2019 ANIMAL BIOSECURITY RD&E SNAPSHOT REPORT

animalhealth AUSTRALIA

A REVIEW OF AUSTRALIAN ANIMAL BIOSECURITY RD&E EFFORTS

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ACN 071 890 956

Animal Health Australia contact details:
PO BOX 5116, Braddon ACT 2612
+61 2 6232 5522
aha@animalhealthaustralia.com.au
animalhealthaustralia.com.au

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EXECUTIVE SUMMARY

The NABRDES is managed by Animal Health Australia (AHA) under the National Primary Industries Framework as an outcome of the first Intergovernmental Agreement on Biosecurity (IGAB). The NABRDES aims to implement cross-sectoral RD&E through collaboration to optimise the efficiency of resource allocation to protect Australia's globally enviable animal health status, market access credentials and animal disease management preparedness.

In 2014 the NABRDES produced the first animal biosecurity Snapshot report in which 23 different organisations participated, reporting 331 projects current as at 1 August 2014. The 2014 Snapshot was conducted using an online survey with a separate spreadsheet to record research, development and extension (RD&E) projects.

In 2018, an updated version of the NABRDES was adopted, and included updated priorities for animal biosecurity RD&E. The 2019 Snapshot tested the relevance of the new NABRDES priorities with participants and sought an update on the RD&E projects completed and underway since the 2014 Snapshot.

Overall, the Snapshot survey found that:

- the NABRDES Tactical Priorities were all highly important to animal biosecurity RD&E
- funding and institutional barriers were the main challenges to conducting animal biosecurity RD&E
- awareness of the NABRDES was high
- organisations were involved with the NABRDES principally through scientific, market access or public health initiatives
- a majority of participants considered the NABRDES to be important to their organisation
- the NABRDES should focus on delivering outputs in the areas of RD&E collaboration, communication, coordination and identifying investments to improve cross-sectoral animal biosecurity RD&E (noting that the NABRDES does not have funding for RD&E).

A total of 345 current, and 259 previously completed (from 2014-2019) animal biosecurity RD&E projects totalling investment of over $200M were reported by participants in the 2019 Snapshot. Considering the 2014 and the 2019 Snapshot reports identified over 330 projects current at a single point in time, the recorded 259 projects completed from 2014-2019 appear to have been under-reported. The reporting of projects in the Snapshot report is dependent on an individuals' ability to access whole of organisation project records, their interpretation of what is in or out of scope, different (and changing) definitions of 'biosecurity'. The NABRDES management also acknowledges that data from approximately 10 organisations that have invested in biosecurity

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(as defined by the NABRDES) initiatives post the last snapshot were not captured in the current snapshot because of time limitations.

Summarising the snapshot findings, the majority of R&D reported were disease related, whereas, the majority of the reported investment was directed to management of pests (vertebrates and invertebrates). Investments in these areas spanned the invasion curve, with the largest investment in projects for prevention and protection (protecting assets). Investments into prevention were largely aimed at exotic pest/disease entry and to training and surveillance activities. Process and techniques required for rapid detection of disease/condition are considered to have a high potential for application within other sectors and presents an opportunity to encourage cross-sectoral collaboration. Surveillance, which is largely used to support evidence of absence or to detect and prevent disease spread, had the greatest reported investment amount of all of the Tactical Priorities. This indicates a potential duplication risk or an opportunity for greater collaboration/ coordination. Further to this, the study of antimicrobials and zoonoses were also noted to be at risk of duplication.

Cross referencing the investment in projects against the NABRDES Tactical Priorities, traceability was highlighted as a potential gap. Traceability had the lowest reported investment amount, despite being identified as one of the most important priorities to animal biosecurity RD&E. Other potential gaps identified in animal biosecurity RD&E included the prevalence and impacts of pasture weeds, the three D's (disposal, destruction and decontamination), water quality and its potential to pose a risk to enterprise biosecurity or animal health, training of detector dogs for biosecurity risk detection and extension resources. The role of social science initiatives and how they might influence adoption of biosecurity practices through animal supply chains was also considered an opportunity where cross-sectoral collaboration would enable this gap to be efficiently managed.

ACRONYMS

AGSOC	Agriculture Senior Officials Committee
AHA	Animal Health Australia
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CEBRA	Centre of Excellence for Biosecurity Risk Analysis
FMD	Foot and mouth disease
IC	Implementation Committee
IGAB	Intergovernmental Agreement on Biosecurity
NABRDES	National Animal Biosecurity Research, Development and Extension Strategy
NAWRDES	National Animal Welfare Research, Development and Extension Strategy
R&I	Research and Innovation
RDC	Research and Development Corporation
RD&E	Research, Development and Extension
SFO	State Farming Organisation

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- Fisheries Research and Development Corporation
- LiveCorp
- Meat and Livestock Australia

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- Malcolm Letts, National Biosecurity Committee
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1. INTRODUCTION

1.1 BACKGROUND

The NABRDES is one of seven cross-sectoral RD&E strategies under the Australian Government's National Primary Industries RD&E Framework that is aimed at promoting collaboration and continuous improvement in the national investment of RD&E resources.

The first version of the NABRDES was published in 2014, and a key output of that strategy was the 2014 Snapshot. The 2014 Snapshot involved an online survey to capture information on stakeholder knowledge and attitude towards animal biosecurity RD&E and to capture a register of animal biosecurity RD&E projects. A total of 33 different organisations were contacted to participate in the survey, with 23 responses received, reporting 331 unique projects current at the 1st of August 2014. The projects identified showed a clear focus on research as opposed to development or extension. The 2014 Snapshot also identified the need for stakeholders to have better coordination of declining resources, better cross-sectoral communication and rationalisation of funding and networking as key activities and/or outcomes of the NABRDES.

In 2017 the process to update the NABRDES was initiated, with the new strategy being endorsed by the Agriculture Senior Officials Committee (AGSOC) Research and Innovation (R&I) Committee in August 2018. Following endorsement, providing an updated RD&E Snapshot was identified as a priority output for the new strategy. The survey for the 2019 Snapshot (Appendix 1) was framed around the survey utilised in 2014, enabling its use as a benchmark for the results of the current Snapshot.

For the purposes of this report, biosecurity is defined as:

The management of risks to the economy, the environment and the community from pests and diseases entering, emerging, establishing or spreading.

1.2 PURPOSE

The goals of the 2019 RD&E Snapshot survey included identifying if the RD&E priorities in the NABRDES are aligned to stakeholders' expectations of priorities for animal biosecurity. Furthermore, the survey aimed to identify animal biosecurity RD&E gaps as well as the ways in which the participating organisations can, and are, contributing to the NABRDES. The second section of the Snapshot report describes the current and past animal biosecurity RD&E activities of all of the major investors, providers and users across Australia.

2. METHODS

2.1 SCOPE OF WORK

The scope of the NABRDES was the framework that defined the Snapshot questionnaire. It included:

- endemic, emergency and emerging animal pests and diseases relevant to market access and livestock health
- animal welfare issues relevant to pests and diseases that impact livestock health
- animal health barriers to market access, where market access relates to any of the stakeholder industries having access to supply a market, whether it be domestic or export
- public health in relation to food and fibre as well as zoonoses.
- biosecurity at a national, state, regional and enterprise (farm gate) level.
- cross-sectoral RD&E, with cross-sectoral defined as where there are two or more stakeholders who have a shared priority/ investment/ interest in an RD&E issue. The Strategy acknowledges the continued importance of single-sector RD&E, but the focus of the Strategy is on cross-sectoral investments.
- a strong focus on extension to increase knowledge transfer to the farmer and reduce adoption time.

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The scope of the NABRDES and this Snapshot does not include:

- Companion animals (other than where there are effects on public health or market access of livestock)
- Wildlife (other than if there are effects on market access or livestock or public health).

Within this scope, 'livestock' is interpreted as animals kept/harvested for use or profit including any class of cattle, sheep, goats, pigs, horses (including mules and donkeys), poultry, emus, ostrich, alpaca, deer, camel or buffalo, and farmed/harvested aquatic species (including crocodiles, finfish, molluscs and crustaceans).

2.2 SURVEY DESIGN

The design of the 2019 survey was adapted from the 2014 survey, with changes made to make it more relevant for the current NABRDES.

Q1) What sector do you represent?

This question was very similar to the 2014 survey. One tick-box option from the 2014 survey (private companies) was split into two categories, one being a private funder and the other a private provider in the 2019 survey.

Q2&3) The table below lists the Tactical Priorities of the National Animal Biosecurity RD&E Strategy 2017 - 2022. In your opinion, how important to animal biosecurity RD&E/your organisation are the following biosecurity priorities?

These questions were adapted from question two in the 2014 survey, which was divided into two questions for the 2019 survey. The first of these asks about importance with regards to animal biosecurity and the second about importance to the participants organisation. In the 2014 survey this question asked about the participants organisation only. This change was made as organisation priorities greatly differ based on the objectives of the organisation, and some (namely Universities) do not have strict priority areas. In addition to this, the categories listed in the table were changed from a series of biosecurity capabilities in the 2014 survey, to the Tactical Priorities from the current NABRDES.

Q4&5) With regards to animal biosecurity, select the three most important RD&E challenges your organisation is facing today/ in the next 5-10 years?

