Sheep disease surveillance on grain-sheep farms in Western Australia

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Abstract
During a one year period the disease syndrome occurrences recorded (n=64) on four grain-sheep farms were compared with passive clinical surveillance reports (n=37) received at the state veterinary regional office during the same period. Passive surveillance reports were received from 33 out of 640 sheep farms located in the regional veterinary office catchment area. Sheep farmers frequently observe their flocks and notify the veterinary authorities when unusual syndromes or a large number of animals affected are noted. This highlights the relative strength of reliance on general passive surveillance for early recognition of exotic or emerging diseases in sheep.

Keywords: *sheep; active; passive; surveillance; syndrome surveillance*

Introduction
Animal health surveillance is a relatively new discipline (1). The World Organisation for Animal Health (OIE) began to use the term surveillance in the early 1990s (2) and it is defined as the systematic (continuous or repeated) measurement, collection, collation, analysis, interpretation, and timely dissemination of animal-health and -welfare data from defined populations. These data are essential for describing health-hazard occurrence and to contribute to the planning, implementation, and evaluation of risk-mitigation actions. The information provided by animal-health surveillance helps to reduce the impact of animal diseases.

Livestock disease surveillance is particularly important in Australia for the following reasons: firstly, the export of live animals and livestock products contribute substantially to the economy. Importing countries require evidence of freedom from various specified diseases. To prove and assure healthy, residue-free livestock, surveillance is needed. Secondly, livestock disease surveillance systems can provide early warning of the appearance of new, emerging diseases, including potential zoonoses. And lastly, surveillance can provide information to livestock industries of the relative importance, and perhaps changing importance of various endemic diseases. The information will help to assess progress in any control or eradication programs, and to make decisions about where research efforts should be focused.

There are many different surveillance systems and methodologies (3). Nationally, there has been a high reliance on general passive surveillance, mainly voluntary reporting of any disease by farmers. These reports mainly consist of descriptions of clinical signs observed; this has been defined as clinical surveillance (surveillance that uses health-related information, such as clinical signs or other data, that might precede {or may substitute for} formal diagnosis). This information may be used to indicate a sufficient probability of a change in the health of the population, warranting either further investigation or enabling a timely assessment of the impact of health threats which may require action. This type of surveillance can be used to detect a variety of diseases or pathogens, including new (emerging) diseases.

In this report the disease syndrome occurrences recorded on four farms are compared with passive clinical surveillance during the same period.

Materials and methods
Four opportunistically selected grain-sheep farmers, within the jurisdiction of the regional state veterinary office in a grain growing area of Western Australia, participated in the survey.

Over a twelve months period from July 2014 to August 2015, the farmers were asked to observe and record signs of disease in their flocks such as deaths, lameness, unusual behaviour or unusual appearance. These observations were made during normal sheep handling activities such as shearing, drenching and drafting. The farmers did not especially observe their sheep more frequently for the purpose of the survey.

A veterinary officer visited the farms monthly, to collect the data. The recorded disease signs were categorised and allocated into one of 25 clinical syndromes as defined by the Australian Animal Health Committee (4).

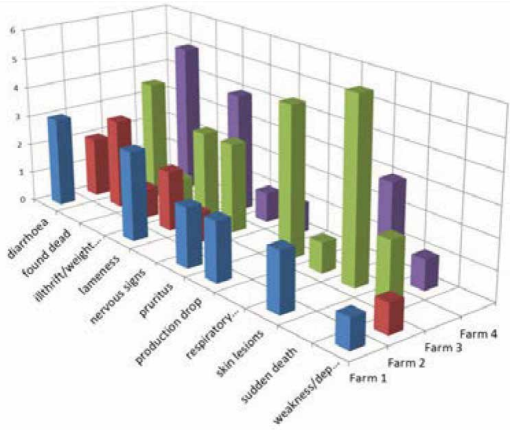
During the same period, sheep disease reports and enquiries, made by sheep farmers and received at the regional state veterinary office, were recorded. In addition sheep diseases reported by private veterinarians and livestock agencies and veterinary diagnostic laboratories servicing the same catchment area were also recorded (Reports of private veterinarians are recorded by the state department if they are approved as a state funded significant disease investigation or if the practitioner utilises the services of the State Animal Health Laboratory).

Results

The catchment area of the regional veterinary office of the Department of Agriculture and Food comprises 630 livestock farms with an estimated total of 600,000 sheep (5). The four surveyed farms stocked between 500 and 1700 Merino or Merino-cross sheep. In total, 3500 sheep were monitored.

