Working Party on Agricultural Policies and Markets

PRODUCER INCENTIVES IN LIVESTOCK DISEASE MANAGEMENT
AUSTRALIA CASE STUDY

Contact: Olga Melyukhina (olga.melyukhina@oecd.org)
Note by the Secretariat

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This draft document complements the main synthesis report [TAD/CA/APM/wp(2016)6/FINAL] and includes the case study on Australia. It is focussed on three aspects of importance coming from the synthesis report: government awareness of producer behaviour; information and skills of producers; and principles of producer compensation for the alignment of private and public incentives in disease management.

The Secretariat would like to thank Australia for their detailed response to the questionnaire which was prepared for the purpose of this case study and for the further clarifications. The report was declassified at the 70th session of the Working Party on Agricultural Policies and Markets in March 2017.

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PRODUCER INCENTIVES IN LIVESTOCK DISEASE MANAGEMENT:
AUSTRALIA CASE STUDY

1. This case study focuses on several aspects of producer behaviour and incentives in livestock disease management. These are: government awareness of producer behaviour (Section 2); information, education and training for producers (Section 3); and producer compensation policy in Australia (Section 4). Section 1 provides a contextual overview of the livestock sector and animal health situation in Australia.

1. Overview of the livestock sector and animal health situation in Australia

2. Structural characteristics and economic importance of livestock production

2. About 70% of Australia is arid or semi-arid, and a large part of the land is pastoral and suited only for low-intensity grazing. Livestock farming is thus predominantly an extensive production system with pasture being the principal source of feed. There is a low prevalence of intensive systems although they are becoming more common (DA, 2016; ACCC, 2016; PwC, 2011). Among livestock operations, beef cattle and sheep breeding dominate: 54% of all Australian farms keep meat cattle, 32% sheep and lambs, and only 7% of farms have dairy cattle. Pig and poultry, associated with intensive systems, are relatively rare: only 5% of agricultural establishments are involved in egg production, 1% raise chickens for meat, and 1% pigs (ABS, 2016a).

3. Livestock production generates about half of agricultural output value and export value. Beef, sheep meat, and wool are the principal exports and accounted for almost three-quarters of the total value of livestock exports in 2014/15 (ABARES, 2016a). In 2014/15, Australia was the third largest exporter of beef, the largest exporter of mutton, the second largest of lamb, and the largest exporter of wool (Whittle et al., 2015). The exposure of these industries to trade is significant. Of the total volumes produced in 2014/15, the exported shares covered 74% for beef and veal, 56% for lamb, 95% for mutton (MLA, 2015a; MLA, 2015b), and nearly the entire production of wool (ABARES, 2016a). Dairy is also an important export sector, but the domestic market absorbs around two-thirds of total milk production (DA, 2016). Other livestock industries – chicken meat, eggs, and pig meat – are oriented at domestic market, meeting most of domestic consumption (USDA, 2016; AECL, 2015).

4. Livestock production is generally specialised along livestock types with the exception of sheep. Around 86% of total meat cattle are reared on specialised beef farms and generate 84% of all cash receipts from beef cattle sales. While an average beef farm is estimated to have around 900 heads of beef cattle, the establishments differ greatly in size and can become very large. Dairying is similarly a highly specialised

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1. For example, between 1992 and 2015, the share of cattle slaughter sourced from feedlots rose from 8% to 30% in response to strong growth in demand, including the demand for marbled beef from external premium markets, in particular from Japan (ACCC, 2016).

2. Anna Creek Station in South Australia is the world’s largest working cattle station. The North Australian Pastoral Company Pty Limited (NAPCO) is one of the largest country’s beef cattle producers, with a herd of over 180 000 cattle and 14 cattle stations in Queensland and the Northern Territory. The Australian
industry: nearly all dairy cattle are concentrated in establishments which receive 87% of their total cash receipts from milk. An average dairy cattle herd is around 284 heads per farm, but there is a steady trend to very large operations of more than 1 000 heads of dairy cattle (DA, 2016). Poultry and egg production are the most specialised and vertically integrated activities. Unlike all other livestock industries, sheep breeding is typically a part of a diversified farming. Specialised sheep farms keep only 37% of total sheep number and receive less than half of their cash receipts from sheep (ABARES, 2016b). Nearly the same share of total sheep number (33%) is on farms with mixed crop-livestock production and another 17% on beef-and-sheep farms. The average sheep herd per farm ranges between around 2 000 heads on farms with mixed livestock production to 3 000 heads on specialised sheep farms (ABARES, 2016b).

Structural profile of pig farming is not specifically informed beyond the total farm numbers and inventories (ABS, 2016a). A study of the Sydney region showed that pig production systems were predominantly intensive or semi-intensive (88%), with 69% of the operations being small hobby producers (Schembri et al., 2006).

5. Livestock farmers are relatively aged, with those at near-retirement (55 to under 65) and post-retirement age (over 65) constituting over half the operators in most livestock sub-sectors (Figure 1.A). These two age categories reach nearly 70% in beef, sheep, and beef-sheep farms – the farms constituting the largest part of livestock establishments. As a general trend, the Australian farm workforce has significantly aged – between 1981 and 2011 the proportion of farmers at 55 years and over increased from 26% to 47% (ABS, 2012). It may be assumed that this trend occurred also in the livestock sector. The formal education profile of livestock farmers seems to correlate with the age structure. Over half the farmers in the major livestock sectors have no specialised education, either at technical (vocational) or higher levels (Figure 1.B). The predominance of such farmers is particularly high in numerous beef and sheep operations. These features suggest that the livestock policy constituency in Australia is a rather aged and ageing group, most with no specialised education beyond high school.

Figure 1. Age and education profiles of livestock farmers

6. Beef cattle and sheep breeders operate within a flexible marketing system, with spot deals representing the most frequent type of sales. In 2014/15, almost half of beef cattle and nearly 70% of sheep were sold through saleyard auctions (ABARES, 2016c). The remaining animals are either delivered to abattoirs or sold from paddock, part of these sales also occur on a spot basis. Dairying falls under a more rigid contracting system. Farmer co-operatives handle around 40% of the national milk output and the rest is supplied to various milk processors, including multinationals such as Fonterra (New Zealand), Kirin (Japan), and Lactalis (France). Egg and chicken meat producers are part of highly integrated vertical systems. At the farm level, production is specialised on specific stages of the animal growth cycle and the majority of output is purchased by a small number of processors, who in turn supply a few major supermarkets and restaurant chains. For example, seven processors provide 95% of total chicken meat in Australia, of which the two largest produce 70% and the next five between 3% and 9% (ACMF, 2011). The differences in the marketing systems across the livestock sub-sectors suggest that in beef and sheep farming, where flexible arrangements prevail, on-farm disease management is largely a matter of the individual decisions of farm operators. In vertically integrated sectors, on-farm disease management is based on practices that are largely determined by downstream integrators to ensure the sanitary standards across the vertical production chain.

**Overall situation related to livestock and animal disease risk**

7. Australia, as an island, is free of many pests and diseases present elsewhere in the world. This provides the country a significant advantage in access to foreign agro-food markets. Given the high exposure of the livestock sector to trade, biosecurity is an area of particular importance. Considerable efforts involving stakeholders across the biosecurity continuum (pre-border, at the border, and post-border biosecurity activities) are made to maintain the country’s good sanitary status.

8. A range of highly contagious animal diseases have been eradicated in Australia over the past decades. Taking the period since 2005, few outbreaks of OIE-notifiable diseases have occurred. The largest one was the equine influenza in 2007, with nearly 10,000 infected premises. Other occurrences were less widespread: low pathogenic avian influenza was diagnosed in 2012 (one infected premises) and 2013 (one infected premises); highly pathogenic avian influenza 2012 (one infected premises) and 2013 (two infected premises). Certain bluetongue virus serotypes have occurred in Australia, but they were not associated with clinical disease. Outbreaks reported to the OIE as Newcastle disease were caused by a pigeon paramyxovirus and were not eradicated – there have been no detections of this virus in poultry. From 2009, spillovers of the pandemic H1N1 influenza A have been detected in pigs and managed conservatively by quarantine, movement restrictions, and controlled slaughter. Rabbit haemorrhagic disease virus incursions have occurred in domestic and wild rabbits and have not been eradicated (Australian Government, 2016).

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3. Producers using this channel transport cattle to saleyards to sell it to the highest bidder. Beyond the sites for physical deliveries, there is also an online platform AuctionPlus: in this case cattle are assessed prior to sale by accredited personnel and the seller outlines sale terms, including bidding and collection conditions, prior to the auction (ACCC, 2016). The use of auctions as a marketing channel differs in the south and north of the country. For example, in 2014/15 almost 80% of beef cattle in South Australia and only less than 2% in the Northern Territory, were sold through saleyard auctions (ABARES, 2016c). According to ACCC (2016), beef cattle herds in South Australia are small, the farms are often located close to saleyards and trade relatively small lots composed of mixed types of cattle. In contrast, the average beef cattle herd in the Northern Territory is large, which makes it possible to form greater lots of livestock with similar quality and avoid losses due to handling in saleyards. Also, some breeders in these areas face long distances to saleyards.
Endemic diseases in Australia are managed through policies of Australian jurisdictions, but for some diseases, national government and industry-led programmes exist. Nationally important endemic diseases are typically spread within one or several jurisdictions and some have relatively low occurrence. Australia distinguishes as endemic diseases of national significance (AHA, 2016a): anthrax (with regional occurrence and subject to national notification and compulsory control); carpine arthritis-encephalitis (found across Australia, not nationally notifiable, but with voluntary accreditation programmes in several states); cattle tick and tick fever (subject to jurisdiction-specific surveillance, control, and eradication regimes); Johne’s disease in cattle, sheep, goats, and alpaca (with national disease management programmes involving governments and each affected industry); Newcastle disease in poultry (there have been no detections of virulent Newcastle disease virus in poultry since 2001, but the two incidents since then have led to a national disease management plan centred on vaccination); ovine brucellosis (nationally notifiable, but with low prevalence and subject for the accreditation schemes in a number of states); ovine foot rot (with eradication or control programmes in several states); and swine brucellosis (a zoonotic disease that is present in feral pig populations in Queensland and New South Wales with low prevalence, with these states applying accredited herd scheme or movement control).

Research commissioned by Meat & Livestock Australia Ltd. (MLA, 2015c) estimated the economic impacts of endemic diseases. The study used the responses from producer, government and industry surveys, and discussions with the MLA to prioritise 17 most important diseases in cattle, 23 sheep and 9 goat diseases. A model was then used to evaluate the economic costs of these diseases. The five most economically important ones in cattle and sheep are shown in Figure 2. The results suggest that endemic diseases in sheep may have potentially the greatest economic impacts on the livestock industry overall.