In the 2014 survey these questions were asked as an open-ended response. To reduce the time burden on participants, the most common challenges listed by participants in the 2014 survey were summarised into eight tick-box options in the 2019 survey. This selection included an option to provide additional text should a particular challenge not be listed.

Q6) Before receiving this survey, were you aware of the National Animal Biosecurity RD&E Strategy?

Q7) How would you characterise your organisation's involvement in the National Animal Biosecurity RD&E Strategy?

Q8) What is the importance of this Strategy to your organisation and its RD&E goals?

Q9) What activities and/or outcomes do you expect to see over the next 3-5 years as a result of the National Animal Biosecurity RD&E Strategy?

Questions 6-9 were unchanged from the 2014 survey.

Q10) In what way do you think your organisation could best contribute to the ongoing development and implementation of the National Animal Biosecurity RD&E Strategy?

The tick-box responses for this question were modified from questions 10 and 11 in the 2014 survey to be more reflective of the current NABRDES and the ways that different organisations could be involved.

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11) Is there anything else you would like to comment about the current and future challenges of animal biosecurity RD&E, the role of your organisation or any other wider outputs you would like to see from the National Animal Biosecurity RD&E Strategy?

The final question is mostly unchanged from the 2014 survey which simply asked, 'if you have any additional comments or questions, feel free to write them here'.

Documenting of the RD&E projects was conducted separately in the 2014 Snapshot using an excel spreadsheet. The headings used in this spreadsheet were replicated into the tables provided at the end of the 2019 survey with the addition of a project summary based upon feedback of the 2014 survey that project objectives were difficult to identify from some titles.

2.3 DATA COMPILATION

Relevant livestock organisations, Governments and other RD&E Funders and Providers were identified by the NABRDES Implementation Committee (IC) to be included in the participant list. Surveys were distributed to 75 different organisations for voluntary participation and responses from 54 organisations were received and collated by the NABRDES Coordinator using Microsoft Excel (Microsoft Office Corporation 2019).

Survey questions 1 to 11 were to determine if participants were aware of the NABRDES, how their organisations interacted with it, if they agree with its priorities and what outputs they expect to see from it. Responses to these questions were separated into four groups with the first being the combined responses of all participants, followed by separate groups for Government (n = 8), research Funders (n = 18) and research Providers (n = 14).

Questions 12 and 13 asked participants to report all animal biosecurity RD&E projects currently underway, and completed since July 2015, respectively. The projects that were reported were checked to ensure they were in scope and that duplicate mentions of projects were removed. Of the 753 projects that were reported, 604 unique, in scope projects remained. In addition to the information provided by participants, projects were categorised to:

a. identify if the projects were related to a disease/pathogen, a pest (e.g. insect pests, worms, feral pigs, wild dogs etc.) or to a management practice (e.g. strategic plans, community engagement, hygiene practices, biosecurity workshops etc.)
b. identify where on the invasion curve the project appeared to be located (prevention, eradication, containment or protection).

2.3 DATA ANALYSIS

Descriptive statistics were used to provide a summary of the responses to the 'check-box' style survey questions, and thematic analysis was applied to the open response questions to identify general themes from the participant responses.

3. RESULTS

3.1 OVERVIEW

The survey was distributed to 75 different organisations (see Appendix 2) of which 54 responses were received. One organisation provided a list of projects only and did not answer the survey questions, and 16 answered the survey only and did not list any biosecurity RD&E projects. The majority of organisations that did not list any projects were peak industry councils which are less likely to directly invest in RD&E projects.

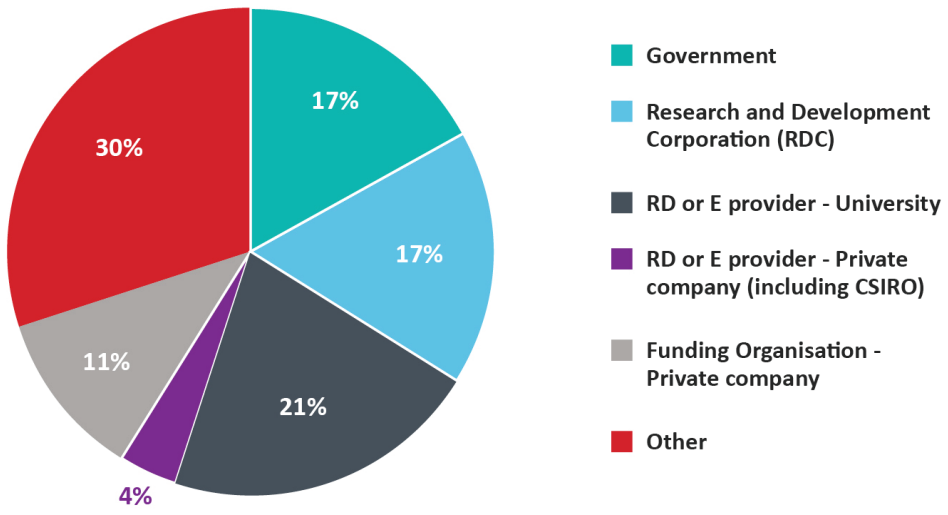
A total of 345 current biosecurity projects were reported with an additional 259 biosecurity projects completed during the last 5 years. This is similar to the 2014 Snapshot where 331 current projects were reported. It is understood that the reporting of specific animal health projects completed over the previous five years was difficult to document due to a variety of factors including time constraints and staff turnover. As a result, this list is predicted to under-represent the total projects conducted over the last five years.

3.2 SURVEY QUESTION 1

The first question identified the sector represented by the participating organisations, Figure 1. The majority of responders elected 'other' as their sector, which consisted mostly of peak bodies as well as some state farming organisations (SFO's), non-government and not-for-profit organisations.

Government included responses from Australian Government (n = 3) as well as State/Territory Governments (n = 6), one of which did not complete questions 1 – 11 of the survey. In

Figure 1. Percentage of respondents from different sectors



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addition, two State/Territory Governments that were contacted did not participate in the Snapshot. Aside from Government, responses were received from nine of the 10 RDCs and from 10 of the 12 universities that were contacted. In the 2014 Snapshot, 22 organisations identified as funders or providers including 7 government, 6 RDCs, 5 universities and 4 other independent providers.

Given the high rate of response from key organisations involved in animal health RD&E, the responses to questions 2-11 in the 2019 Snapshot survey are considered to provide a good representation of national views.

3.3 SURVEY QUESTION 2 & 3

Questions two and three from the survey were similar and based upon the Tactical Priorities identified in the NABRDES; communication, surveillance, collaboration, traceability, education/training, pest animal/weed in pasture management and policy/legislation. Question two asked participants to rate the importance of the Tactical Priorities to animal biosecurity RD&E based upon their opinion (Figure 2) and question three looked at the importance of the Tactical Priorities to the participant's organisation (Figure 3).

In most instances, at least 50% of participants rated each of the Tactical Priorities as highly important to animal biosecurity. Policy/legislation and pest animal/weeds in pasture were generally considered to be of lower importance compared to all other priorities. Surveillance and traceability were recorded as high priority areas by more than 80% of participants, with education, communication and collaboration considered as high priority by approximately 70% of participants. None of the Tactical Priorities were selected as 'not a priority' to animal biosecurity RD&E, suggesting that the NABRDES is fit for purpose and underscores the relevance of the Strategy's Program Logic and the tactical priorities through which end of program outcomes could be delivered.

Many of the participants selected the same priority levels for question three as they did for question two, however, some differences were identified. Approximately 55% of participants selected surveillance and traceability as being a high priority to their organisations, which is considerably less than the over 80% selecting it as a high priority to animal biosecurity RD&E in the previous question. When Government, Funders and Providers were viewed separately, the decrease in importance of surveillance and traceability to Funders and Providers was greater than for Government organisations.

One meat industry participant identified pest animals/weeds as not a priority to their organisation as did two wildlife participants for traceability and one RD&E provider for surveillance. Education/training was identified as the most important priority to RD&E Providers which is not unexpected as the majority of Providers were universities. Collaboration and education/training were identified as equally the most important priorities to RD&E Funders and communication was the highest priority for Government.

Figure 2. In the participants opinion, how important to animal biosecurity RD&E were the tactical priorities?

