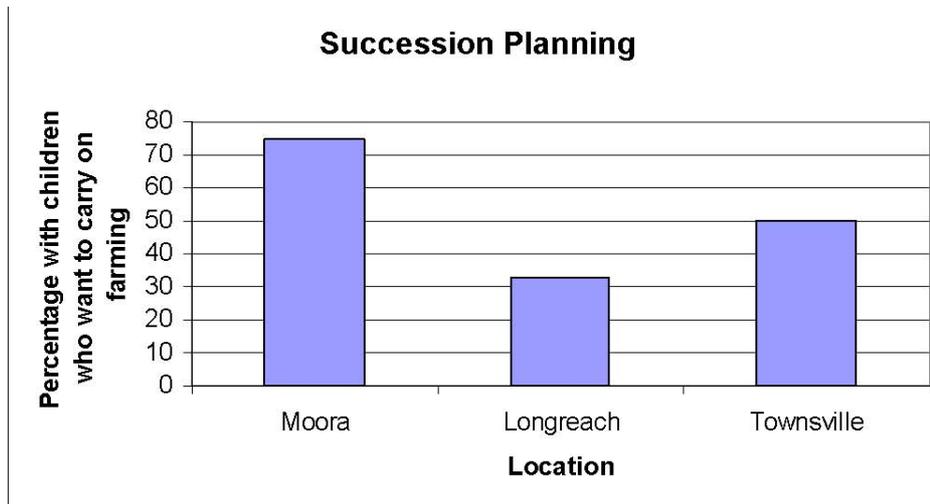


Figure 7: Percentage of respondents with children who want to continue farming

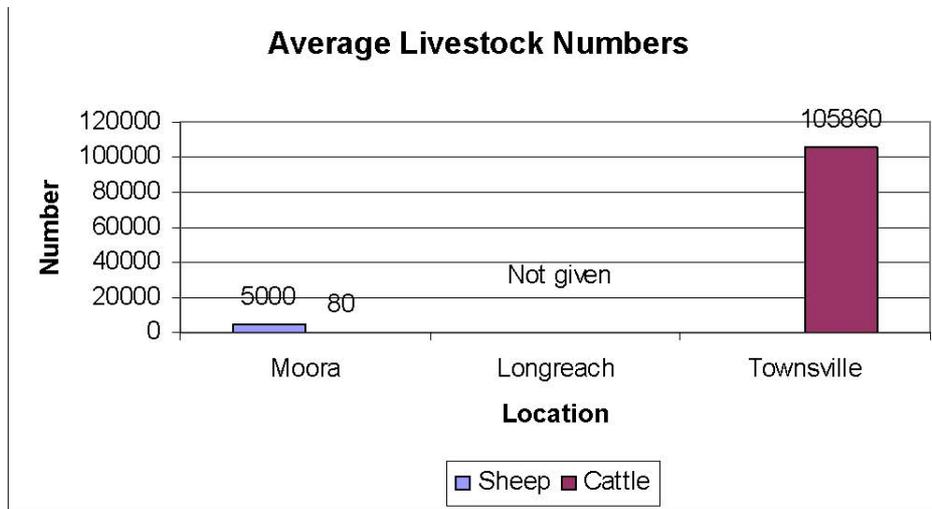


Figure 8: Average livestock numbers (sheep and cattle)