**Figure 2. Economic impacts of endemic diseases in cattle and sheep:**
*Diseases with the largest estimated losses*

<table>
<thead>
<tr>
<th>Disease</th>
<th>AUD million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle tick</td>
<td>156</td>
</tr>
<tr>
<td>Bovine viral diarrhoea</td>
<td>117</td>
</tr>
<tr>
<td>Buffalo Fly</td>
<td>98</td>
</tr>
<tr>
<td>Dystocia</td>
<td>98</td>
</tr>
<tr>
<td>Neoplastic calf mortality</td>
<td>96</td>
</tr>
<tr>
<td>Perinatal mortality</td>
<td>540</td>
</tr>
<tr>
<td>Internal parasites</td>
<td>436</td>
</tr>
<tr>
<td>Dystocia</td>
<td>220</td>
</tr>
<tr>
<td>Weaner ill thrift and mortality</td>
<td>188</td>
</tr>
<tr>
<td>Flystrike</td>
<td>173</td>
</tr>
</tbody>
</table>

*Note: The values shown are based on a model estimating the cost per herd/flock at the farm level for each disease. Costs were calculated for treatment, prevention and production losses. These results have been extrapolated across the regions in which each disease occurs, in line with adopted herd and flock demographics from Australian Bureau of Statistics Agricultural Commodities Statistics for 2010-11 to provide a national total cost estimate.*

*Source: MLA (2015c).*
Key institutions involved in livestock disease issues within country borders

11. Australia’s biosecurity system manages pest and disease risks across a biosecurity continuum with an emphasis on prevention, preparedness and early intervention of pests and diseases with activities undertaken offshore, at the border and onshore. Australia’s animal health system is distinctive in that it is based on a partnership between the Australian government, state and territory governments, and private stakeholders. Key institutions dealing with domestic biosecurity issues and interacting with the farmer community within Australia are presented below.

12. The Australian Government Department of Agriculture and Water Resources represent federal government in the national animal health system. It is responsible for international animal health matters, including biosecurity, export certification and trade, and disease reporting to the World Organisation for Animal Health (OIE). Six Divisions of this Department cover specific areas of biosecurity: Biosecurity Animal Division, Australian Chief Veterinary Office, Biosecurity Policy and Implementation Division, Compliance Division, Exports Division, and Service Delivery Division.

13. The state and territory governments are responsible for animal health within their borders. They develop and administer legislation relating to surveillance, control, investigation and reporting of diseases; chemical residues and contaminants; and animal welfare. They also deliver services through government-appointed or government-accredited animal health personnel. Nearly 13 000 government and private veterinarians and other health personnel work across the country, together with over a 1 000 stock and meat inspectors (AHA, 2016a).

14. Animal Health Australia (AHA) is a unique institution underpinning the partnership organisation of the national animal health system. AHA is a not-for-profit public company uniting 32 member organisations (Annex A.1):

- The Commonwealth: Department of Agriculture and Water Resources
- State and territory governments: Departments of Primary Industries or Departments of Agriculture
- Industry organisations: 14 associations representing relevant livestock sub-sectors
- Service providers: Australian Veterinary Association and the Australian Animal Health Laboratory of the Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Associate members: representatives from livestock and milk product exporters, Wildlife Health Australia, and some others

15. Animal Health Australia co-ordinates national livestock animal health programmes encompassing areas of disease surveillance, domestic biosecurity services, emergency response to animal disease, endemic disease programmes, and livestock welfare (Annex A.2). Most of these activities engage various AHA membership groups in the development and implementation of the measures, and cost-sharing. The Australian government, state and territory governments, and industry parties contribute equal shares to the AHA’s core funding, while specific initiatives can be funded through additional stakeholders’ subscriptions.

16. SAFEMEAT is another partnership between the red meat and livestock industry and the state and federal governments; it focusses on standards of safety and hygiene (SAFEMEAT, 2016). SAFEMEAT initiates research, support communication, and monitors the status of meat products. It reviews and promotes the rationalisation of industry food safety regulations and standards, and monitors industry performance in these areas. This partnership covers all stages and actors from the farm to consumer. In what concerns farm and feedlot level, SAFEMEAT is engaged in the development and implementation of programmes such as the Livestock Production Assurance (LPA), LPA National Vendor Declaration and
Waybill, National Livestock Identification System (NLIS), and the National Feedlot Accreditation Scheme (NFAS). It is also involved in activities related to the saleyard, transportation and meat processing stages.

17. **Wildlife Health Australia** (WHA) is an institution embodying the same partnership principle of biosecurity in the area of wildlife. It complements livestock health activities by investigating and reporting on the health of wild native and feral animals. WHA brings together people, groups and agencies working in these fields at different levels of government, in the private and public sectors (WHA, 2016).

18. **Consultative Committees** of the Australian Government Department of Agriculture and Water Resources involve a broad range of stakeholders. They report to the Committee of Agricultural Senior Officials and include the National Biosecurity Committee, Animal Welfare Task Group, Animal Health Committee, and SAFEMEAT. These consultative groups operate to support the cohesion of the biosecurity system and co-ordination between all parties involved in animal biosecurity (AHA, 2016a).

2. *Governments’ activity to increase its awareness about farmer behaviour*

19. Private operators are the ultimate decision makers of farm enterprises. Evidence about farmer behaviour and their response to policy is thus a necessary input into policy making, including in the area of animal disease.

**Availability of information about farmers undertaking livestock activities**

20. As a starting point, governments require sufficient information about the number, structural and social characteristics of the farming community they engage with. This information should have adequate national coverage and consistency. The Australian Bureau of Statistics (ABS) and Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) are the principal generators of this information. ABS undertakes an agricultural census every five years; it also releases annually updated national data on livestock populations, the number of holdings and other characteristics based on the ABS Agricultural Commodities Survey and the biennium Land Management Practices Survey, which includes collection of livestock numbers, as well as livestock and pasture management.

21. ABARES carries out extensive farm survey work. Overall, 12 farm surveys are performed, most of them on an annual basis and for specific farm industries. The surveys of broadacre and dairy industries cover grazing livestock producers and provide information on livestock inventories, herd structure, farm financial indicators and receipts, land area, marketing methods, and socioeconomic characteristics, such as age of farm owner and spouse, and hours worked on- and off farm. ABARES surveys, however, do not include poultry and pig meat industries, which involve only a small proportion of livestock establishments and are not export-oriented sectors. These industries are monitored within the limits of the Australian Bureau of Statistics work plan. No detailed structural studies of these sectors are undertaken on a regular basis.

4. Farm surveys undertaken by ABARES are funded by the Australian Government Department of Agriculture and Water Resources, with some either co-funded or fully financed by industries. For example, the ABARES broadacre industry survey, *Australian Agricultural and Grazing Industry Survey* (AAGIS) is mainly funded by the Australian Government Department of Agriculture and Water Resources with some co-funding by the Grains Research and Development Corporation and Meat & Livestock Australia. ABARES’s *Cost of Production Supplementary Survey* (COPSS) is fully funded by the Meat & Livestock Australia (DAWR, 2016).

5. Four surveys of specific farm industries are conducted on an annual basis and include: broadacre, dairy, and vegetable and irrigation farms in the Murray-Darling Basin. Broadacre surveys cover five farm types: wheat and other crops, mixed livestock-crops, sheep, beef, and sheep-beef farms.
basis, as is done for grazing industries. This may reflect a reduced interest in socioeconomic observation of these sectors due to their highly corporatized structure.

22. There is a lack of information about farmers undertaking livestock activity not included in the official statistical observation. Both five-year ABS Agricultural Census and annual Rural Environment and Agricultural Commodities Survey cover agricultural businesses with an Estimated Value of Agricultural Operations (EVAO) of AUD 5,000 (ABS, 2016b; ABS 2016c). This leaves the establishments below this threshold – very small businesses and hobby farmers with some livestock – outside official statistical collections. The proportion of beef cattle and sheep on these establishments is estimated to be very small – less than 1%. However, for some livestock types, such as horses, the proportion is likely to be more significant. The evidence about the biosecurity risk that these very small establishments present is limited. However, Beach et al. (2007) note that non-commercial husbandry is frequently identified by health agencies as a risk to the commercial sector even if it accounts for a negligible production share.

**Funded research into farmer behaviour**

23. Supporting behavioural research allows the government to build awareness about farmer decision making. Since the mid-2000s, Australian and state governments have funded several studies on animal disease management as well as social rural studies, which, among other issues, examined aspects of livestock farmer behaviour (Annex A.3). This work focussed on specific diseases (e.g. FMD or avian influenza), specific geographic areas, and animal types (pigs, horses, or poultry), but provided a number of behaviour-related findings with potentially broader implications:

- Strong influence of risk perceptions on farmers’ biosecurity decisions and disease reporting (Palmer et al., 2009; Taylor et al., 2016).
- Poor uptake of recommended practices by (horse) farmers (Taylor et al., 2016).
- Insufficient farmer knowledge on emergency animal diseases or a lack of information (Schembri et al., 2006; Schembri et al., 2016; Hernandez-Jover et al., 2014).
- Reporting by producers can act as a barrier to early identification of (FMD) disease (Matthews, 2011).
- Little knowledge about how farmers obtain information on emergency animal disease (Hernandez-Jover et al., 2014).
- Veterinarians are farmers’ trusted sources of information, strongly influencing farmer biosecurity intentions – a finding which is similar to studies in other countries (Taylor et al., 2016).
- A lack of trust in government sources, e.g. scientific institutions linked to the government, a finding which is similar to studies in other countries (Palmer et al., 2009).

24. A general policy implication from the studies above was the need to adapt communication between government and farmers on biosecurity, including moving from generic messaging towards more specific information to target groups and interacting more actively with veterinarians as policy outreach channels. Other issues were trust building between livestock farmers and government, and increased engagement of local communities in biosecurity. Finally, the gaps in farmers’ knowledge about animal disease were diagnosed in specific contexts, which implied the need to identify these gaps more comprehensively, in particular, to adapt the existing extension programmes. Furthermore, the difficulties that farmers demonstrated in understanding the roles of different actors in biosecurity, including emergency situations, indicated the need for better co-ordination and communication about these roles with farmers. Practical steps undertaken since include the creation of a Biosecurity Incident Communication Network and the preparation of a producer guide for planning business risks from emergency disease
outbreaks, and the funding for further policy development related to (FMD) vaccination, training for veterinarians, surveillance and community engagement.

25. In developing the research discussed above, and other feedback (see below), two studies were recently conducted, both funded by the Australian Government Department of Agriculture and Water Resources through the national facilities for priority R&D. The study by BehaviourWorks Australia on “Development of behaviour change strategies for animal disease surveillance and reporting” (Wright et al., 2016) looks at producer risk perceptions, barriers to surveillance, attitudes to surveillance and reporting, knowledge about animal diseases, and trusted sources of information. This research is to be used to review and fine-tune surveillance policy, and create more sustainable partnership-based approaches to surveillance. This project is notable as an effort to develop policy aiming producer behaviour change. It is also instructive in terms of substantive findings and organisation (Annex A.4). The other study is the “National survey of agricultural landholders—common established pest animals and weeds”, the purpose of which is to measure the level of awareness among the landholders and the community on the benefits of disease management and the costs of inaction. This study is also expected to feed into the development of animal health policy.