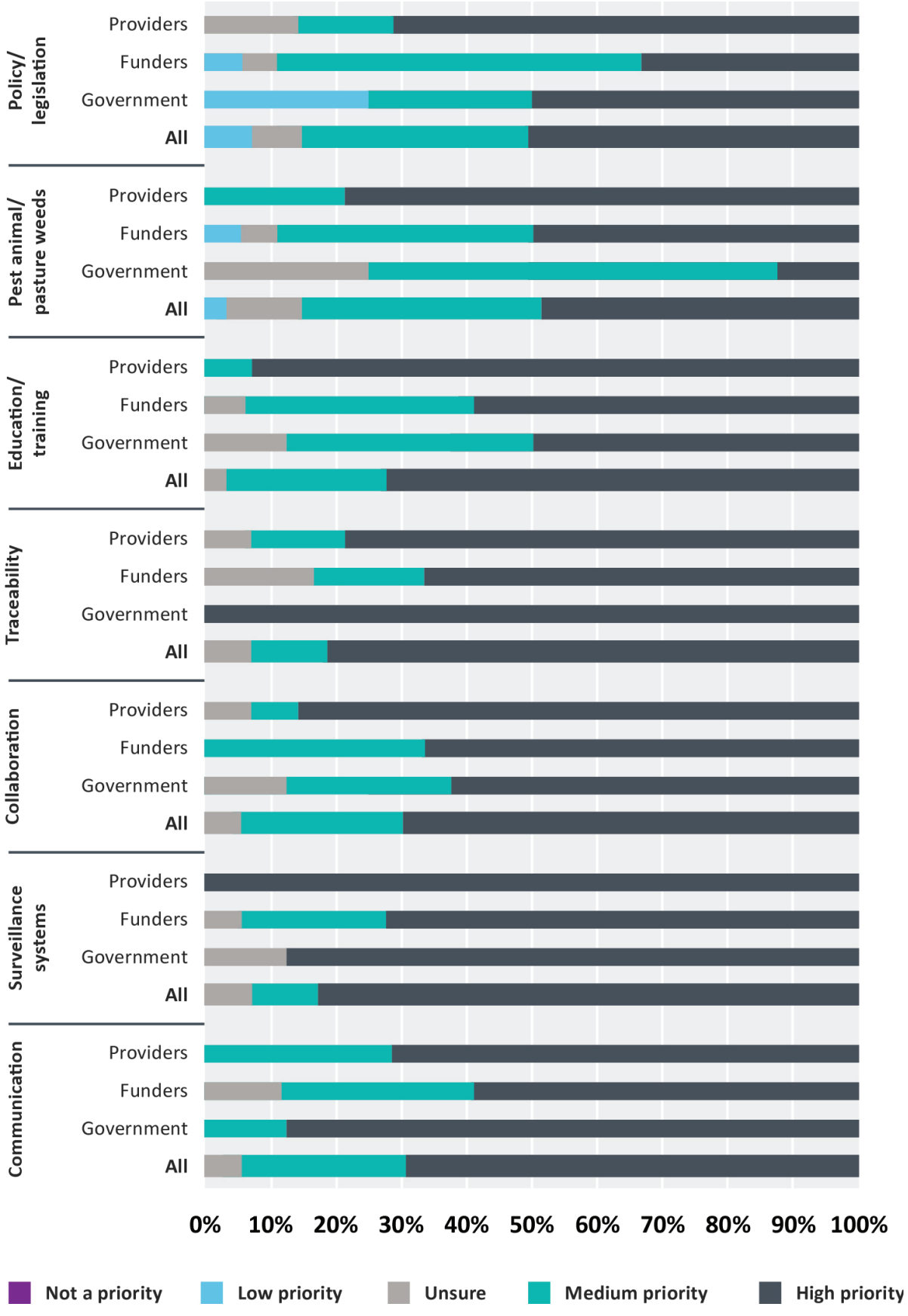
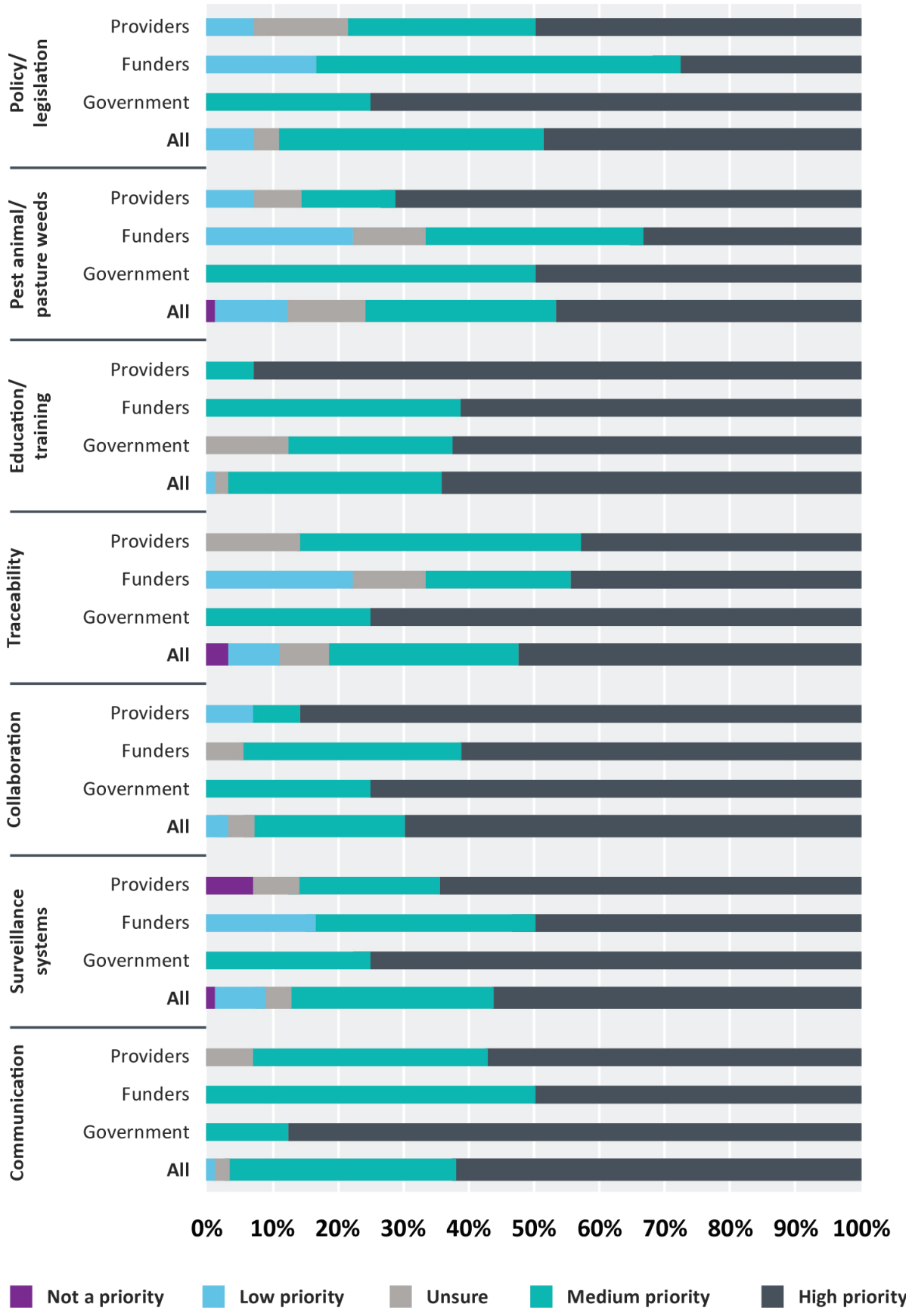


Figure 3. In the participants opinion, how important to their organisation were the tactical priorities?



3.4 SURVEY QUESTION 4 & 5

Survey questions four and five asked the participants what, in their opinion, were the current and future (respectively) biggest challenges in the animal biosecurity space (Table 1).

In the 2014 Snapshot report, resourcing and funding were identified as the main challenges facing participants. Funding was also identified as a key challenge in the current Snapshot; however, 'resources' was only the fourth most chosen challenge behind institutional barriers and staff skills and capability. The ranking of the challenges varied slightly between Government, Funders and Providers. Government and Providers had the greatest emphasis on funding as a challenge, where Funders indicated they were more restricted by institutional barriers. Secondary to these challenges, 'staff skills' was listed as a common challenge followed by 'resource availability'. Communication, collaboration and tools and technology were not highly rated as challenges in the animal biosecurity RD&E space.

Many participants provided the same response to both questions four and five, suggesting that participants may feel current challenges will not be remedied in the next 5-10 years.

Other current challenges listed by participants included the funding of non-industry specific RD&E (public interest, social science and cross-sectoral issues) and a lack of a national strategic direction and coordination.

Participants also noted the difficulties faced in the transfer and uptake of knowledge to end users with government becoming less involved and industry struggling to compensate for this.

Participants indicated that other challenges in animal biosecurity that could be faced into the future include a lack of public support and national coordination contributing to a growth in animal activism and difficulties in building trust, benchmarking practice change and implementing lethal pest control. Communication was identified as a challenge to drive a shared responsibility, promoting evidence of absence, responsiveness to community needs and preparing industry for opportunities, risks and technological advancements. Operating in a cross-sectoral environment was postulated as another future challenge where RD&E projects may not be developed for a unified whole of system purpose or benefit, and collaboration to improve One Health is not fully utilised.

3.5 SURVEY QUESTION 6-8

Question six asked participants if they have heard of the NABRDES prior to being sent the survey. Overall, 77% of participants indicated that they had heard of the NABRDES prior to being sent the survey with 15% selecting no and 8% unsure. This result is influenced by the individual within the organisation that received and completed the survey as it was identified that known organisations to the NABRDES had selected 'no' or 'unsure'. All participants of the 2014 Snapshot were aware of the NABRDES,

Table 1. The percentage of current and future challenges of animal biosecurity selected by participants

	All		Government		Funders		Providers	
	Current	Future	Current	Future	Current	Future	Current	Future
Funding	24%	22%	26%	24%	22%	20%	28%	33%
Resource availability	14%	17%	17%	16%	9%	15%	16%	20%
Collaboration/ knowledge sharing	10%	10%	9%	12%	9%	11%	12%	8%
Staff skills and capability	16%	17%	17%	16%	19%	19%	12%	10%
Institutional barriers	22%	18%	17%	8%	28%	20%	19%	20%
Communication	10%	9%	13%	12%	9%	9%	7%	5%
Lack of specific tools and technologies	5%	7%	0%	12%	4%	6%	7%	5%

with approximately half indicating that they were also familiar with its content.