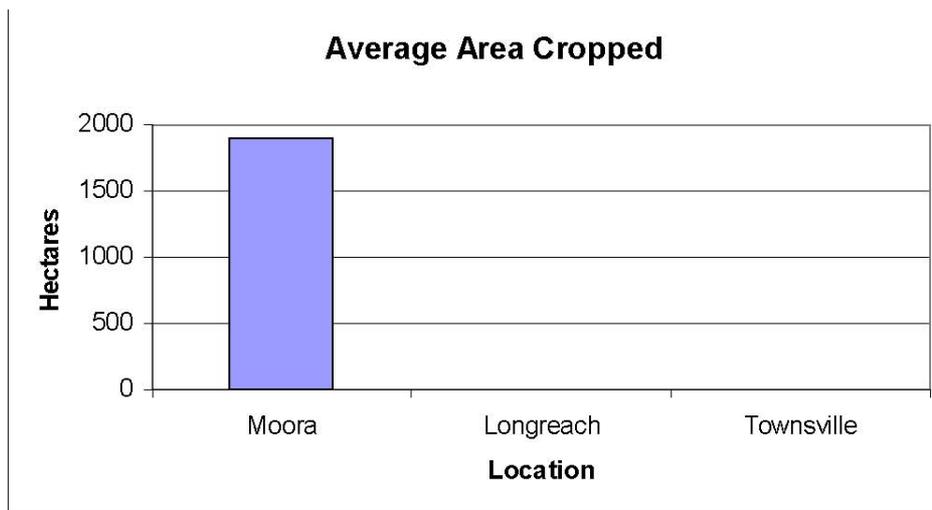


Figure 9: Average area cropped (Ha)

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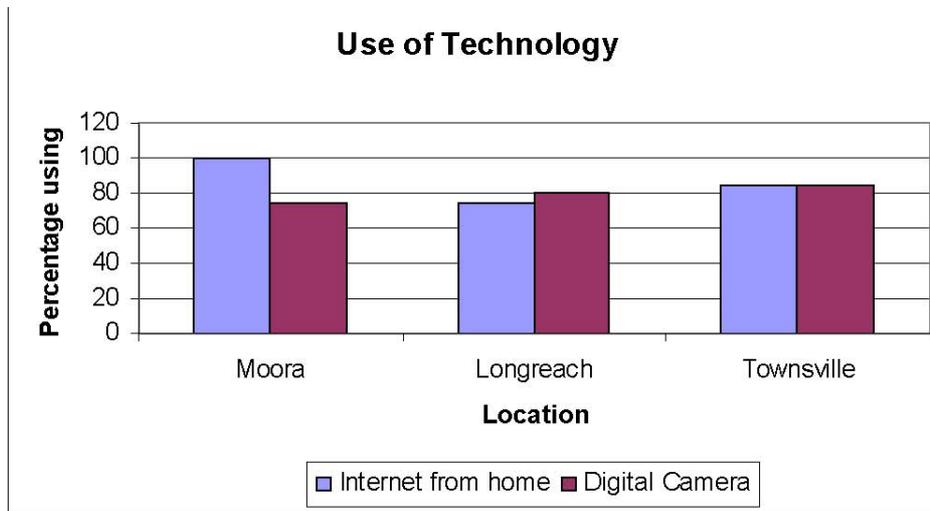


Figure 10: Use of the internet and digital cameras by respondents

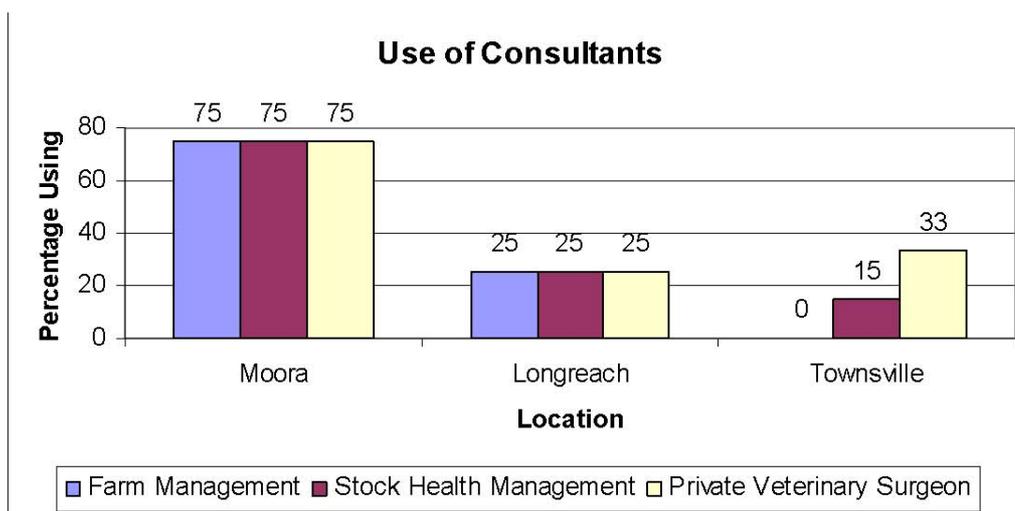


Figure 11: Use of various consultants at each location

The differences between producers at each location are apparent. However, a number of similarities are worth noting:

- virtually all are 3rd or higher generational farmers
- almost all are male
- all have at least high school educational attainment
- there is a high level of adoption of internet and digital camera technology
- the majority of respondents were aged 50 years and under
- Most have many years farming experience, particularly noticeable at the Moora and Townsville sites.