Awareness through interaction with industry organisations

26. Governments at all levels in Australia operate as part of the partnership-based biosecurity system, which creates constant feedback flows from producer groups and other stakeholders to governments. More broadly, this constitutes overall consultative and participatory approach to policy making, open policy reviews, and policy impact assessments in Australia. Formal methods include: industry-government working groups or forums, public consultation (online written submissions), focus groups, stakeholder workshops, and consultations through Animal Health Australia and the Livestock Biosecurity Network. Informal methods include: discussion or email with industry representatives and other stakeholders, monitoring online producer or industry media and participating in social media. An example of how feedback from industry to government is used is the national Ovine Johne’s Disease Management Plan (2013-18) which is the result of extended consultations between Sheepmeat Council of Australia (SCA), WoolProducers Australia (WPA), state departments of primary industry and other stakeholders. Another example is the National Sheep Health Monitoring Project where the list of health conditions to be monitored in abattoirs was agreed among the sheep industry peak councils, Animal Health Committee and the Australian Meat Industry Council.

27. Animal Health Australia interacts with producer and industry organisations to obtain evidence about farmer behaviour and attitudes, and shares this information with the government. Regular Farm Biosecurity Surveys is one such activity, undertaken in co-operation with Plant Health Australia, an analogous institution in the phytosanitary area. The most recent survey in 2013 covered 1273 producers, but did not include hobby or “lifestyle” farmers (Farm Biosecurity, 2016a). These surveys are an instrument to inform policymaking about actual producer behaviour. They look into farmers’ use of different sources of animal health information, how they rank their usefulness and trustworthiness, the preferred ways to access information, and farmers’ awareness of key biosecurity information resources. This instrument is also used to identify the employment by farmers of different biosecurity practices, and their attitudes to reporting disease (Annex A.5).

Awareness through interaction with veterinarians

28. Veterinarians are in direct contact with producers and can be key sources for obtaining evidence about farmer behaviour. They have an understanding about the adequacy of on-farm disease prevention, farmers’ risk perceptions, their awareness about various disease risk management practices and attitudes
towards these practices, and what enables or impedes their adoption. Veterinarians can clarify farmers’ contact with them and also reasons for no interaction.

29. There are no routine arrangements for interacting with veterinarians on these issues, e.g. focussed surveys of veterinarians, or regular questionnaires. A range of general means to communicate with veterinarians exists, including working groups, the public consultation process and scientific and media events. Many government-appointed veterinarians have past experience working with producers or work directly with them. Animal Health Australia and the Livestock Biosecurity Network employ veterinarians and animal health officers to formulate and adjust producer and veterinary education and training programmes (e.g. about biosecurity, disease surveillance, emergency disease management), especially for priority target groups (e.g. livestock exhibitors) or to develop policy around specific issues (e.g. swill feeding, the use of antibiotics in livestock and measuring antibiotic use).

3. Communication, information and training for farmers

30. Information and education influence all aspects of farmer decision-making. Appropriate communication and information about disease existence, its identification, consequences, costs and benefits of control and prevention programmes, responsibilities and policies enables farmers to make well-informed decisions and ensure diseases are managed effectively.

Communication and information

31. According to the 2013 Farm Biosecurity Survey by Animal Health Australia, producers seek and gather information from a variety of sources. Veterinarians are the most frequent source (reported by close to one-third of respondents), followed by the state departments of primary industries (23%), industry bodies (17%), suppliers (17%), and internet (15%). The share of farmers who understand biosecurity as a set of measures to protect farm production has increased notably since the previous survey. However, around one-fifth of respondents indicated, without any prompting, that they did not know the meaning of the term “biosecurity”, while almost the same percentage understood it as “border protection or quarantine” (Farm Biosecurity, 2016a). A large share of farmers thus lacked the understanding of biosecurity consistent with how it is currently used by policy makers: as a range of “measures to protect farm production from disease, pest and weeds”. This may be due to the fact that this term is relatively recent, but it can also imply that many farmers may not be capable of identifying and using all the information about animal biosecurity that they may actually need.

32. A variety of national, regional, and industry channels provide information on animal biosecurity. Possibly, the most comprehensive is the Farm Biosecurity website operated as a joint initiative of Animal Health Australia (AHA) and Plant Health Australia (PHA). It is targeted to farmers and includes information about diseases, pest and weed risks, what they can do to reduce those risks and how. It provides materials to help producers implement good biosecurity on their property (Farm Biosecurity, 2016b). Users can create their “biosecurity toolkits” – i.e. the information can be filtered by topic, farm specialisation type, or animal type – as well as receive electronic newsletters. State and territory governments maintain biosecurity pages on the official websites of their departments of primary industries or departments of agriculture; beyond national issues, these pages provide information customised to jurisdictions, for example state-specific disease control policies and state animal programmes. All peak industry bodies include information on animal health in their on-line communication with members. It is typically focussed on areas specific to the profession, i.e. in particular livestock diseases, national disease programmes of relevance to industry, or industry disease initiatives (e.g. Livestock Assurance Programme, or National Livestock Identification System).
Thus, many providers at different administrative levels and multiple industry groups are involved in communicating biosecurity information. One issue in this respect is to understand the degree to which farmers use various channels and to identify the most effective ones to communicate with producers. For example, the 2013 survey indicated that 90% of surveyed farmers had access to internet, but that only 48% used it daily and 17% obtained biosecurity information from the internet. Somewhat less than two-thirds of livestock producers did not know about the national Farm Biosecurity website (Farm Biosecurity, 2016a). Another issue is a lack of co-ordinated management, so duplication and lack of harmonisation may occur across the different levels of government, as well as between industry and government, and Animal Health Australia. A co-ordination initiative was the creation of the Biosecurity Incident National Communication Network (NCN). Its purpose is to produce nationally consistent public information about the response to pest and disease outbreaks (biosecurity incidents). The core network consists of communication managers from the broad range of government and industry bodies involved in biosecurity (NCN, 2016).

The content of biosecurity information to best respond to producer needs is another area for consideration. Some evidence about farmer information needs is available from the Farm Biosecurity Surveys by Animal Health Australia. The 2013 survey found that the most frequently sought information by farmers was the “biosecurity warnings and alerts”. Disease emergencies and risk awareness are indeed a strong focus of animal health communication to farmers. The National Pest and Disease Outbreaks website provides public information about current emergency animal disease outbreaks and the Biosecurity Incident National Communication Network explains policies and practices. Several state animal health departments distribute newsletters which report notifiable disease cases in their region. AUSVETPLAN contains detailed emergency guidelines and sets out control and eradication strategies for each disease, operational manuals, and reporting requirements. However, recent research identified the need for further work on information around compensation.

While there is active communication with farmers on veterinary and sanitary issues, there seems to be less emphasis on economic aspects of disease management. Behavioural analysis has demonstrated that economic considerations are often the strongest drivers of disease management decisions and producer views about cost-efficiency of practices can be a principal factor to take up or ignore recommended measures. Communication with producers should include information to help them understand the cost and benefits of disease management decisions. This is facilitated if the information is tailored to farmers’ particular circumstances, for example through decision-support tools, e.g. worksheets or web-based tools. An example of tailored decision-support communication is the “Tools and Calculators” offered by Meat & Livestock Australia for red meat producers. Another type of economic information which is important to convey is the one that helps farmers understand the economic impacts of animal disease on farm enterprise. Studies by Productivity Commission (2002), and most recently by ABARES (Hafi et al., 2015), take steps in this direction. The latter study estimated what the authors called “the value of biosecurity at farm gate”, or the effect of a disease outbreak on annual farm enterprise profits (or gross margins). It is also important to communicate to farmers the broader effects of potential disease

These bodies include Australian, state and territory (agriculture/biosecurity), departments, Plant Health Australia, Animal Health Australia, CSIRO’s Australian Animal Health Laboratory, Australian Government Department of Health, and the Australian Local Government Association. Wildlife Health Australia and the National Farmers’ Federation are the observers in this Network.

Six different calculators are available on-line for specific themes. One of them is the Health Cost Benefit Calculator to determine the benefit and marginal rate of return of applying an animal health treatment to a herd for bloat, clostridial diseases and grass tetany. The Tool is downloadable on a personal computer and requires a limited amount of farm-specific information, e.g. herd size and structure, and price data (MLA, 2016).

The study considers six potentially significant biosecurity threats: foot-and-mouth-disease, Mexican feather grass, citrus greening, highly pathogenic avian influenza, Karnal bunt and red imported fire ants. The value
outbreaks – on the livestock sector as a whole, upstream and downstream industries, consumers and local communities. Some research has been undertaken in Australia on these issues, but the base of the impact analysis could be increased to support communication to different groups (specialisations) of farmers on a variety of disease issues. This would likely require going beyond one-time impact studies, and possibly conducting a longer-term research programme that involves research centres and the Australian Department of Agriculture and Water Resources.

36. Disease related information programmes are currently not comprehensively assessed by government, except that with online information campaigns, the number of website hits/views/shares/comments is counted. Many of these programmes have top-down, one-way communications (rather than collaborative efforts) because this involves relatively low costs in addition to the fact that there is a lack of expertise in engagement and effective communication measurement (Australian Government, 2016). Government-funded research recently undertaken by BehaviourWorks (Wright et al., 2016) has, as one of its themes, improved animal health communication and is expected to be used in communication development (Australian Government, 2016).

Education and training

37. Producers with good basic competencies, as well as a technical and business education can be expected to make better informed decisions. They tend to look for and adopt new practices (OECD, 2010). There is also evidence of a positive correlation between levels of education and cognitive skills (Pearson, 2016), which implies that those with a better education may be less susceptible to cognitive failure when making decisions.

38. The share of owner-operators with special education – technical and tertiary – varies between 30% in mixed grains-livestock farms to 47% in dairying. Amongst those who have a high school education only, around half only completed one to four years (Australian Government, 2016). This likely compares favourably to similar groups at an international scale, given Australia’s overall high education status. Nevertheless, these data also show that owner-operators without special education prevail in Australian livestock industry. Formal education is not the only determinant of managerial capacity and skills, but general concerns about supply of skills are raised by the representatives of the agro-food industry. This challenge is increased by the population outflow from rural areas, particularly among young people, and the rapidly ageing workforce (OECD, 2015).

39. Education and training in animal health in Australia is decentralised across state and territory governments, Animal Health Australia, as well as industry groups, and the education sector. Topics, financing and organisation vary according to jurisdiction, the type of issue or disease and its priority, the scope of the programme (whether national or regional), and the stakeholders involved. In terms of funding, some programmes, particularly those administered by Animal Health Australia, are financed through levies from the beneficiary industries and contributions are sought from governments and industry. Other programmes are initiatives taken by industry, financed and organised by a peak industry body. The state of biosecurity is approximated by the on-farm costs and losses avoided as a result of biosecurity activities that target the pathways through which pests, diseases and weeds enter, become established and spread throughout Australia. Without an effective biosecurity system, the likelihood of a pest, weed or disease incursion is expected to be significantly higher and, in the event of an incursion, pests, weeds and diseases are expected to become endemic. As a result, farm profits may be lower because of: (i) direct production losses; (ii) additional expenditures on control measures; and (iii) export market losses. The analysis estimates that the profits of typical broadacre farms are AUD 12 000 to AUD 17 500 a year higher than they would be in the absence of an effective biosecurity system, in terms of the on-farm costs and losses avoided as a result of Australia's biosecurity activities that reduce the risk of an incursion (Haft et al., 2015).
New South Wales is unique in that it has a Local Lands Services system which socialises the cost of programmes in regional areas within this state (Australian Government, 2016).