Question seven asked participants to identify the involvement of their organisation with the NABRDES (Figure 4). As 23% of participants indicated that they were 'unaware' or 'unsure' of the NABRDES prior to receiving the survey, some level of inaccuracy was expected with the responses to question seven.

Participants were asked to select up to three drivers of their organisation's involvement with the NABRDES from a list of five options, and also encouraged to identify other drivers if needed. Overall, 'scientific/technical contributions' was the most commonly selected driver followed by 'public health' and 'trade'. This same result was found in the 2014 Snapshot report. The weightings of the selection of key drivers in the 2019 Snapshot was very similar across Government and Funding participants, however, the results of Providers differed (Figure 5).

Providers put a much greater emphasis on contributing to the NABRDES through scientific and public health drivers, with little nomination towards financial, political and trade. This is expected as providers often require funding from external sources to conduct RD&E and have little political power or interest, and ultimately little influence over market access.

Figure 4. Drivers of involvement of all participant organisations with the NABRDES

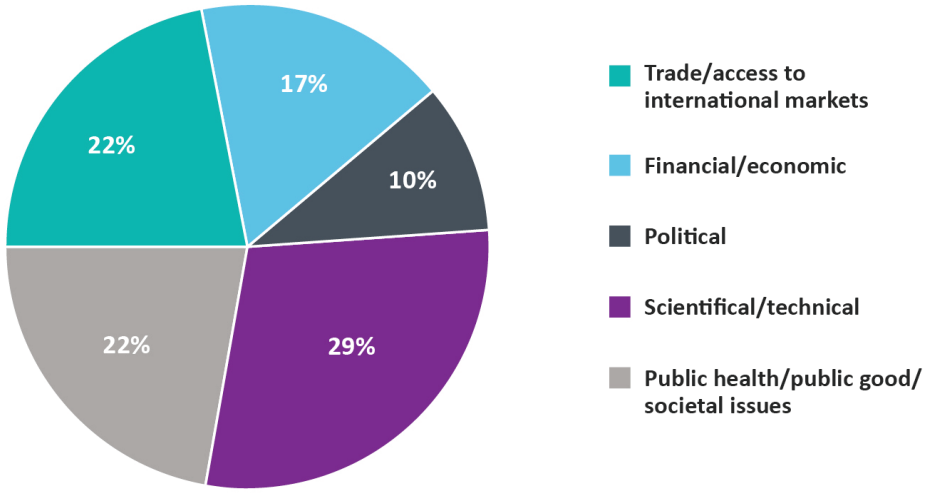
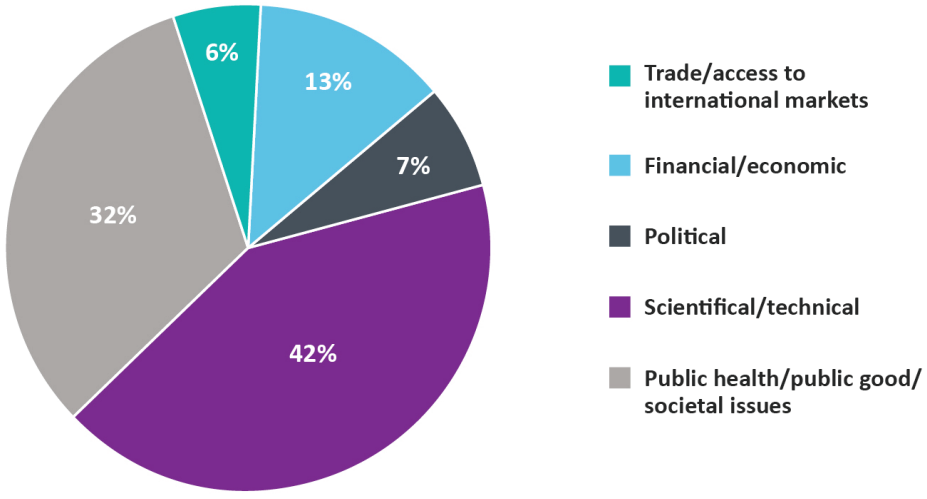


Figure 5. Drivers of involvement of participating provider organisations with the NABRDES



Some additional comments were offered where a Government participant indicated that they are not necessarily involved in the NABRDES but can utilise the NABRDES for their projects. A Funding participant indicated that their involvement could include being representative of producers and a Provider listed their involvement was in education and training.

Following this, question eight asked participants to rank the importance of the NABRDES to their organisation and its RD&E goals. Approximately 59% of participants considered the NABRDES to be either 'important' or 'highly important' to their organisation, with 37% listing it as 'somewhat important' and 4% as having 'little importance'.

3.6 SURVEY QUESTION 9

Survey question nine required a written response regarding what outcomes participants expected to see over the next 3 – 5 years from the NABRDES. The majority of participants provided comments to this question (n = 40) which were grouped in common themes for presentation of the results.

The most common theme in the responses to this question related to the NABRDES Tactical Priority, 'collaboration'. Participant views were that the NABRDES should help to increase collaboration across industries to aid with sharing tools and information, reduce RD&E duplication, improve RD&E and resource efficiency and also to improve animal industry preparedness.

Communication, coordination and investment were also commonly mentioned outcome areas expected from the NABRDES. Similarly, participants noted that the NABRDES should facilitate communication between industries to promote biosecurity tools and information sharing. Communication was noted as a key driver to improve awareness of biosecurity issues and actions for all levels of the animal industry supply chain. Furthermore, participants also drew attention to the importance of communication to promote awareness of the NABRDES and wider RD&E.

The reported need for improved coordination was referred to by participants alongside other key words including investment, communication and collaboration. In addition to these, participants would like to see the NABRDES promoting greater national coordination of the approach to the biosecurity landscape including;

- alignment of State/Territory and national strategies
- management of industry biosecurity issues
- communication and cooperation between agencies
- cross sectoral RD&E effort.

Participants indicated they had the expectation that the NABRDES will facilitate increased investment into cross-sectoral animal biosecurity RD&E to help reduce biosecurity threats and produce benefits for multiple industries. An improvement in the coordination and prioritisation of investment was also noted with the need for an increase in security of investment through committed funding and evidence based agreed priority areas for funding. The need for the NABRDES to identify more funding opportunities was also raised by multiple participants.

Management of resources, risk, duplication, gaps and surveillance were additional outputs suggested by a smaller number of participants. Participants wanted to see better management of resources including skills shortages and succession planning along with greater availability and updating of resources and technologies. In addition, a greater understanding and detection of risks and risk management including tools to assist with risk management and a more objective analysis of risk with a more unified approach. The importance of avoiding duplication and identifying RD&E gaps to notify RD&E funders and providers of priority areas was also highlighted. Consistency, collaboration, availability, integration and awareness of surveillance were also listed as outputs expected from the NABRDES.

Other comments from participants related to the improvement of preparedness, identifying gaps and opportunities, and encouraging national consistencies.

The expected outcomes reported in the 2014 Snapshot were not dissimilar to these. Participants in that survey also highlighted the need for improved cross-sectoral coordination and communication, particularly for improved funding and resource management.

3.7 SURVEY QUESTION 10

Question 10 asked participants to nominate from six tick box options and/or add additional text, on the ways in which their organisation can best contribute to the NABRDES (Figure 6).

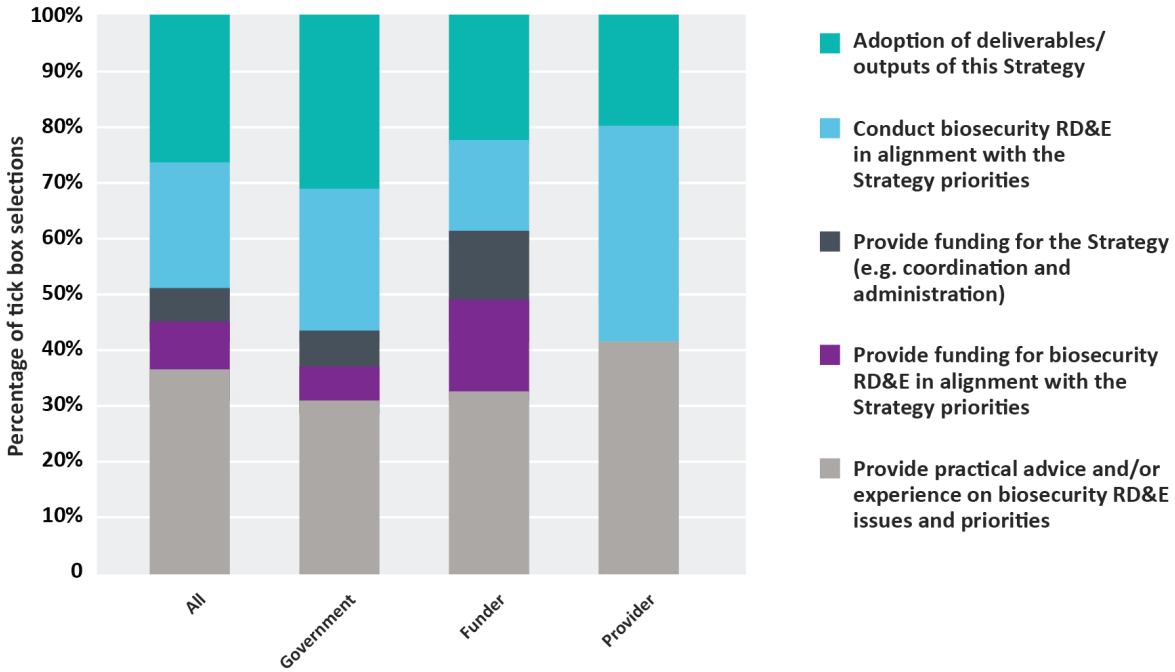
Providers selected options mostly weighted towards providing advice and conducting RD&E, with no Providers indicating they could provide funding for the NABRDES or for RD&E. One provider indicated in their written response that they could potentially provide funding for the NABRDES similar to the structure of the National Animal Welfare RD&E Strategy (NAWRDES). This funding structure is on a membership basis where any organisations wishing to be involved in the strategy pay a set annual fee which covers the cost of managing the strategy.