In addition, producers at Moora provided the following data:

The average value of total holding is \$5.4 million

The average equity is 80%

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The average farm income in the previous financial year is \$875,000

Producers at the other two locations did not provide this data.

The intent of this background sociological survey is as follows:

- To obtain an overview of the type of people we are working with
- To see if there are any sociological parameters that relate to animal disease reporting activities in the longer term
- To see if there are sociological differences between sheep and cattle producers, and any particular differences between sites.

4.2 Producer returns on deaths in their flocks

Producers in the Moora group agreed to provide quarterly information on the deaths in their flocks. Originally a fax-back, or reply paid system was well received by producers, but was not used. Producers were responsive to a quarterly return done over the phone.



Figure 12: Crude death rates per thousand for different categories of sheep (incomplete)

The death rate in lambs was zero, because at this time of year lambs are not present, and the youngest stock are weaners, which includes maiden ewes (hence the zero death rates in this group)

Weaner death rates were variable, from 1.4 to 10.3 deaths per thousand, with producer reasons for sheep deaths being given as shown in Table 1:

Reason given for death	Number of reports
Cancer	3
Arthritis	2
Twin lamb disease	2
Dermatophilosis	1

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Flies	1
Ill thrift	1
Old age	1
Stress	1

Table 1: Reasons given by producers for deaths of sheep, March quarter 2007

Although about three quarters of the Moora producers advised that they make use of a private veterinary surgeon, none of the producers consulted a vet during the quarter. Diagnoses, while potentially correct, do to some extent beg questions, such as:

- Why would dermatophilosis kill sheep? The season was unusually dry. Could this be an incursion of sheep pox?
- What was the cause of the ill thrift?
- Why was cancer the most frequently reported cause of death?

One could think of other questions in this regard. It is the intent of ongoing activities of the project to clarify the magnitude of deaths, and endeavour to determine the inputs required to stimulate and maintain reporting.

4.3 Researcher impressions of surveillance and surveillance activities by producers

1. On the larger more remote properties the people that handle the cattle – mustering and husbandry procedures, are not likely to be the same person/s that sit in front of computers in the evening. This would mean that either
 - a) they need to remember clinical details to pass on to someone else (pretty hard if there are hundreds/thousands of head of cattle in various paddocks)
 - b) or record data at the time – bearing in mind that there may not be any mobile phone coverage
2. It is generally the wives/older children that are most interested & capable of using new technologies, but then they may not be the ones that see or handle the stock
3. The value of the individual animal may be quite small in comparison to the herd and therefore a few sick beasts are not worth a second look
4. Lack of historical reference to morbidities / mortalities on a property may mask subclinical illnesses and therefore preclude investigations
5. The highly seasonal nature of the areas mean that it is either ‘all on’ or ‘all off’ – no time for extra activities in the dry or likely not even to be present on the property during the wet
6. Many properties are run by managers who may not have the same enthusiasm for surveillance
7. The days are long and hard – getting the motivation and energy to conduct a post mortem may be just too difficult at the end of the day
8. Syndromic surveillance activities will not deliver a benefit without significant training being provided to participants. Any analysis of the value of syndromic surveillance must only be undertaken if training has been provided.

Overall most remote producers have been genuinely keen on surveillance and disease diagnoses as they are aware that it is their livelihood/export markets ultimately affected. A tool which enables them to work out possible diagnoses is very appealing as a ‘do it yourself’ measure. However taking into consideration the above points they may need that extra bit of incentive to complete data processing. With time delays (consecutive days mustering, seasonal, lack of reporting

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options, and change of management) between opportune events, interest will wane and producers will drop out. Harnessing a handful of willing participants with a two-way relationship may produce more successful outcomes.

4.4 Producer workshop feedback

Autopsy technique workshops were conducted in Queensland, coordinated from the Longreach and Townsville sites.