40. Animal Health Australia carries out training with national outreach. It focusses on emergency animal disease and targets responsible personnel in state and territory governments and the livestock industry, both producers and groups working with livestock. Training includes an online study, work-based tasks, and face-to-face workshops.

41. Industry groups promote training amongst their members. The majority of peak livestock bodies provide information to members on courses available externally at educational institutions. Some industry bodies develop and deliver their own extension and training programmes. Meat & Livestock Australia Ltd. offers probably the most extensive one. Australian Egg Corporation Limited (AECL) also organises its own training programmes. Other industry bodies operate more simple formats, such as livestock shows, e.g. the Australian Alpaca Association. The Livestock Biosecurity Network (LBN) was recently created as an industry initiative to fill a perceived gap due to reduced government extension services. It represents a network of regional extension offices in four Australian states (Northern Australia, Victoria, Tasmania and New South Wales). LBN personnel give presentations on various topics of animal health at agricultural events across Australia.

42. An examination of the on-line pages of state agricultural departments shows that only a few contain a rubric on farmer training, suggesting this activity is not a significant focus of the state-level government. However, an example of state engagement is the PROfarm courses delivered by the Department of Primary Industries in New South Wales. Many of these courses are subsidised through the Local Lands Services system mentioned above. On-demand courses tailored to the specific needs of individual groups can also be organised. Another example is the State of Tasmania Department of Primary Industries, Parks, Water and Environment which promotes training through TasTAFE, the largest state-owned vocational education and training provider in Tasmania. In both New South Wales and Tasmania, the training concerns general animal husbandry with no specific courses in animal disease management.

43. In sum, it is difficult to generalise about the overall structure of programmes and the spending on farmer education and training in animal health. This activity is highly decentralised across a wide range of levels and providers. Training with a national scope focusses on disease emergencies and rapid response. Livestock industry groups provide information on the opportunities available at various educational providers as well as their own training programmes. The involvement of state and territory governments in farmer training, at least at the level of the bodies responsible for agriculture, seems to be limited, except in a few jurisdictions. The training beyond disease emergencies, e.g. related to “peace time” issues of disease prevention and good husbandry, is likely a matter of private initiatives by farmers. The degree to which farmers undertake training requires further examination.

4. Current experience with farmer compensation policy

44. Compensation is the principal economic instrument of livestock policy with a direct impact on producer incentives and actions to manage disease risk. Compensation is understood in this case study to be any payment or reimbursement provided to farmers within the framework of disease control and prevention programmes. This includes (i) indemnity for direct disease losses, such as dead or destroyed animals; (ii) compensation for consequential losses, such as those from business interruption; and (iii) payments for farmer ex ante actions, such as subsidising biosecurity investments and operations. This part examines the degree to which Australia’s compensation policy stimulates or discourages producers to make adequate efforts to prevent disease and report it in a timely fashion when it occurs.

Owners of livestock in Australia may be eligible for compensation in the case of an animal disease emergency. The response to an outbreak is generally determined and managed by state or territory legislation, processes and procedures; however there is provision in Commonwealth legislation for the Australian government to lead a response under certain circumstances. Compensation is to be paid to an owner of any livestock or property destroyed for the purpose of eradication or prevention of the spread of an emergency disease and any dead livestock that would have been otherwise compulsorily slaughtered. The jurisdictions can share these costs with the parties to the Emergency Animal Disease Response Agreement if compensation falls under the scope of this agreement and provided that it is included in the emergency response plan adopted for a particular outbreak case.

The Emergency Animal Disease Response Agreement (EADRA) is a unique contract between the Australian, state and territory governments and livestock industry groups to prepare for—and respond to—emergency animal disease incursions. It has 23 signatories and covers 61 categorised diseases. It is a comprehensive ex ante framework to deal with animal disease emergencies. EADRA embodies a set of government-industry agreements which in broad terms establish the baseline for biosecurity, requirements for disclosure of incursion, standard actions to control and eradicate disease, and financial commitments of the parties to contribute to disease response costs. Detailed modalities underpin these agreements (Table 1).

EADRA is an arrangement that explicitly delineates the public, collective (industry), and private roles in disease management. First, it employs the concept of “normal/acceptable business risk” to set the frontier between the costs to be borne by an individual producer, on one hand, and government and producer groups, on the other. Second, the principle of cost sharing between government and industries is based on the notion of externalities, or the consequences of a farm disease incident on external parties. The externality concept is EADRA’s instrument to determine the parties affected by a disease and thus the beneficiaries of any response to this event. The government’s financial burden increases as the estimated impact of a disease across the economy and society broadens. This is established through the categorisation of diseases, from those with potentially the broadest human health and socio-economic consequences to those whose impacts are limited to specific industries. Four disease categories are distinguished on this basis, with the government’s share of total outbreak response costs ranging from 100% (category 1) to 20% (category 4).

EADRA creates disincentives for moral hazard because producers, if affected, would share the financial burden to control an outbreak. The connection to cost sharing is straightforward, as the incident would trigger a “disease response levy” on producers (except the case where costs are fully borne by government). Although the largely ex post nature of the levy may eliminate some potential for awareness raising amongst livestock holders, there is substantial communication to increase risk awareness (OECD, 2012). Moral hazard is also controlled through regulation, particularly in cases where the government bears the total or the majority of the financial burden (i.e. for disease categories 1 and 2). This includes the formal commitment by EADRA industry parties to risk mitigation, which in practice is implemented through their obligation to develop industry biosecurity plans and the requirement for farmer-members to have individual bio-security plans. There is also a conditionality attached to compensation of no illegal behaviour or failure to adhere to standards.

There is a strict requirement by EADRA to report diseases: industry parties should instruct their members to notify the applicable authority within 24 hours of becoming aware of an incident. Government parties, on their part, are obliged to give formal notification to the Consultative Committee on Emergency Animal Disease within 24 hours of becoming aware of an incident. Any failure to comply means that a jurisdiction may cease to be eligible for cost-sharing under EADRA. This mechanism establishes a common responsibility for the parties to report early, as well as creating a strong financial incentive to do so. An additional economic incentive is the possibility that a top-up payment beyond the initial compensation will be provided if on the day when the property becomes
eligible to be restocked this is more expensive than the payment received for dead or culled livestock. The cost-sharing provides additional economic incentive for disease reporting because farmers are encouraged to report early so as to contain any incursion and resulting levy collection. Animal Health Australia reports there has been no misbehaviour of producers related to disclosure of disease (OECD, 2012).

Table 1. Key components of Australia’s Emergency Animal Disease Response Agreement

<table>
<thead>
<tr>
<th>Existence of a framework which sets out potential set of response actions</th>
<th>Cost-sharing agreement between the parties</th>
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<tr>
<td><strong>Incentive aspects</strong></td>
<td><strong>Modalities</strong></td>
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<tr>
<td>Australian Veterinary Emergency Plan (AUSVETPLAN) is a national response plan for the management and eradication of emergency diseases. It contains detailed control and eradication strategies for 35 most significant emergency diseases and policy response briefs for 27 other emergency diseases. It explains policy and rationale, and recommended operational procedures, such as quarantine and movement controls.</td>
<td>1. All parties commit to contribute to funding the eligible costs of response to an emergency by which they are affected.</td>
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<tr>
<td>2. Cost sharing does not apply to activities: (i) considered “normal” and carried out by a Lead Agency’s normal biosecurity commitments; these are considered as a baseline above which other costs can be shared; each state or territory is obliged to define costs that are considered ‘normal’; (ii) considered to be part of normal/acceptable business risk; (iii) consequential loss (costs not directly related to the response); (iv) recovery costs related to outbreak; these are managed outside disease control legislation and procedures.</td>
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<td>3. Upper cost limit for cost sharing: each party’s proportional share of 1% of the gross value of production of the industry(ies) affected by the emergency (2% in the case of foot-and-mouth disease). Once this threshold is reached, the National Management Group would discuss increasing the limit, continuing the response, changing agreed cost-sharing proportions or revising the emergency animal disease response plan.</td>
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<td>4. Costs are covered by government and industry in proportions that change depending on the scale of potential externality effects of disease: the higher these effects are the higher government’s share is and lower the industry’s share. (see Annex A.6 for further detail)</td>
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<tr>
<td>5. Formulae for cost-sharing between governments within the government total share and industries within the industry total share (see Annex A.6 for further detail)</td>
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</table>

Industry arrangements to meet cost-sharing obligation

The Commonwealth may initially meet an industry’s cost sharing obligations, which industry should then repay to the Commonwealth – usually within a 10-year period. At the same time, each industry party must ensure that it meets its cost sharing obligations. An “emergency animal disease response levy” can be established for that purpose. Usually, it is set to zero and activated only in an incident. This is, however, not the only option, and one industry party has chosen a fixed amount held in reserve, which provides the greatest flexibility in adjusting levy rates to suit particular needs.

Stakeholder-consulted and approved Emergency Animal Disease Response Plan

The Plan is developed by the state or territory chief veterinary officer(s) in whose jurisdiction(s) the emergency incident has occurred. It must be prepared in accordance with a specific schedule and follow certain procedures: in particular, it must be endorsed by a consultative committee of technical representatives of the parties and subsequently approved by a higher level group of affected parties, the National Management Group.

Explicit rules for the scope and valuation of livestock holder compensation (see Annex A.7 for further detail)

1. Any livestock or property that is destroyed for the purpose of eradication or prevention of the spread of the emergency disease, and any livestock that has died of emergency disease. Compensation also covers damaged or destroyed farm equipment and destroyed product.

2. The livestock and property for compensation are valued at market value. A “topping-up” provision is also included for livestock: if the livestock prove to be more expensive to be replaced on the day that the property becomes eligible to be restocked, a second payment (“top up payment”) may be available.

Disease reporting obligations of parties

The parties to EADRA must notify the relevant government authority within 24 hours of becoming aware of an emergency incident. Failure to do that may trigger no cost sharing of compensation under EADRA.

Biosecurity obligations of parties

Parties undertake biosecurity obligations to reduce the risk of an emergency incident. Animal Health Australia manages a national biosecurity planning and implementation programme under which industry parties develop industry biosecurity plans. Government parties are obliged to develop biosecurity statements outlining policies and programmes on feral animal, public health and environmental policies.