Government participants indicated involvement very similar to the overall findings of mostly providing advice, conducting RD&E and adopting findings of the NABRDES, with a small number indicating they would provide funding. Funding bodies indicated a greater capacity than government to provide funding to support the NABRDES and RD&E, and a lower capacity to conduct the RD&E. Additional comments from participants indicated that their organisations can share their experience and connections with other industries and agencies.

3.8 SURVEY QUESTION 11

Survey question 11 was the second and final open-ended question asking participants for any additional comments on the NABRDES or the survey. There were 18 participants who chose to provide additional comment in this section, two from Government, nine Funders, three Providers and four other participants. The responses to this question were mostly

Figure 6. Percentage of tick box selections on organisation involvement with the NABRDES



unique, and some were in relation to aspects already covered in previous questions. Those comments that discussed areas not previously noted could be summarised in the following areas or topics:

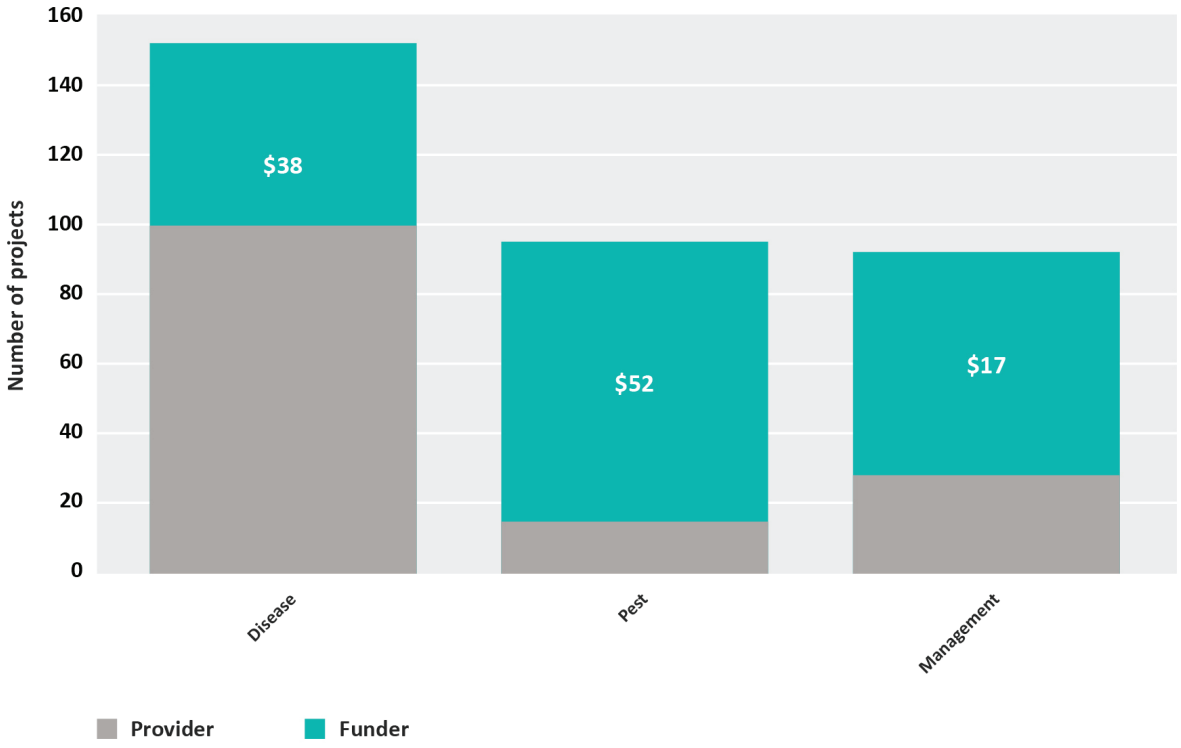
1. Need for partner investment in the RD&E strategy.
2. Need for the strategy to support specific research areas and produce outcomes. Traceability, Farm Biosecurity, zoonoses and tools to respond to biosecurity threats were identified.
3. Need for increased collaboration within the sector and with other sectors. More specifically participants identified a need for:
    - better alignment with other sectors RD&E strategies, to ensure similar approaches for development, implementation and evaluation
    - better collaboration between organisations to support capacity building
    - cthe creation of collaborative research entities, such as CRCs or Centres of Excellence.
4. Need for integrating social sciences into animal biosecurity RD&E.
5. Some research providers further discussed the institutional barriers due to changes in legislation, reducing the national capacity for biosecurity research.

3.9 SURVEY QUESTION 12 - CURRENT PROJECTS

A total of 345 current projects with a reported investment of $106,524,220.49 were reported (51 duplicate projects were removed). A summary list of the project topics is provided in Appendix 3.

Participants were asked to provide information on the project title, objectives, impacted species, alignment with NABRDES Tactical Priorities and if it is a research, development and/or extension project. Funding bodies were also asked to provide the financial budget for each project; however, approximately 6% of these projects did not include budget details. For those projects reported with a budget, some had indicated that the budget was annual, some as a total

Figure 7. The number of current animal biosecurity RD&E projects covering a disease, pest or management tool reported by providers and funders and the money invested (million) into projects reported by funders



budget and others not identified. Given this information, the financial information presented in this Snapshot is only used to indicate possible trends.

Once the project data were compiled and duplicates of projects were removed, the projects were categorised based on whether they involved a disease (including viruses or other pathogens), a pest (vertebrate and invertebrates) or a management tool (e.g. strategic plan, training course, community engagement etc.). From the information provided in the project title and objectives, the projects were also estimated as to where they would be placed on the invasion curve from prevention to eradication, containment or protection.

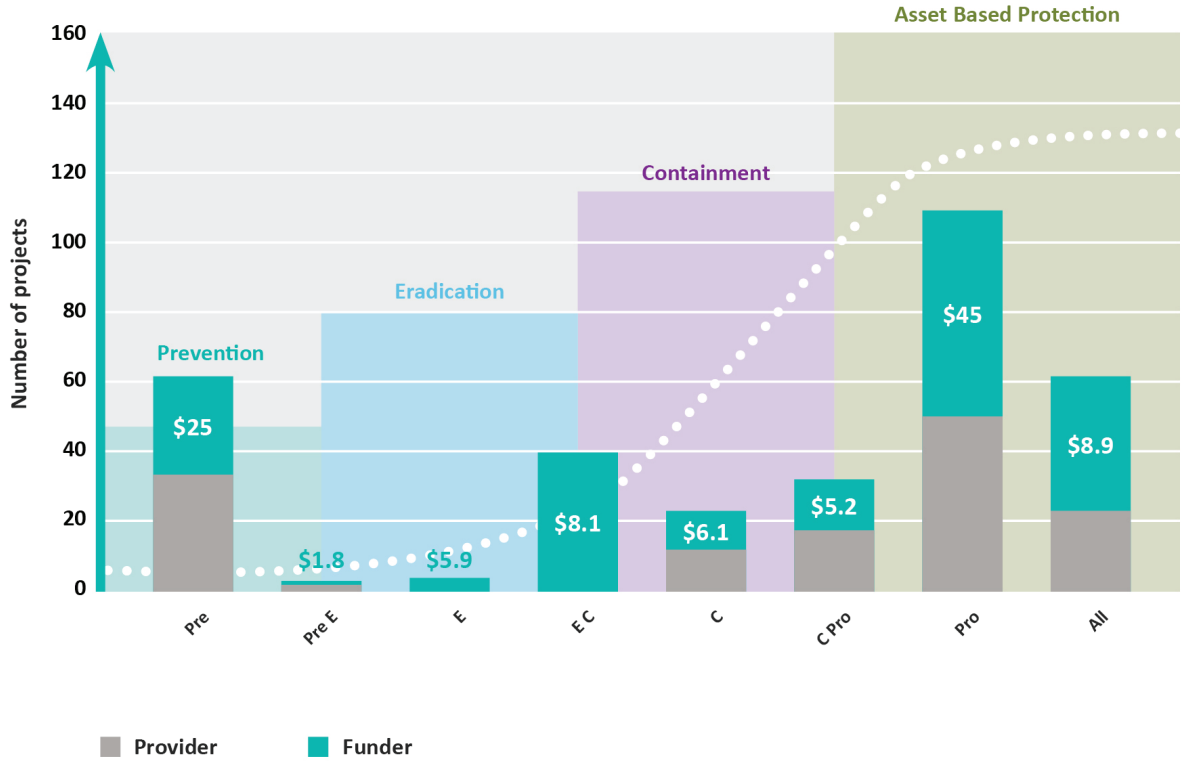
The greatest number of projects that were reported were from Providers in relation to disease, followed by the $52M reported investment in pests by funding bodies (Figure 7). Few disease related projects were reported by Funders in comparison to those reported by Providers, which may indicate gaps in RD&E reporting by funding bodies, or that Providers internally fund a substantial amount of disease RD&E. Specific disease related projects that recorded five or more individual projects on that topic included:

- antimicrobials
- diagnostic techniques
- FMD
- surveillance
- vaccination
- white spot disease
- zoonoses
- overseas disease investigations with Australian relevance.