Producers were provided with basic autopsy equipment (Table 2). They were shown how to conduct an autopsy, and how to submit suitable samples for laboratory examination. In addition, staff conducting the workshops provided additional information on local diseases and their diagnosis. Producer feedback was sought, and this is summarized below (Tables 3 and 4).

Table 2: Post Mortem Kit Contents, as used in Queensland

Item	Units	Cost per Unit	Total (\$)
20ml Syringe	3	0.23	0.69
10ml Syringe	4	0.11	0.44
5ml Syringe	5	0.082	0.41
18G Needle	10	0.03	0.30
21G Needle	10	0.04	0.40
Vacutainer Plain	2	0.295	0.59
Vacutainer EDTA	2	0.273	0.55
Vacutainer Heparin	2	0.295	0.59
Brain Bucket with 10% Buffered Neutral Formalin	1 with 1 Litre	1.51 2.41	3.92
200ml Sample Jars	3	0.77	2.33
70ml Sample Jars	5	0.17	0.84
Transport Swab	2	0.88	1.76
Gloves – Disposable	3 pairs	0.172	0.52
Techni-ice	1 sheet	1.21	1.21
Small Warwick Tub	1 x 40 Litre	12.99	12.99
Exotic Disease Hotline Magnets and Post Cards	1 of each		
Small Scissors	1	3.13	3.13
Plastic Disposable Forceps	1		
No. 22 Scalpels	4	0.24	0.96
Giant Rubber Bands	2	0.03	0.06
Large Garbage Bags	2	0.149	0.30
Black Marker Pen	1	2.84	2.84
		TOTAL	34.83

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Feedback from each of the workshops was sought independently. Those who attended the workshop organized from Longreach responded as follows in Table 3, and from Townsville in Table 4.

Table 3: Feedback from attendees at the workshop organized from Longreach

Question	Responses
Overall usefulness of the activity	Very useful (9); Quite useful (1); Useful (1)
Event of most interest	Post mortem (5); Poisonous plants (4) other (2)
Preference for presentation method	No changes (7); Use CD or Video (1)
General comments	Favourable (9); Unfavourable (0)

Table 4: Feedback from attendees at the workshop organized from Townsville

Question	Responses
Suitability of facilities	Excellent (9); Above Average (5) Average (2)
Usefulness of topics covered	Excellent (11); Above Average (2) Average (3)
Clarity of demonstration	Excellent (8); Above Average (8)
Clarity of explanations	Excellent (8); Above Average (6) Average (2)
Assessment of pre-workshop skills	Excellent (1); Above Average (0) Average (10); Below average (4); Poor (1)
Assessment of post-workshop skills	Excellent (1); Above Average (11) Average (4)
Value of activity in general	Excellent (14); Above Average (2)
Rating of tutor	Excellent (14); Above Average (1) Average (1)
Free text comments	All positive

It was clear that producers appreciated the input, and were enthusiastic about the training and would be interested in further input from project staff. Further activities are planned, and will be reported on in due course.

4.5 Producer attitudes to reporting

The questionnaires regarding attitudes to reporting were developed following consultations with producers and animal health managers in Government and University. The questionnaires were posted to 3000 farmers with 455 responses. Once returned, they were scanned (data was automatically entered into statistical analysis software files) and data analysed. 70 farmers who completed the questionnaire indicated they were interested in participating further in the study. The intention was to interview about half this number so a list of names was drawn up using a sampling strategy which took into consideration thematic factors, livestock type and geographical location. Farmers were contacted by phone and arrangements made to visit them at their farms. 37 interviews were conducted in all.

The results of the questionnaire showed that the farmer's biosecurity practices were neither good

nor bad, and that the level of reporting was generally low. The two factors which emerged as significant predictors of whether farmers would consult a veterinarian were distance from the veterinarian and the degree of trust in the government. The latter factor also emerged in the interviews as a significant issue. The mistrust was apparent across all levels of government and related to a lack of resources and services, bureaucratic mismanagement and repeated inconsistent advice. This lack of trust results in a tendency for farmers to disregard advice from government sources, relying instead on their own judgment. They generally had a very high level of confidence in their own abilities. Uncertainty of the symptoms prompted farmers to call a veterinarian.