EADRA does not foresee compensation for consequential losses. In this respect, one group for which negative incentives may potentially be created is livestock owners subject to movement restrictions who are not eligible for compensation for lost animals but may experience consequential loss. Possible negative incentives related to consequential losses are addressed to a certain extent through guaranteeing a rapid response and the requirement that restricted areas should not be larger than is epidemiologically required to prevent the spread of infection (e.g. restricted areas should not simply be determined by administrative borders) (OECD, 2012).

Protocols and formal procedures are an important pillar of EADRA, influencing producer incentives in several ways. First, they reduce uncertainties for producers, and strengthen their compliance with disease reporting and response plans. EADRA provides clarity to producers about a potential set of response measures, scope and timing of compensation, and commits parties to secure funds for and effectively fund emergency responses. Second, protocols and procedures reduce information asymmetries in outbreak response measures. They ensure that the necessary information is collected, shared and considered by all stakeholders, the decisions follow a consultation process and are agreed amongst stakeholders. These principles are in particular manifest in the procedure of the Emergency Animal Disease Response Plan, which is based on the nationally agreed response policies published in AUSVETPLAN. The Emergency Animal Disease Response Plan, prepared by the state or territory chief veterinary officer(s), must be endorsed by the Consultative Committee on Emergency Animal Diseases which brings together technical representatives of the parties; it is then submitted to the National Management Group, a higher level group representing each of the parties affected. The Group should approve, or not, the invoking of cost sharing and manage, on behalf of the affected parties, the national policy and resourcing needs of the Response Plan (AHA, 2016c).

The EADRA was first ratified in 2002, and has been undergoing constant reviews and updates since then, but has not been changed significantly. This indicates its general good performance and acceptance by stakeholders. The cost-sharing has been effectively invoked several times since 2002, most recently in respect of avian influenza outbreaks in 2012 and 2013 (Table 2). But the largest event was the 2007 outbreak of equine influenza, which, however, was a special case with respect to EADRA. Although equine influenza is among the EADRA-listed diseases, at the time of the outbreak the affected equine industry had not yet signed on to the EADRA. The cost-sharing mechanism was not officially invoked, but the cost-sharing procedures were essentially applied whereby the Australian government ultimately underwrote industry’s share of response costs. Beyond that, the Australian government provided other substantial support to affected businesses and individual workers, essentially for the industry recovery and business interruption. The decision to provide such large-scale assistance through EADRA was first, because the outbreak originated with imported horses, and second, prior to the outbreak the horse industry had already initiated their adherence to the EADRA (OECD, 2012).

As shown above, the EADRA has broad application in terms of livestock industries and the scope of diseases. It is nevertheless worthwhile to highlight the areas outside this framework. First, considering the scope of diseases, although the list of EADRA emergency diseases is long, certain diseases remain outside this framework. EADRA applies only to response measures which have been included in and approved under its Response Plan. Any response measures outside this plan will potentially be left at the discretion of state and territories. Furthermore, EADRA does not extend to livestock holders who are not members of industry bodies participating in EADRA and who are above the minimum industry business threshold (gross value of production below AUD 20 million) – in these cases compensation may be payable under state and territory legislation and could be cost-shared if agreed by all parties.

The EADRA, however, provides guidance on how other diseases, including the previously unknown emerging ones, could be included in an emergency.
Table 2. EARDA-shared expenditures on emergency animal disease events

<table>
<thead>
<tr>
<th>Year</th>
<th>Disease</th>
<th>Species</th>
<th>Response measures</th>
<th>Total expenditure, AUD</th>
<th>Direct costs of disease control of which:</th>
<th>Operational support</th>
<th>Price support</th>
<th>Consumption measures</th>
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<td>Total of which paid to livestock owners</td>
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<tr>
<td>2002</td>
<td>Newcastle disease in Victoria and New</td>
<td>Chickens</td>
<td>Stamping out</td>
<td>2 342 000</td>
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<td></td>
<td>South Wales</td>
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<td>Surveillance</td>
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<td>Zoning</td>
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<td>Movement control</td>
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<td>Treatment of affected animals</td>
<td></td>
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<tr>
<td>2007</td>
<td>Equine influenza</td>
<td>Horses and</td>
<td>Movement control</td>
<td>354 298 689</td>
<td>97 700 000</td>
<td>256 598 689</td>
<td>0</td>
<td>0</td>
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<tr>
<td></td>
<td></td>
<td>other equids</td>
<td>Screening</td>
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<tr>
<td>2012</td>
<td>Highly pathogenic avian influenza in</td>
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<td>Movement control</td>
<td>775 800</td>
<td>775 800</td>
<td>261 884</td>
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<tr>
<td>2012</td>
<td>Low pathogenic avian influenza in</td>
<td>Ducks</td>
<td>Movement control</td>
<td>1 004 559</td>
<td>1 004 559</td>
<td>0</td>
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<td>Victoria</td>
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<td>Screening</td>
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<td>2013</td>
<td>Highly pathogenic avian influenza in</td>
<td>Chickens</td>
<td>Movement control</td>
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<td>5 135 334</td>
<td>2 312 257</td>
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</table>

.. not available.

Note: Direct costs of disease control include (i) compensation paid to livestock owners for destroyed animals and lost product and (ii) salaries and wages, operating expenses and equipment costs incurred in control and eradication activities. Operational support (in the case of equine influenza) includes hardship fund, business assistance grant, wage supplement to equine workers, commercial horse assistance payment, and grant to non-government non-profit equestrian organisations.


54. Second, EADRA does not compensate for consequential losses. As in many countries, these losses are typically outside the scope of compensation schemes for epidemics and regarded as entrepreneurial risk. At the same time, some consequential losses are corollary to compulsory measures applied in response to epidemics, such as protective vaccination and livestock movement restrictions. For example, under protective vaccination animals may not be destroyed, but when marketed, they command reduced price and involve additional costs in processing. Consequential losses thus influence farmers’ incentives to disclose disease and to participate in preventive vaccination or movement control. As such, they have strong implications for the longer-term viability of farm businesses and even the entire industry.

55. Livestock insurance may be one solution to market risks related to livestock epidemics. In Australia, there is generally no insurance for specific emergency animal diseases, except that valuable stud animals may be insured for death regardless of the cause or type of disease (Australian Government, 2016). Comparing internationally, livestock epidemics insurance is indeed limited because of the significant difficulty to estimate the scale and probability of livestock epidemics risk, classify and price it accordingly, and also because this risk tends to be systemic. Some analysts point to a market failure in provision of livestock disease insurance, and conclude about the need for government subsidy or other action, such as
facilitation of the “production” of insurance products to make such insurance more operational (e.g. Meuwissen and Asseldonk, 2013). This facilitation may include creation of an information-sharing system on risks involving insurers, farmers and government, which could help reduce transaction costs incurred by insurers in obtaining the information and facilitate setting actuarially sound insurance premiums for different risk groups. Broadly speaking, subsidised insurance seems unlikely in the context of Australia where there is little public acceptance of intervention in markets and where farmers are viewed as ultimately responsible for assuming their business risks. The country’s overall favourable disease status, assumingly reducing potential demand of livestock producers, also puts into question the feasibility of such insurance.

56. Finally, there is a constituency of non-commercial livestock holders who are not typically incentivised to prevent and report disease through compensation for lost animals but who may present difficulty. For example, the recent avian influenza emergencies drew attention to poultry exhibitors in Australia as a risk group for disease introduction, through allowing wild birds to have contact with domestic birds, the high frequency of bird movements and the lack of appropriate isolation for incoming birds (Hernández-Jover et al., 2015). As a result, a range of materials was produced for poultry exhibitors and fanciers by the Australian Government Department of Agriculture and Water Resources. A standard compensation policy towards these groups is unlikely and they should be rather incentivised through local action, such as targeted awareness campaigns at the level of local communities, training to improve the ability to recognise and report diseases, voluntary assurance action, and community pressure for due diligence.

5. Conclusions

57. The official statistical and public research institutions in Australia generate a large body of structural information to support livestock policy development. At the same time, the statistical observation of small commercial livestock producers, particularly in the pig and poultry sectors, is limited and there is also a lack of information about livestock holders below the size threshold of official statistical coverage.

58. Governments at all levels in Australia recognise the importance of understanding individual producer behaviour for the development of effective animal health policy. The national partnership-based biosecurity system creates interactions with industry stakeholders and feedback flows to government about “on the ground” actors of biosecurity. Government and industry also undertake specific efforts to increase their own awareness of private producer behaviour, such as Farm Biosecurity Surveys and government-funded research, with the most recent studies conducted as part of the national priority research. All of these elements are the necessary input into the fine-tuning of policy in response to the knowledge gaps, perceptions, and attitudes of farmers that drive their decision-making processes. The efforts so far have evolved from one-off case studies to broader behavioural research, which is intended to feed into policy development. There is nevertheless room for a more comprehensive behavioural work related to farm biosecurity, e.g. involving a longer-term research programme and the monitoring of change in farmer behaviour through surveys with possibly higher frequency and larger scope than currently, as well as focussed feedback from veterinarians.

59. Information on animal biosecurity comes to farmers from multiple channels. It is necessary to build a good understanding about the degree to which farmers use this external information and what their preferred sources are. It is also necessary to improve the co-ordination and harmonisation of biosecurity information. The type of information is also important and there is a need for more emphasis on the economic aspects of biosecurity, such as the cost efficiency of various disease management practices, and the impacts of good (bad) disease management at farm, industry and society levels. Information that is adaptable to specific farm contexts has a higher chance of uptake by farmers, implying that communication should be more targeted and that tools to customise the information to individual conditions are needed.
The government has been taking steps in all of these directions, so the issue is to build on and continue these initiatives.

60. The structure of programmes and spending on education and training in animal health for farmers is difficult to estimate at the national scale as it is highly decentralised across a wide range of levels and providers. It is, nevertheless, warranted to investigate the knowledge and skills of livestock farmers and the extent to which they are adequate, to fully understand biosecurity and improve disease management practices. The knowledge and skills gaps that may be identified could help to prioritise extension and training in livestock disease management. Co-ordination of training programmes across various providers seems to be an issue as in the area of information and communication. Finding synergies between different channels of provision and less duplication could help more efficient allocation of public and private resources in farmer training.

61. Australia’s compensation policy, with the Emergency Animal Disease Response Agreement (EADRA) at its centre, is an international example of a well-designed compensation policy. The EADRA creates mechanisms to align private, collective and public incentives. Cost sharing is the principal mechanism to delimit public and private responsibility in disease emergencies and to control moral hazard and incentivise early reporting. EADRA’s economic incentives are coupled with regulatory instruments and ex ante written protocols and procedures. These serve to ensure informed and consensual decisions and to commit parties. It is worthwhile noting, however, that an agreement like EADRA largely follows from Australia’s specific conditions – the overall tradition of public-private partnership building and the strong institutional organisation of agricultural industries – advantages that some other countries may not enjoy.