These projects present a potential opportunity for coordination to encourage collaboration, and for some, projects could potentially be expanded to be made relevant across multiple sectors.

The largest amount of funding reported was towards vertebrate and invertebrate pests.

Figure 8. The number of current animal biosecurity RD&E projects undertaken in different areas of the invasion curve and the money invested (million) into projects reported by funders. Areas of the invasion curve are PRE = Prevention, E = Eradication, C = Containment AND PRO = Protection.



The main investments into invertebrates were towards RD&E of sheep blowfly, ticks, and tick related disease as well as fewer numbers of projects looking at nematodes and other parasites. Almost $37M of the total investment reported into pests was allocated towards specific vertebrate pests. Of this amount, approximately $12M was towards wild dogs and foxes, $10M towards deer, $7.5M towards carp control, and $7.5M in rabbit and rodent control.

Projects in the area of management without reference to a specific pest or disease were fewer in number and budget. A large portion of these projects were centralised around training and engagement activities, and the collection/ management of information for strategies, manuals, workshops and other reference type materials. Many of these projects are relatively non-specific to a particular biosecurity risk/ practice, creating a potential opportunity to combine projects, pool resources and encourage collaboration. This is particularly beneficial for RD&E gaps that are highly important and impact on all industries such as disposal, destruction, decontamination and water quality which were rarely reported.

The objectives of each project were viewed to determine where along the invasion curve the project best fit, prevention, eradication, containment or protection (Figure 8). Investments in the preventative space were mostly towards high risk exotic diseases such as FMD and zoonoses, and preparedness activities including training, surveillance and enhancing capability. Many projects in the preventative space, although linked to a specific risk, include fundamental processes to their success (such as in diagnostics and detection) that have the potential to be adapted to be of use to other sectors e.g. technical advances in one diagnostic flowing through to other diagnostic tests. This presents an opportunity for coordination and identification of specific collaborative projects in which existing projects could be adapted for greater animal industry benefits and resource efficiencies.

Eradication and containment efforts were primarily directed towards pests and diseases that are not widespread throughout Australia including cattle tick (and related disease), European carp and pacific oyster mortality virus in the aquaculture industry. Investments

Figure 9. The number of animal biosecurity RD&E projects reported by providers and funders and the money invested (million) into projects reported by funders. R = Research, D = Development and E = Extension.

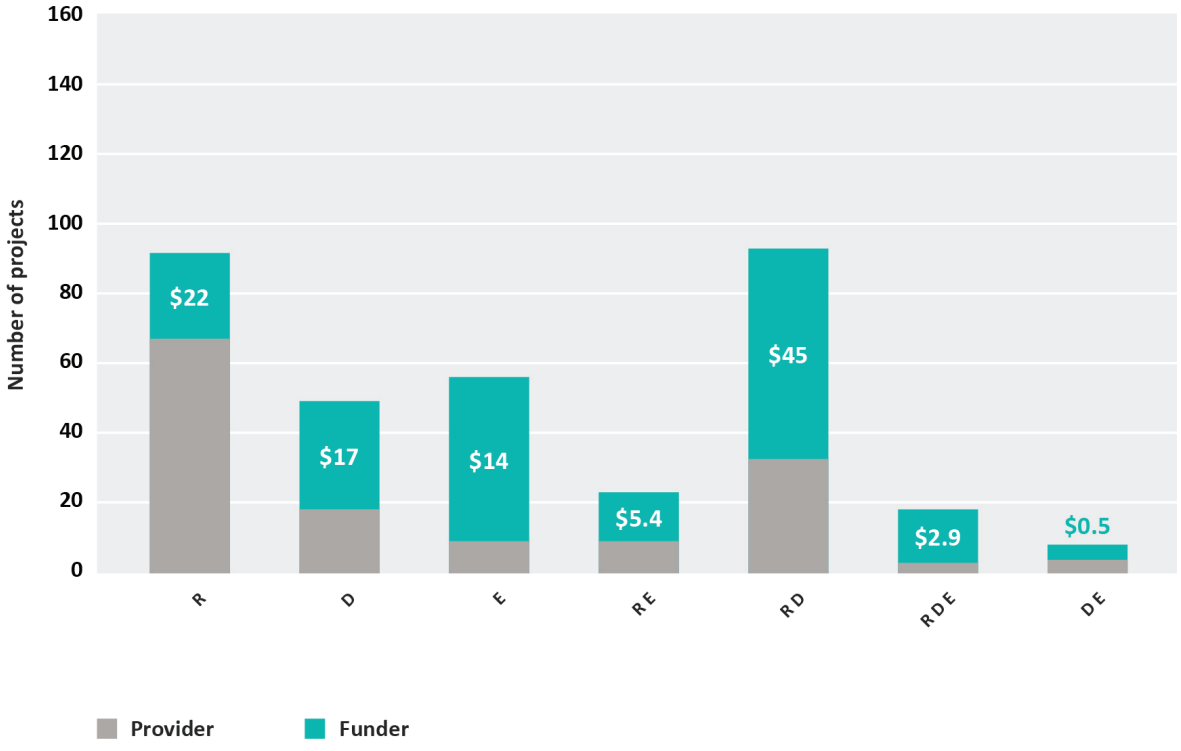


Figure 10. The number of current animal biosecurity projects associated with each tactical priority reported by providers and funders and the money invested (million) into projects reported by funders

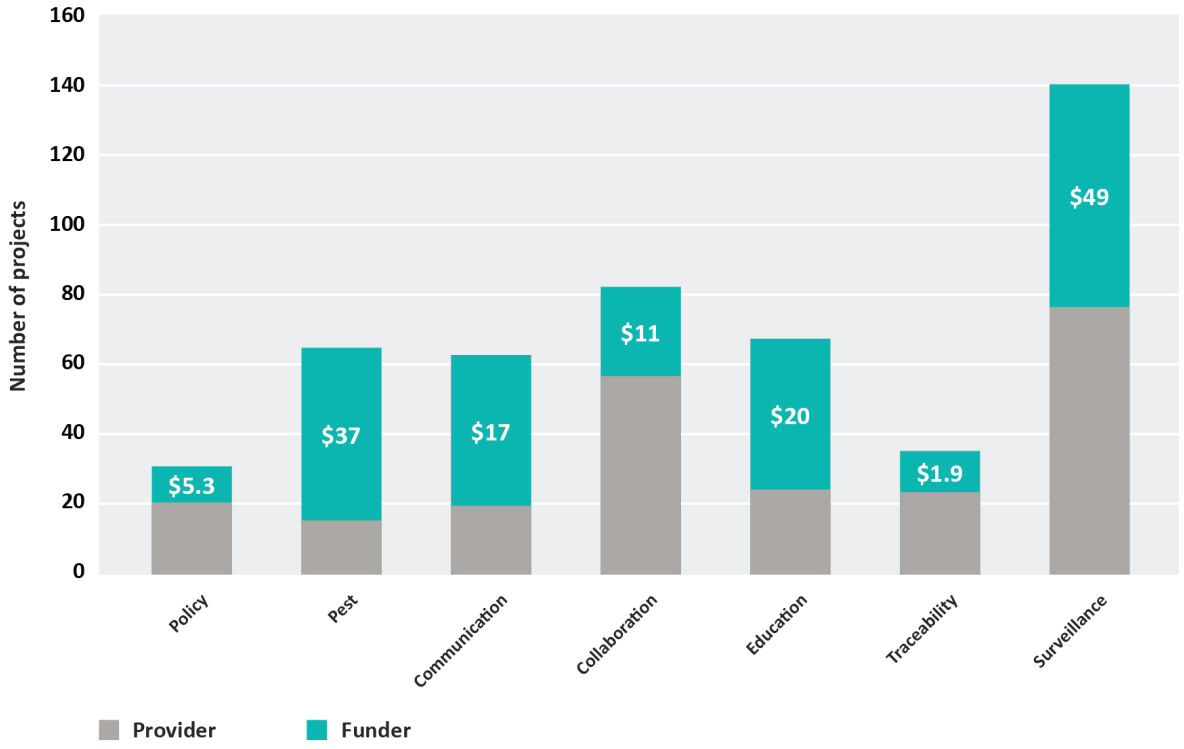
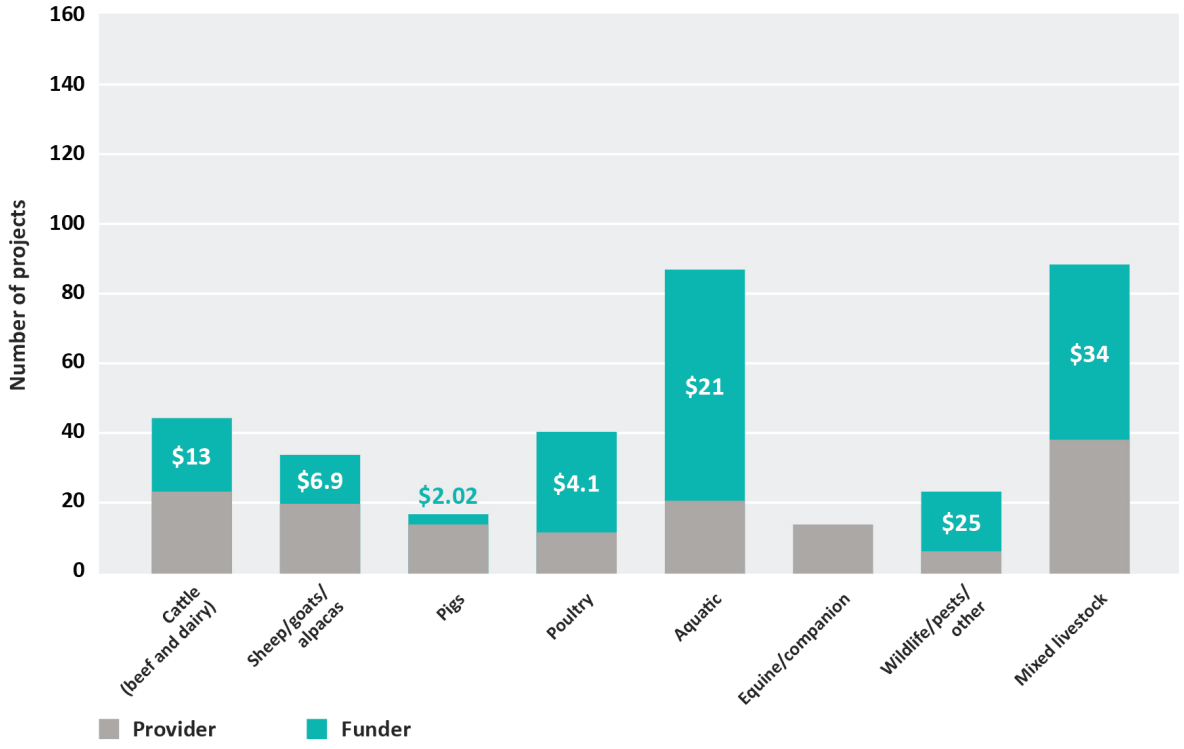