Three elements, mistrust of government, confidence in self diagnosis and uncertainty of the symptoms are a concern with regard to biosecurity. If farmers do not trust government sources, even when uncertainty is present, important animal health messages may go unheeded. If biosecurity and surveillance is to be improved at the farm level, greater understanding, communication and respect between farmers and government agencies needs to be developed.

Further analysis of this data is in progress.

5 Success in Achieving Objectives

1. Establish a series of up to five pilot surveillance groups in regional/remote areas across Australia, and determine social profile of participants - achieved
2. Coach producers in the value of reporting, the process of syndrome reporting, and use of relevant technology – achieved in part - ongoing through AB-CRC
3. Evaluate the quality and quantity of data collected through each of the groups - achieved
4. Evaluate techniques to improve the quality of data provided – not achieved
5. Evaluate systems to improve sustainability of the surveillance system by providing more benefits to participating producers - achieved
6. Establish inputs required to maintain such systems in the future as a routine part of Australia's surveillance activities – achieved in part – ongoing through AB-CRC

6 Impact on Meat and Livestock Industry – now & in five years time

The outcomes of this work, suggest that there are valuable and important opportunities to increase the knowledge and awareness of biosecurity issues amongst producers through involvement in practical workshops. However, there are some broader longer-term concerns over the processes for collection of animal health information that remain to be addressed. The failure to develop processes to collect animal health information may have market access implications. However, it is difficult to make these judgments at this time.

7 Conclusions and Recommendations

Australia's claims of freedom from a variety of livestock diseases (notably World Organisation for Animal Health (OIE) List A diseases), and also our ability for early detection of incursions of exotic disease, are dependent on a reliable disease reporting system. It is fundamentally important for

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each of these purposes that there is recognition of as many occurrences of disease of all sorts as possible. This includes endemic diseases and production limiting diseases as well as occurrences of suspected exotic disease. In order to achieve this level of reporting, participation by producers is needed. This project is aimed at providing a better understanding of the factors involved in engaging producers in disease surveillance. The project is a part of a broader AB-CRC activity in this area.

Biosecurity is fundamentally a social activity as it involves individuals and communities, and decisions that they make regarding livestock management. Thus a social science perspective ensures a holistic approach to bio-security. Disease managers have recently begun to focus attention on the on the social and cultural dimensions of animal health practices. A broader understanding of cultural factors such as perceptions of risk and threat; rules of social interaction; appropriate communication; relationships; acceptable farming practices; issues of stigmatization; economic motivations and individual factors by both producers and researchers is very important.

The key observations and conclusions of this project are:

1. Producers are still predominately male third-generation farm owners,
2. There is a high level of access to information technology,
3. Frequently deaths not reported and veterinarians not consulted even in the face of uncertainty,
4. The hands-on managers of livestock often than not willing or able to access computers for a variety of genuine reasons,
5. Producers have a genuine interest in participatory surveillance,
6. There was strong enthusiasm and response to field workshops where autopsy processes were demonstrated,
7. There is a clear lack of trust of government disease managers,
8. The lack of trust in government disease managers, together with overconfidence in farmer disease diagnosis may be cause for concern.

From one perspective, the results of this project show that livestock deaths are not reported and veterinarians tend not to be consulted. On the other hand, there is a genuine interest by producers in being actively involved in disease surveillance activities. At one level, these results seem to be inconsistent. However, the deeper analysis indicates that the failure to report is due to a complex mixture of factors including a distrust of government, access to veterinary services, faith in their own diagnostic ability and the value of the animals. Some elements of the reporting complexities do raise some significant biosecurity concerns.

The results of the surveys indicated that producers generally have access to computers and the Internet. However, connection speeds were not analysed. In considering access to technology, it became clear that the people managing the livestock directly are often not the people who are regularly using computers. Hence, the collection of information via the Internet remains problematic for genuine reasons.

A key recommendation from this project is to continue to develop and trial systems to involve producers in the collection of animal health information in order to meet national market access requirements. Low (opportunity) cost tools that can be easily used by producers need to be developed. These need to use technology that is available to most producers, provide value to producers and generate the required information.

The involvement of producers in disease surveillance and reporting is clearly a complex matter that

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requires further consideration. Any additional research and trial activities in this area need to involve producers in the planning stage.