62. The compensation framework in Australia – which combines EADRA and state and territory legislation – has the flexibilities to indemnify small livestock holders on a case-by-case basis, providing, in principle, an incentive to these constituencies to report disease. However, outreach to small livestock holders, particularly hobby farmers, needs to be diverse so as to include direct and targeted actions at the local level. This includes awareness campaigns, information and knowledge dissemination adapted to non-professional recipients, publicising and awarding positive behaviour, or any other initiatives appropriate in the local contexts. Policy could potentially play a role in promoting and facilitating such local initiatives.
REFERENCES


AHA (2016c), EADRA Frequently Asked Questions, Animal Health Australia, Canberra, Australia.

Australian Government (2016), “OECD project on producer incentives in livestock disease management: Country case questionnaire”, Responses to the OECD received from the Australian Government


### ANNEX A.1. MEMBERS OF ANIMAL HEALTH AUSTRALIA

<table>
<thead>
<tr>
<th>Governments</th>
<th>Industry associations</th>
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<tbody>
<tr>
<td>Australian Government Department of Agriculture and Water Resources</td>
<td>Australian Alpaca Association</td>
</tr>
<tr>
<td>State of New South Wales (NSW) Department of Primary Industries</td>
<td>Australian Chicken Meat Federation</td>
</tr>
<tr>
<td>State of Queensland (Qld) Department of Agriculture, Fisheries and Forestry QLD</td>
<td>Australian Dairy Farmers</td>
</tr>
<tr>
<td>State of South Australia (SA) Department of Primary Industries and Regions SA</td>
<td>Australian Duck Meat Association (no website)</td>
</tr>
<tr>
<td>State of Tasmania (Tas.) Department of Primary Industries, Water, Parks and Environment</td>
<td>Australian Egg Corporation</td>
</tr>
<tr>
<td>State of Victoria (Vic.) Department of Primary Industries</td>
<td>Australian Horse Industry Council</td>
</tr>
<tr>
<td>State of Western Australia (WA) Department of Agriculture and Food WA</td>
<td>Australian Lot Feeders’ Association</td>
</tr>
<tr>
<td>Australian Capital Territory (ACT) Department of Territory and Municipal Services</td>
<td>Australian Pork</td>
</tr>
<tr>
<td>Northern Territory (NT) Department of Resources</td>
<td>Cattle Council of Australia</td>
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<td>Equestrian Australia</td>
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<td>Goat Industry Council of Australia</td>
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<td>Harness Racing Australia</td>
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<td>Sheepmeat Council of Australia</td>
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<td></td>
<td>WoolProducers Australia</td>
</tr>
</tbody>
</table>

**Service providers**

- Australian Veterinary Association
- CSIRO – Australian Animal Health Laboratory

**Associate members**

- Australian Livestock Export Corporation (LiveCorp)
- Australian Racing Board
- Council of Veterinary Deans of Australia and New Zealand (no website)
- Dairy Australia
- National Aquaculture Council Inc.
- Wildlife Health Australia
- Zoo and Aquarium Association

*Source: AHA, 2016b.*
ANNEX A.2. ANIMAL HEALTH AUSTRALIA: MAIN ACTIVITY AREAS AND NATIONALLY CO-ORDINATED PROJECTS

Animal Health Australia (AHA) currently manages more than 60 national projects which fall under four principal areas: disease surveillance, domestic biosecurity services, the emergency response to animal disease, endemic disease programmes, and livestock welfare (Figure A.2.1.).

**Figure A.2.1. Activities and projects under co-ordination of Animal Health Australia**

Source: AHA, 2016b.

All AHA’s projects operate on the principle of partnership in the development, implementation and funding of animal biosecurity activities. Selected examples of the partnership principle in the activities under AHA’s co-ordination are presented below.

Australia’s *National Animal Health Information System* (NAHIS) is probably one of the most developed animal health information systems. It combines information from laboratory network, national animal health programmes (e.g. TSE freedom assurance programme and Johne’s disease market assurance programmes), veterinary investigations, altogether forming more than a dozen of information channels and
databases. AHA is tasked to collate these data and provide an overview of animal health in Australia (OECD, 2012).

The National Sheep Health Monitoring Project monitors lines of adult sheep in abattoirs (groups of animals purchased from a single location, but sourced from different vendors) for a number of health conditions. The list of the monitored conditions has been agreed among the sheep industry peak councils, Animal Health Committee and the Australian Meat Industry Council. Fourteen domestic and export processing plants located in all states are monitored. The data are stored in the national database maintained by AHA. The information is processed and can be used by governments, producers, and processors. Some state jurisdictions provide producers with individual animal health status reports on the lines inspected. Industry associations Wool Producers Australia and Sheepmeat Council of Australia fund this project, while each state department of primary industries has a state co-ordinator to facilitate the return of data to producers and provide extension advice about the conditions that are monitored.

The Ovine Johne’s Disease Management Plan (2013-18) has been developed through extended consultations between Sheepmeat Council of Australia (SCA), WoolProducers Australia (WPA), state departments of primary industry and other stakeholders. It is funded by sheep meat and wool industries and draws on the R&D programme managed by Meat & Livestock Australia. The main objectives are to minimise the risk of infection for properties and regions that currently appear to be disease free and to reduce the adverse effects of the disease on individual flocks, and on the sheep industry as a whole. A similar Johne’s Disease Management Plan for cattle is currently under stakeholders’ review process.

Australia is a country with “negligible risk” for bovine spongiform encephalopathy (BSE) and free from classical scrapie – the types of transmissible spongiform encephalopathies (TSEs). TSE Freedom Assurance Programme is a nationally integrated management of animal-related TSE activities, including ruminant feed-ban scheme (a total ban on feeding meat and bone meal), surveillance of imported animals, national surveillance programme, and R&D. The objective of the national surveillance programme is to demonstrate the country’s ability to meet the requirements for a BSE negligible risk and classical scrapie–free country, and provide early detection of these diseases should they occur. It receives funding from ten industry stakeholders (livestock and associated industries), the Australian Government, and the state and territory governments.
### ANNEX A.3. STUDIES INTO LIVESTOCK PRODUCER BEHAVIOUR CO-FUNDED BY AUSTRALIAN AND STATE GOVERNMENTS