Figure 11. Number of current projects by species reported by providers and funders and the money invested (million) into projects reported by funders



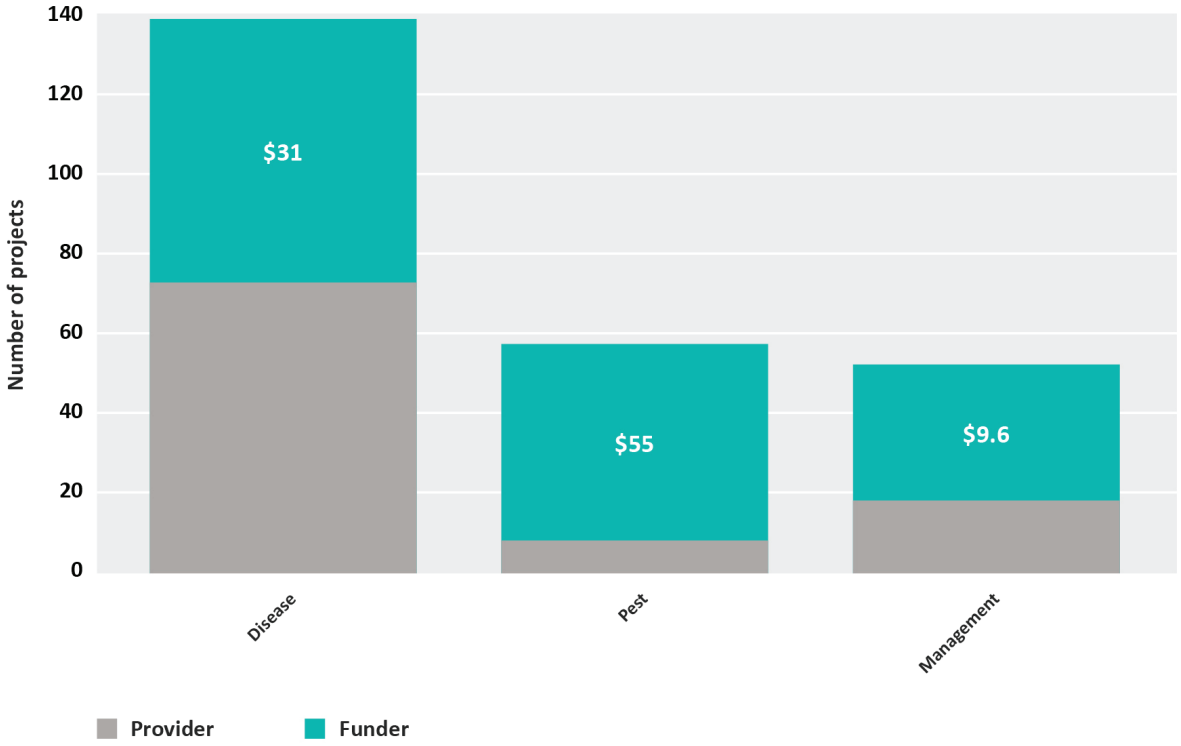
into eradication and containment are unlikely to have as large of a return on investment as projects in the preventative space but will have a greater return then investments into protection. Investment into this space is expected to be lower than prevention and protection as there are few outbreaks or emerging/isolated pests and diseases of animals within Australia. Work in the protection space is often ongoing in an attempt to reduce the impact of endemic pests and disease such as investigations into the use of antimicrobials, vaccine development and rabbit and blowfly control.

When reporting projects, participants were asked to indicate if the projects were research, development and/or extension focused (Figure 9). In the 2014 Snapshot report, research was noted as the predominant focus area, with development and extension falling much further behind. This is similar to what is seen in the current Snapshot summary where a greater amount of resources has been allocated to "R". As a large number of projects were reported as "R", "D", and "R D", similar to the 2014 Snapshot, "E" appears to have the least amount of resources invested.

In the reporting of projects, participants were asked to indicate which of the Tactical Priorities (up to two) from the NABRDES reflected the objectives of each project (Figure 10). Surveillance was selected most often and reported the greatest investment amount in money and project numbers, reflecting the results of question 2 and 3 of the survey which noted surveillance as one of the most important Tactical Priorities. Second to Surveillance in funding, RD&E of Pest Animals/Weeds reported $37M in project funding, and second in project numbers was Collaboration.

Along with Surveillance, Traceability was also noted as one of the highest priority areas for animal biosecurity RD&E in question two of the survey. Dissimilar to Surveillance, Traceability had the lowest reported investment amount and the second least number of reported RD&E projects of all the Tactical Priorities. Although this does indicate a gap in traceability, activity in this space is increasing as the Department of Agriculture recently put forward $7M in grants over the next four financial years for traceability programs.

Figure 12. The number of animal biosecurity RD&E projects focused on a disease, pest or management tool reported by providers and funders and the money invested (million) into projects reported by funders only during July 2015 to June 2019.



The greatest number of projects reported were focused towards aquatic species and mixed livestock (Figure 11). Aquatic pest species were categorised as aquatics as opposed to pests, where approximately 40% of the aquatic projects reported were related to carp control.

Projects affecting mixed livestock species included RD&E into diseases that affect multiple species and training, information, guidelines and resources that have cross-sectoral relevance. Within this, project areas that may benefit from pooling resources through cross-sectoral collaboration (potentially also with human health) include antimicrobials, surveillance activities and zoonoses (e.g. Q-fever). The largest investment of resources into mixed livestock was for FMD related activities which totalled approximately $14M.

For the main livestock industries, cattle, sheep, pigs and poultry, the amount of reported money invested into RD&E is somewhat reflective of the GVP of each of those industries. Cattle have the greatest GVP and the greatest reported RD&E spend, followed by sheep, poultry and pigs. One variation that can be seen is that although poultry had a smaller reported RD&E budget compared to the sheep industry, a greater number of RD&E projects were reported. Sheep did include goats and alpacas, however, this equated to only three of the 30 reported projects. Projects related to sheep biosecurity are expected to increase into the future with the establishment of the National Sheep Industry Biosecurity Strategy and Action Plan that is committed to investing in sheep biosecurity and extension.

3.10 SURVEY QUESTION 13 – PAST PROJECTS

A total of 259 projects completed during July 2015 to June 2019 were reported at a total cost of $95,847,625.31 and is bound by the same limitations as mentioned in 3.9. As this is almost 100 projects fewer than what were reported in section 3.9 and is spanning over a much greater duration, it is suspected that there was a substantial underreporting on this question.