The farmers frequently observed their sheep flocks (on average every second day). The four surveyed farms reported a total of 64 disease syndrome occurrences (10,13,15 and 26 respectively) or an average of 16 on each farm over the 12 months. Figure 1 shows the number of syndromic observations for each farm. The figure does not include syndromes which were not observed and the number of observations does not relate to the number of sheep affected. One observation of a disease syndrome could involve one or more sheep.

Figure 1. The number of syndromic observations for each farm (The figure does not include syndromes (4) which were not observed).



In the 12 month period, at the regional veterinary office, there were 37 disease syndrome reports received from 33 of the 630 farms. Table 1 shows the proportions of the different disease syndromes (4) detected over the survey period, for the four surveyed farms and for the reported syndromes and recorded at the regional state veterinary office(r). The combined syndromes "found dead" and "sudden death" were most frequently recorded on the four farms and reported through passive surveillance. Both syndromes (combined mortality rate of 3.1% (95% confidence interval 2.7-3.7%) were mainly seen around lambing in both ewes (n=61) and lambs (n=48). A whole flock (500) was "pruritic" at one time. All syndromes recorded on the four farms were also reported at the regional veterinary office, except for "lameness". During the year, one of the four farmers contacted the regional veterinary office to report an unusual high number of sheep deaths.

Table 1. The number of disease syndromes observed on the four surveyed farms, compared with the reports made voluntarily, over the same period.

Syndrome (4)	Syndromes reported on four surveyed farms		Syndromes reported to State Veterinary Office	
	Number	%	Number	%
Abortion/stillbirth				
Acute febrile disease			1	3
Circulatory/anaemia/ oedema				
Congenital defect				
Diarrhoea	6	9	2	5
Found dead	12	20	10	27
Generalised oedema				
Genital lesions				
Illthrift/weight loss	2	3	1	3
Infertility				
Jaundice			2	5
Lameness	12	18		
Lymphadenopathy				
Nasal discharge				
Nervous signs	5	8	2	5
Oral lesions or salivation				
Pruritis	3	5		
Production drop (including milk production – mastitis)	7	11	1	3
Respiratory signs	1	1	2	5
Skin lesions	11	20	6	16
Sudden death	3	5	3	8
Weakness/depression/ anorexia/ malaise	2	3	5	14
No suitable syndrome			2	5
No history available				
No clinical signs				
Total observations/ reports	64		37	

Discussion

Mortality rates on the four farms were similar to rates found in two New Zealand studies (6,7). It is unclear if the number of syndromes recorded is comparable with other sheep flocks in Australia and elsewhere; as no similar studies have been published. However, the sheep in this survey seemed in general to be healthy, with low intra-flock syndrome prevalence.

The disease syndromes reported via general passive surveillance corresponded reasonably closely to those syndromes occurring on the four surveyed farms during the same period (Table 1). The study showed that the four farmers frequently observed their flocks and would have reported disease outbreaks (= the occurrence of cases of disease in excess of what would normally be expected in a defined population, geographical area or season) immediately. It is expected that an outbreak of "lameness" would also be reported through passive surveillance, and it could aid to detect lameness associated diseases such as endemic Footrot (8), invading Blue Tongue or exotic Foot and Mouth disease.

General passive surveillance in sheep is a simple and low cost surveillance system, but it has limitations as found previously by Palmer *et al.* (2009) (9). No single source of surveillance data will provide all the information required for all the purposes of surveillance (3). Passive surveillance of sheep in Western Australia is complementary to surveillance information from other sources. Current active surveillance activities are the National Sheep Health Monitoring Project (10) and the Transmissible Spongiform Encephalopathy Freedom Assurance Programme (11). Further, there are insect trap programmes to early detect Screw Worm flies (12) and Arboviruses vectors, such as *Culicoides brevitarsis* (13). The combination of all these sources contribute to the surveillance objectives as described above.

Recently, the National Surveillance and Diagnostics Framework has been developed by the Intergovernmental Agreement on Biosecurity to try to improve animal health surveillance (14) at a national scale, by developing a national surveillance and diagnostic system. To enhance passive surveillance further, incentives to report have been implemented. The current subsidised disease investigation program encourages farmers to report diseases to veterinarians by subsidising the cost of complete veterinary investigations (15). This could be enhanced further.

This study shows the farmers are instrumental in observing and reporting sheep disease syndromes to the veterinary authorities. A proactive approach is needed by the public sector to enhance sheep health surveillance further by convincing farmers to report more frequently. Similar studies should be conducted for other livestock species to identify the relative strength of passive surveillance in these sectors too.

Acknowledgements

The authors would like to thank the four participating farmers. This study was partially funded by the Royalties for Regions programme.

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