<table>
<thead>
<tr>
<th>Study title</th>
<th>Motivation for study</th>
<th>Issues</th>
<th>Performer</th>
<th>Funding</th>
<th>Use in policy development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development of behaviour change strategies for animal disease surveillance and reporting (forthcoming, 2016)</td>
<td>The independent review “Australia’s Preparedness for the Threat of Foot-and-Mouth disease” by K. Matthews in 2011 identified surveillance gaps (in particular, reporting by producers) acting as a barrier to the early identification of disease. The research was undertaken as part of priority work (under a funded policy initiative) to optimise the allocation of resources to surveillance needs.</td>
<td>Risk perception, barriers to surveillance, attitudes to surveillance and reporting (or contacting a veterinarian), knowledge about animal diseases, trusted sources of information.</td>
<td>BehaviourWorks Australia</td>
<td>Research consultancy funded by the Australian Government Department of Agriculture and Water Resources. A limited tender process was undertaken to procure providers.</td>
<td>The findings of the research are being used to review and fine-tune surveillance policy, and create more sustainable, partnership approaches to surveillance (e.g. producer-based syndromic surveillance networks).</td>
</tr>
<tr>
<td>National survey of agricultural landholders—common established pest animals and weeds (forthcoming, 2016)</td>
<td>The Australian Government is investing AUD 50 million through the Agricultural Competitiveness White Paper to improve the way pest (including feral animals) and weeds are managed and increase the capacity of farmers to deal with these threats. The primary purpose of the survey is to measure the level of awareness among the landholders and the community on the benefits of management and costs of inaction.</td>
<td>Pests and weeds, knowledge and attitudes, risk perception, pest and weed management.</td>
<td>Australian Government Department of Agriculture and Water Resources.</td>
<td>Government funding through the Australian Government Department of Agriculture and Water Resources.</td>
<td>Extension activities.</td>
</tr>
<tr>
<td>Schembri, N., M. Hernandez-Jover, J.-A.L.M.L. Toribio, and P.K. Holyoake (2015)  &quot;On-farm characteristics and biosecurity protocols for small-scale swine producers in eastern Australia&quot;, Preventive Veterinary Medicine, 118(1):104-16.</td>
<td>Following an independent review of Australia’s preparedness for managing an FMD outbreak by K. Matthews (ibid.), enforcing the ban on swill feeding was identified as a “gap” requiring more government and industry intervention.</td>
<td>Farm characteristics of small-scale swine producers, biosecurity practices (on farm and at sale yards).</td>
<td>University of Sydney, Victorian Department of Primary Industries, Graham Centre for Agricultural Innovation.</td>
<td>Australian Biosecurity Cooperative Research Centre – a consortium of government and research institutions.</td>
<td>The specific practices and concerns of small-scale swine producers (and the differing management practices and motivations within this group) were used to inform industry and government extension programmes.</td>
</tr>
<tr>
<td>Schembri, N., K Hart, R. Petersen, R. Whittington (2006)  “Assessment of the management practices facilitating the establishment and spread of exotic diseases of pigs in the Sydney region”, Australian Veterinary Journal, V. 84, N 10, October 2006, pp.341-348.</td>
<td>Since the UK outbreak of FMD caused by swill feeding, enforcing the ban on swill feeding in Australia has been viewed as a priority. However, to inform any intervention, research was first required to identify on-farm characteristics and biosecurity practices among Australian pig producers, and to assess the disease risk level of groups within the industry.</td>
<td>Farmer biosecurity practices and risk perceptions (especially around swill feeding) farmer awareness of risks and their potential effects, awareness about exotic diseases and risk management practices, and attitudes towards these practices.</td>
<td>Vale Rural Lands Protection Board. Lead researcher an employee of the latter and was also a research student at the University of Sydney.</td>
<td>New South Wales Department of Primary Industries and Moss Vale Rural Lands Protection Board</td>
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<tr>
<td>Use in policy development</td>
<td>Peri-urban backyard farmers have been identified as a key (high risk) group for intervention. Industry and government have worked together to increase awareness of the sell-offing ban, pig traceability and preventing the provision of swill by supermarkets and restaurants. However, non-English speaking backyard owners are still recognised as a difficult group to reach.</td>
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<tr>
<td>Motivation for study</td>
<td>Following an independent review of Australia’s preparedness for managing an FMD outbreak (Matthews, 2011), government (at the Australian and state levels) was tasked with enhancing communication with farmers about how emergency disease threats (FMD, in particular) should be recognised, reported and managed. The research was to fill a gap in understanding about beef producer behaviour.</td>
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<tr>
<td>Issues</td>
<td>How farmers obtain information on emergency animal disease, the ways in which they understand and manage disease risks, and whether current communication strategies are effective in improving farmer understanding and knowledge of how to deal with disease threats.</td>
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<tr>
<td>Performer</td>
<td>Charles Sturt University</td>
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<tr>
<td>Funding</td>
<td>Research consultancy funded by the Australian Government Department of Agriculture and Water Resources. A limited tender process undertaken to procure providers.</td>
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<tr>
<td>Use in policy development</td>
<td>In its approach to communication and engagement, the Australian Government Department of Agriculture and Water Resources is moving away from broadcasting messages to generic, anonymous group of ‘livestock producers’ and instead providing more specific information to target groups. Attempts to improve co-ordination and collaboration between stakeholder organisations are proving more difficult. A Biosecurity Incident National Communication Network has been formed to assist with this aim.</td>
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<td>Motivation for study</td>
<td>The Australian commercial poultry industries have long identified backyard poultry as a biosecurity threat. With the outbreak of zoonotic highly pathogenic avian influenza, and research confirming its spread through wild birds, industry and government supported further research to evaluate the risk posed by backyard poultry and shows</td>
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<td>Issues</td>
<td>Exhibition poultry enthusiasts’ biosecurity practices and risk perceptions (esp. around contact with wild birds and commercial flocks).</td>
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<tr>
<td>Performer</td>
<td>University of Sydney with support from the Australian Government Department of Agriculture and Water Resources</td>
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<tr>
<td>Funding</td>
<td>Government funding was provided for the study and staff from the Australian Government Department of Agriculture and Water Resources provided data and epidemiological input.</td>
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<tr>
<td>Use in policy development</td>
<td>There is little evidence of contact between commercial poultry and show/backyard poultry. However, the government worked directly with exhibitor groups to develop traceability measures and biosecurity guides. Measurement of the impact of these activities is not available, however.</td>
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<tr>
<td>Motivation for study</td>
<td>This report summarises the findings of a three-year mixed methods research study designed to capture factors that influence horse owner Hendra virus (HeV) risk mitigation practices.</td>
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<tr>
<td>Issues</td>
<td>The project focused on horse owners; their knowledge, attitudes, and risk mitigation practices, i.e. uptake of vaccination, property management, and biosecurity practices.</td>
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<td>Performer</td>
<td>Biosecurity Queensland, Department of Agriculture and Fisheries and New South Wales Department of Primary Industries.</td>
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<tr>
<td>Funding</td>
<td>The study was funded by the Australian government and the states of New South Wales and Queensland under the National Hendra Virus Research Program.</td>
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<tr>
<td>Use in policy development</td>
<td>The study has recently concluded. It is expected that results will lead to alternative approaches to engagement of horse owners around Hendra virus prevention activities.</td>
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<tr>
<td>Motivation for study</td>
<td>Globalisation means that more new animal diseases have been identified in Australia since 1994 than in any previous equivalent period. To protect its relatively disease-free status (which is of economic value) and leverage additional resources (funding for</td>
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<tr>
<td>Study title</td>
<td>Motivation for study</td>
<td>Issues</td>
<td>Performer</td>
<td>Funding</td>
<td>Use in policy development</td>
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<td>9.</td>
<td>The independent review of Australia’s preparedness for managing an FMD outbreak (Matthews, 2011) recommended a program of FMD biosecurity work for government and industry. This led to an economic study being commissioned to investigate the costs of a foot and mouth disease incursion in Australia.</td>
<td>Information needs, community impacts, household impacts, personal impacts, community involvement in outbreak response.</td>
<td>Australian Government Department of Agriculture and Water Resources</td>
<td>The work was undertaken internally by the Australian Government Department of Agriculture and Water Resources (then known as the Department of Agriculture, Fisheries and Forestry).</td>
<td>The study resulted in funding being granted for policy development around: FMD vaccination, training for vets, surveillance and community engagement. To increase producer knowledge and resilience, a guide for producers to plan for risks to their business (posed by emergency animal disease outbreak) was created.</td>
</tr>
<tr>
<td>10.</td>
<td>Improve the profitability and sustainability of mixed farms, focusing on cropping, pastures, livestock, profitability, whole-farm economics, farming systems, social issues and natural resources such as soil, water and biodiversity.</td>
<td>Social research into the trade-offs influencing mixed farming decisions</td>
<td>Australian Government Land &amp; Water Australia + three R&amp;D corporations.</td>
<td>Collaborative partnership between government and R&amp;D corporations.</td>
<td>The program expanded the scope of farming systems RD&amp;E in Australia through explicit recognition of the triple bottom line and development of formal and informal approaches to integration across these dimensions.</td>
</tr>
<tr>
<td>11.</td>
<td>To gather information essential for planning for and managing infectious disease (e.g. drafting Ausvetplan manuals).</td>
<td>Biosecurity practices, movement of livestock.</td>
<td>Various consultants contracted by the Australian Government Department of Agriculture and Water Resources.</td>
<td>The Australian Government’s ‘Securing the Future’ initiative was used to fund Department’s project ‘Emergency Animal Disease/Emerging Disease Awareness’ (under this project various contractors were each commissioned to report on a particular livestock industry).</td>
<td>Affected disease management policy, as captured in Ausvetplan, see <a href="https://www.animalhealthaustralia.com.au/our-publications/ausvetplan-manuals-and-documents/">https://www.animalhealthaustralia.com.au/our-publications/ausvetplan-manuals-and-documents/</a></td>
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<tr>
<td>Motivation for study</td>
<td>Invasive/pest animals in Australia impose significant commercial losses on livestock producers and also pose disease threats to humans, livestock and native fauna. Public and landholder attitudes to pests and pest control.</td>
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<tr>
<td>Issues</td>
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<tr>
<td>Performer</td>
<td>Invasive Animals CRC (a consortium of government, industry and research institutions)</td>
<td><a href="http://www.invasiveanimals.com/research/">http://www.invasiveanimals.com/research/</a></td>
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<tr>
<td>Funding</td>
<td>Co-operative research centre comprising government, industry and research organisation funding and resources.</td>
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<tr>
<td>Use in policy development</td>
<td>Unknown.</td>
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</thead>
<tbody>
<tr>
<td>Motivation for study</td>
<td>Trade or agricultural productivity concerns.</td>
<td></td>
</tr>
<tr>
<td>Issues</td>
<td>Issues involving the survey of farmers about: pest management, land management, agricultural workforce, illegal logging, farmers’ response to weather variability, social impacts of drought, water use, animal welfare, sustainability, natural resource management, lifestyle farmers</td>
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</tr>
<tr>
<td>Performer</td>
<td>ABARES (a division within the Department of Agriculture and Water Resources)</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>Work undertaken by ABARES researchers.</td>
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</tbody>
</table>

The Australian Department of Agriculture and Water Resources (DAWR) has sought to change the perception of livestock producers regarding the risk of emergency animal diseases and to encourage them to participate in surveillance activities. There had been concern that farmers did not prioritise disease surveillance amongst other more urgent issues: for example, debt or drought. Another consideration was that further top-down awareness campaigns would not be effective and would not be a desirable way forward. To provide evidence for alternative strategies, BehaviourWorks Australia undertook the project “Development of behaviour change strategies for animal disease surveillance and reporting”.

Structure of the project

The project had four phases, each employing a specific study method that provided input into the subsequent phase:

1. **Literature, policy and practice review** to understand the problem, the behaviours of interest, and the target audience.

2. **Focus groups** to investigate common themes and issues that were pertinent to how producers related to surveillance and reporting of animal disease. Three focus groups were organised: the first one with sheep-and-cattle producers in rural South Australia who formed a community group to discuss collective issues; the second one was conducted as part of the Wool Producers Australia meeting with participants from all states and territories; and the third one used individual interviews with pig producers.

3. **Online farmer survey** to collect behavioural data and perform a predictive analysis of behaviour on that basis. A questionnaire was developed based on the themes identified by the focus groups. It was reviewed against established questionnaires and theoretical frameworks (notably, the Reasoned Action Approach) so as to ensure there was sufficient coverage and detail for the areas of interest. A computer-assisted telephone interview was then conducted with 200 producers from the sheep, cattle and pig industries. Based on the data collected, a cluster and multiple regression analyses were undertaken to identify predictors of the behaviours of interest.

4. **Design workshop** with key stakeholders to plan potential targeted interventions based on the findings from the data analysis. This workshop sought to facilitate collective decisions, which is important to appropriate, realistic and achievable design approaches. Nine stakeholders, in addition to the staff of BehaviourWorks Australia, attended the design workshop. These additional stakeholders included seven staff members from the Department of Agriculture and Water Resources, one representative from state government, and one representative from the Livestock Biosecurity Network.
Project outputs

The project outputs include: (i) the findings from the review of the existing sources and from the discussions in the focus groups; (ii) predictors of Australian farmer behaviour resulting from the analysis of the survey data; and (iii) the themes identified for potential policy development.

Following the review of the existing sources and discussions by the focus groups, a range of topics were identified to study surveillance and reporting by Australian farmers. The subsequent farmer survey was based on these topics. Its findings include:

- **Past experience and intentions related to disease outbreak:** A minority of producers (12%) had experienced an emergency disease. Asked what they would do if they experienced an outbreak, 99% of farmers responded they would talk to someone, the vast majority (86%), to a veterinarian; 65% of respondents would report suspicious signs within 24 hours, 18% would get a second opinion, 15% would watch animals before reporting, and only 1% said their action would depend on the severity of the disease.

- **Confidence in the ability to identify the disease:** When asked as a general question, confidence was rated at 7 points on a 10-point scale, but ranged between 2 and 5 points when asked in relation to a specific disease. This may indicate an over-confidence of producers in their general ability to recognise diseases, but may also mean that although they are able to recognise suspicious symptoms, they are not able to associate them with a specific disease.

- **Competency to deal with outbreaks:** Farmers scored local veterinarians highest (8 points on a 10-point scale), followed by themselves (7 points), followed by an industry organisation, Animal Health Australia, state departments, other farmers in the region, and the Australian Department of Agriculture and Water Resources, which ranked lowest (5 points).

- **Responsibility of different stakeholders:** Producers rated themselves as having the greatest responsibility for both surveillance (9 points out of 10) and dealing with emergencies (nearly 9 points).

- **Attitudes towards the Australian Department of Agriculture and Water Resources:** This was rated highest in terms of providing easily accessible and useful information (7 points) and lowest in terms of making good management decisions and dealing with producers (6 points).

- **Perceived risk:** Producers perceived the impact of disease outbreak on their farm to be high, but saw the risk of it developing on own farm to be lower than on other farms.

- **Social norms:** Producers perceive a social norm to exist for monitoring and reporting disease, and that this behaviour is expected of them by the community. These expectations are not perceived by farmers as being unreasonable.

A further analysis of the data collected points to the following significant predictors of Australian farmer behaviour related to disease monitoring and reporting:

- **Government as a source of credible and clear information:** Producers who trusted the government (DAWR) to follow the best available science and to communicate this effectively were more likely to report disease emergency. This implies that producers need to trust the accuracy of information, and the method and time of communication. Including producers in
developing strategies to monitor their stock is a starting point to build collaborative relationships that are effective.

- **Personal responsibility:** Producers who felt responsible for dealing with disease emergencies in their livestock were more likely to engage in monitoring behaviour. Farm trials of surveillance actions and providing access to additional information resources may assist in this.

- **Perceived behavioural control:** Producers who reported they knew what they should do were more likely to monitor their livestock and work with a private veterinarian.

- **Proximity to preferred veterinarian:** The greater the distance, the less likely producers monitor disease and report it to their veterinarian. Increasing skills and resources of producers to levels that do not require recourse to consultation in the first instance, and using communication technologies to connect remote farmers with veterinarians, could be ways to address this issue.

- **Social norms:** Social rewards of approval and the attribution of social sanctions are likely to be effective.

The design workshop subsequently prioritised three areas for intervention: (i) changing producer perceptions of risk; (ii) building relationships between producers and veterinarians; and (iii) supporting producers with poor access to veterinary services. The next step foreseen is to refine these interventions with producers and develop a framework to evaluate the effects of intervention on producer behaviour. Overall, this project highlighted the importance of clear communications, the necessity to engage stakeholders, and to align the understanding of behavioural drivers with interventions.

*Source:* Wright et al. (2016).
## ANNEX A.5. 2013 FARM BIOSECURITY SURVEY: MAIN FINDINGS

<table>
<thead>
<tr>
<th>QUESTION CATEGORY</th>
<th>SUMMARY OF PRODUCER RESPONSES</th>
</tr>
</thead>
</table>
| **Understanding of biosecurity**                       | • Without any prompting, almost half of all producers surveyed related the term “controlling diseases, pests and weeds” to biosecurity, a substantial increase from 37% in 2010.  
• A further 24% thought, without prompting, that biosecurity meant ‘border protection/quarantine’. This was the same result as reported in 2010.  
• While there was also a reduction in the proportion of producers surveyed who responded ‘nothing’ or ‘don’t know’ when they hear the term ‘biosecurity’, these still accounted for 20% of all responses in 2013.  
• When prompted with four different statements to choose from, around 90% of all respondents identified “Measures taken to protect farm production from disease, pests and weeds” as the best definition of biosecurity. This has increased from around 80% in 2010. |
| **Current practices undertaken to protect crops and livestock** | • 30% of respondents said they control weeds, when asked the question, “What biosecurity practices do you currently undertake to protect your property from pests or diseases and weeds?”  
• Overall, the practice of monitoring livestock saw the biggest increase over 2010 results, with 20% of all producers listing ‘monitoring livestock’ as a biosecurity activity in 2013 compared with only 14% in 2010.  
• Of those producers surveyed that did undertake a biosecurity activity, controlling weeds was the most prevalent (35%), followed by controlling livestock pests and diseases (33%). There were predictable differences for plant and livestock producers consistent with their operations. |
| **Sources of agronomic, animal health & biosecurity information** | • Agronomists were the most typical source of information on farm management issues for 26% of all respondents.  
• Information on animal health, crop protection and biosecurity was most commonly provided by a vet (31%) followed by an agronomist (23%), state department of primary industries (23%) industry bodies (17%) and suppliers (17%) and the internet (15%).  
• When asked what specific information they wanted to be able to access regarding biosecurity, 26% of all respondents replied ‘biosecurity warnings and alerts’. The producers surveyed reported email as the preferred way to receive information on biosecurity (48%), with hard copy in the mail being the next preference (32%), followed by websites (18%).  
• Around 90% of all producers surveyed have internet access on their property.  
• Overall, around 48% of all respondents used the internet daily with just under 20% of all producers using the internet less than every two-three weeks. |
| **Association membership**                             | • A total 64% of all respondents belong to a crop or livestock industry association.  
• Of livestock producers surveyed, 63% said they belong to an industry group or association compared with 56% of grain growers who said they belong to an industry group or association. |
| **Awareness of the Farm Biosecurity program**           | • A total 36% of respondents had heard of the Farm Biosecurity program with awareness highest amongst plant producers (37%) compared to livestock producers (33%).  
• Awareness of the program amongst livestock producers was highest for alpaca producers at 67%.  
• The largest increase in awareness between 2010 and 2013 results was amongst grain growers. In 2013 34% had heard of the program compared to 23% in 2010. Most respondents reported hearing about the program in their local newspaper (37%), whilst 25% had heard about it through their industry association. |
## On-farm biosecurity monitoring

When asked who monitors crops or livestock for disease or pests, most producers identified themselves or their family or staff.

- More than 80% of producers did their own monitoring, while 31% relied on family or staff.
- While grain producers reported similar levels of self/family/staff monitoring, more than half also used an agronomist or cropping consultant.
- The amount of producers surveyed who used their family and/or staff rose from 25% in 2010 to 31% in 2013.
- In 2013, approximately 1 in 10 producers surveyed identified cropping groups as monitors of their crops. In 2010 no producers, at all, identified cropping groups monitoring their crops.
- Half of all producers monitored daily but it varied from 34% of grain producers to 56% of livestock producers. Monitoring daily increased, compared with 2010 from 41% to 50% overall.
- Grain producers were less frequent monitors than other groups and as likely to monitor weekly as daily.
- 60% of producers kept records of their monitoring, with similar levels across all groups. In 2010, only 46% kept records.
- Close to 80% were willing to share the records of their monitoring.

## Identifying and reporting new or unusual pests and diseases

Almost all producers surveyed said they would do something to try to identify an unusual pest or disease on their property.

- Almost half of the producers surveyed would seek advice from their state department of primary industries or the Department of Agriculture. Two-thirds of grain growers would ask a private agronomist or advisor and 50% of livestock producers would consult a vet. Both of these options increased in 2013.
- 97% said they would report a new pest or disease found on their property.
- The same sources (state department of primary industries or the Department of Agriculture, vet and agronomist) were the most cited places to report a new pest or disease. Again, government agencies were less used than in 2010, while more would notify an agronomist.

## Benefits of implementing biosecurity practices

‘Freedom from diseases, pests and weeds’ and ‘protection of incomes and livelihoods’ were the most often cited reasons to implement biosecurity practices.

- ‘Freedom from diseases, pests and weeds’ was the main benefit, reported by 57% of producers.
- The next most reported benefit was ‘protect livelihood/income’.
- While the levels of reported benefits of biosecurity were similar to 2010, there was an increase in the proportion who cited ‘protect livelihood/income’ (40% in 2013 compared to 29% in 2010).

1. Farm Biosecurity programme is an awareness campaign through a joint initiative of Animal Health Australia and Plant Health Australia on behalf of their members. Its core is a website hub of farm biosecurity information, which includes information to help producers understand disease, pest and weed risks, what they can do to reduce those risks, and how to go about it. It provides materials to help producers implement good biosecurity on their property.

Source: Farm Biosecurity, 2016.
ANNEX A.6. COST SHARING SCHEME IN EMERGENCY ANIMAL DISEASE RESPONSE AGREEMENT

I. Cost sharing between government and industry:

<table>
<thead>
<tr>
<th>Category of disease</th>
<th>Government funding</th>
<th>Industry funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1: 5 diseases</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Predominantly seriously affecting human health and (or) the environment (depletion of native fauna) but which may only have minimal direct consequences to the livestock industries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category 2: 13 diseases</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Potentially causing major national socio-economic consequences through very serious international trade losses, national market disruptions and very severe production losses in the livestock industries that are involved. This category includes diseases that may have slightly lower national socio-economic consequences, but also have significant public health and/or environmental consequences.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category 3: 16 diseases</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Potentially causing significant (but generally moderate) national socio-economic consequences through international trade losses, market disruptions involving two or more states and severe production losses to affected industries, but have minimal or no effect on human health or the environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category 4: 27 diseases</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>Mainly production loss diseases: while there may be international trade losses and local market disruptions, these would not be of a magnitude that would be expected to significantly affect the national economy. The main beneficiaries of a successful emergency response to an outbreak of such a disease would be the affected livestock industry(s).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

II. Cost sharing within government funding:

Government funding is shared between the Commonwealth, the six states and the two territories. For each disease, the Commonwealth share is 50% of the total government share.

The split between states and territories is based on a set of detailed formulae. For Category 1 diseases, the formula uses figures from the latest human population census. For all other diseases, the formula is based on the relevant livestock population and on Gross Value of Production data of the industry(ies) affected by the disease.

III. Cost sharing within industry funding:

The split of costs eligible for sharing between the industry parties where disease affects more than one species, or concerns more than one industry party for a species, are similarly determined on the basis of the Gross Value of Production of each industry.

Source: AHA, 2016c.
ANNEX A.7. COMPENSATION RULES IN EMERGENCY ANIMAL DISEASE RESPONSE AGREEMENT

<table>
<thead>
<tr>
<th>Scope of compensation</th>
<th>Cost-sharing under the EADRA applies to several types of expenses: 1. Compensation to livestock holder is payable for livestock or property destroyed to control an emergency animal disease, as well as for dead animals that, had they not died of the disease, would have been ordered slaughtered. 2. Salaries and wages; operating expenses; and capital costs which result directly from disease response plan implementation and exceed the implementing agencies’ normal commitments. Neither routine biosecurity expenses nor consequential losses incurred by communities within affected states/territories are cost-shared.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequential losses</td>
<td>No allowance is to be made for loss of profit, loss occasioned by breach of contract, loss of production or any other consequential loss whatsoever.</td>
</tr>
<tr>
<td>Eligible beneficiaries</td>
<td>Commercial holders of livestock represented by one of the industry organisations that are EADRA signatories. Small industries Can be compensated even if not represented by an EADRA signatory, if their industry gross value of production (GVP) is less than AUD 20 million. Animal Health Australia Can be reimbursed for non-normal costs incurred during a disease response. Commonwealth and state/territory governments Can be reimbursed for non-normal costs of salaries and wages; operating expenses; capital costs; and compensation payments.</td>
</tr>
<tr>
<td>Rules for valuation</td>
<td>For destroyed property, the value is assessed immediately prior to destruction. For livestock, the market value of animals destroyed and dead as a result of the disease is based on farm-gate price. If applicable, a second, top-up payment compensates for the difference between the market value of the equivalent livestock on the date restocking eligibility is granted and the previous compensation.</td>
</tr>
<tr>
<td>Conditionality</td>
<td>Unless in a sector with GVP less than AUD 20 million, a livestock owner must be represented by one of the industry organisations that are EADRA signatories to be compensation eligible. Industry parties must advise their members to notify authorities within 24 hours of an incident. Also, a state/territory may lose its claim to cost-sharing through failure to notify the Consultative Committee on Emergency Animal Diseases of an incident within 24 hours. Livestock holders must notify the appropriate authority within 24 hours of dead animals or about “the occurrence of a confirmed or reasonably held suspicion of an emergency animal disease (not including a disease investigation where the provisional diagnosis is that the disease is endemic although it is known that the disease may be an emergency animal disease)”. Industry parties have also committed to development of biosecurity plans.</td>
</tr>
<tr>
<td>Timeframe for compensation</td>
<td>A holder’s initial compensation claim must not follow livestock death or destruction by more than 90 days; a request for a valuation of restocking cost needs to be made within 30 days of notification of restocking eligibility; and a claim for a second compensation payment has to be made within 21 days of receipt of the second valuation’s results. Compensation payments are made in short order by the states/territories.</td>
</tr>
</tbody>
</table>

*Source: OECD (2012).*