Underreporting may be linked to a variety of reasons which may include:

- accessibility to RD&E records
- staff turnover
- time constraints
- interpretation of what is in scope
- interpretation of the definition of biosecurity
- absence of RD&E reporting by several key organisations.

Assuming that over 300 animal biosecurity RD&E projects are completed annually (based on number of current projects reported), an estimated number of 1,500 projects would have been completed over a 5-year period. This suggests that the 259 projects reported may only account for approximately 17% of actual animal biosecurity RD&E efforts during this time. A summary list of the project topics is provided in Appendix 4.

The distribution of projects and funding between disease, pest and management RD&E was very similar to what was reported in question 12 with Providers reporting the majority of disease projects and pests reported with the greatest funding (Figure 12). The reported investments into invertebrate pests ($1.5M) varied slightly with a greater focus towards nematodes and flies with few tick related projects reported. Investments in vertebrate pest RD&E ($45M) also varied slightly where there was much less of a focus on aquatic pests ($3.9M) and a larger focus towards control of rabbits ($15M). Wild dog impact management was also heavily invested in ($11M), followed by investment into non-species specific control ($9.5M), foxes ($3.1M) and feral pigs ($2.6M).

Reported past investment into specific areas along the invasion curve (Figure 13) was very similar to what was reported for current projects. Prevention and protection were again the main areas of investment in animal biosecurity RD&E. Investments into current RD&E in the protection space was approximately double that of what was reported in the preventative space (Figure 8). Similarly,

projects conducted over the past 5 years had approximately triple the money invested into protection compared to prevention. Greater investment in the protection space reflects the high costs associated with protecting industries against widespread invasive pests and diseases through treatment of animals, as well as targeted actions to reduce pest/disease spread and impact. This enforces the importance of conducting RD&E on preventative measures as fewer activities and costs are required to prevent something from occurring as are needed to manage something once it is established, resulting in a greater return on investment.

Australia as an island continent with strong systems protecting its borders fortunately does not frequently have incursions requiring a widespread response, its reasonable to expect investments into eradication and containment to be lower.

Projects completed over the past 5-years were reported as mostly research focused, particularly by Providers, with development and extension much further behind in number of projects, and extension behind with funding (Figure 14). This result is similar to what was reported in Figure 9, as well as what was reported in the 2014 Snapshot.

The linkages of past projects with the Tactical Priorities of the NABRDES were very similar in distribution to what was identified for current projects (Figure 15). The largest number of RD&E projects were reported in surveillance with the remaining Tactical Priorities reporting similar numbers of projects. Pests and surveillance again reported the largest budgets, where the reported investments into pests was double that of surveillance for past projects, but only ¾ of the investments for surveillance in current projects (Figure 10).

Traceability was also again reported with the smallest budget, further highlighting a resourcing gap in what was identified as one of the most important areas (Figure 2) for animal biosecurity RD&E.

Figure 13. The number of animal biosecurity RD&E projects completed during July 2015 to June 2019 and the money invested (million) into projects reported by funders in different areas of the invasion curve. Areas of the invasion curve are PRE = Prevent, E = Eradicate, C = Contain and PRO = Protect.

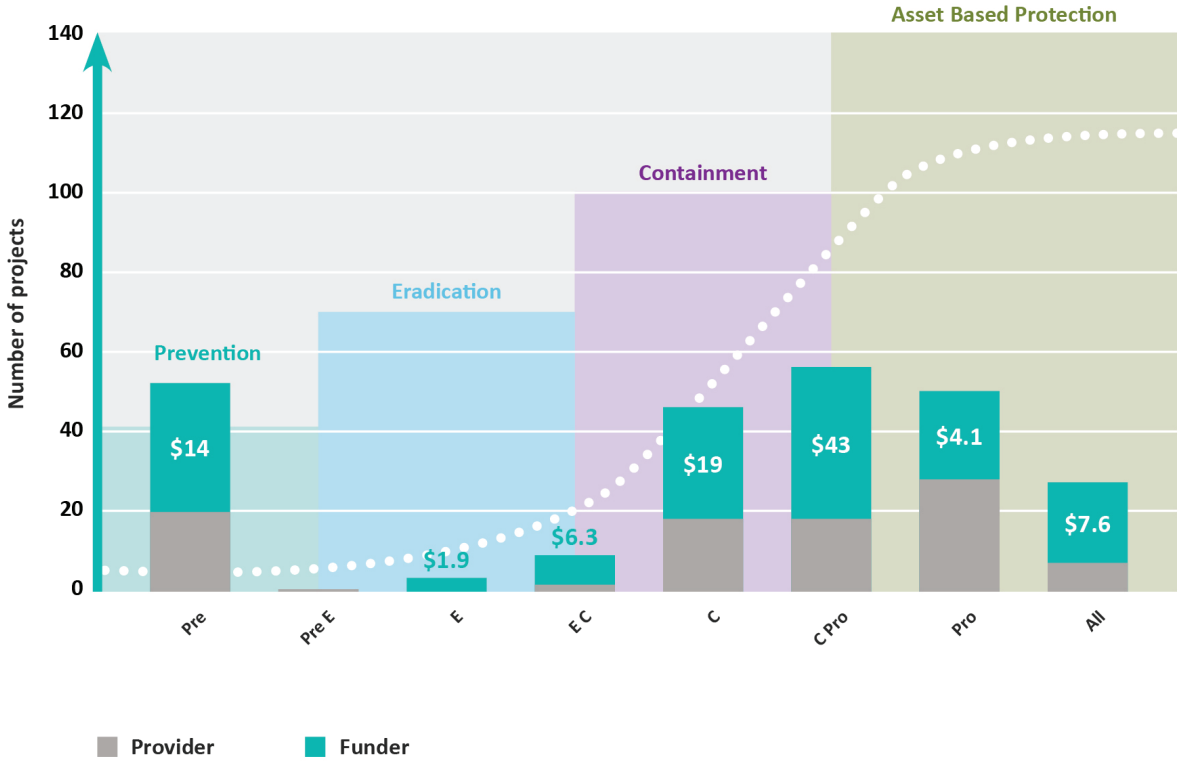


Figure 14. The number and value of effort invested into animal biosecurity RD&E projects reported by providers and funders and the money invested (million) into projects reported by funders only completed during July 2015 to June 2019. R = Research, D = Development and E = Extension.

Figure 15. The number of animal biosecurity projects reported by providers and funders and the money invested (million) into projects reported by funders only during July 2015 to June 2019 linked to each tactical priority and the associated money invested.

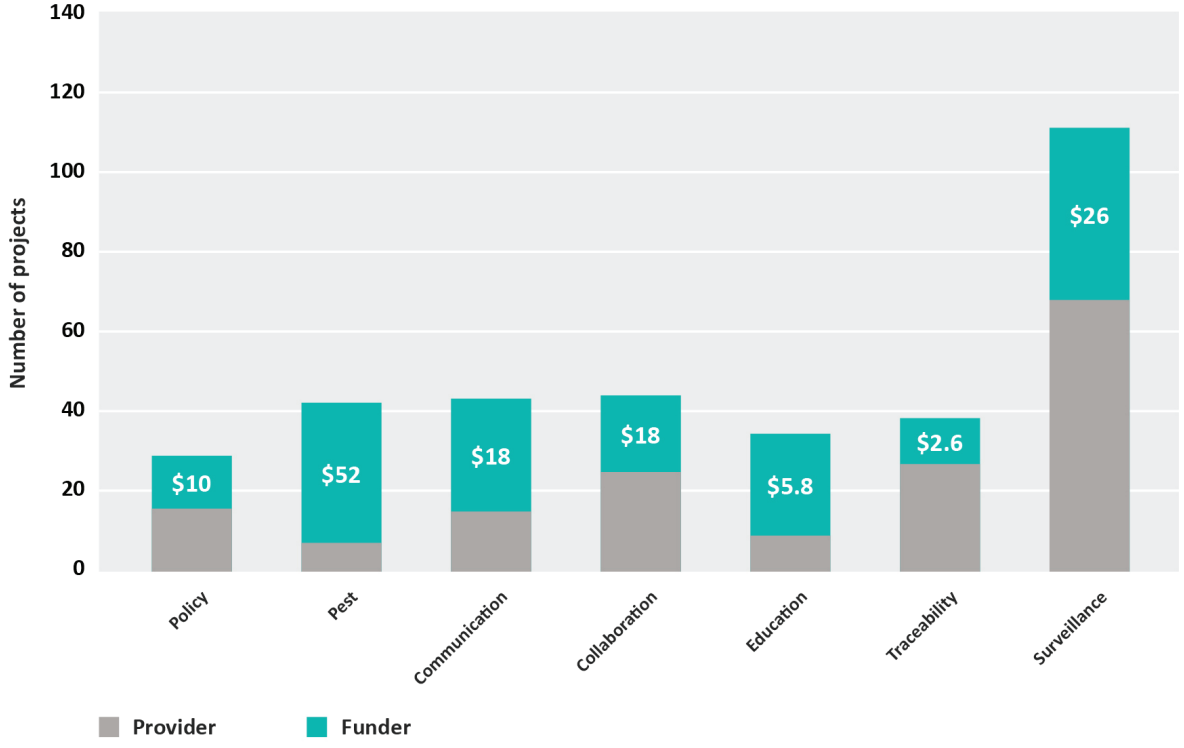
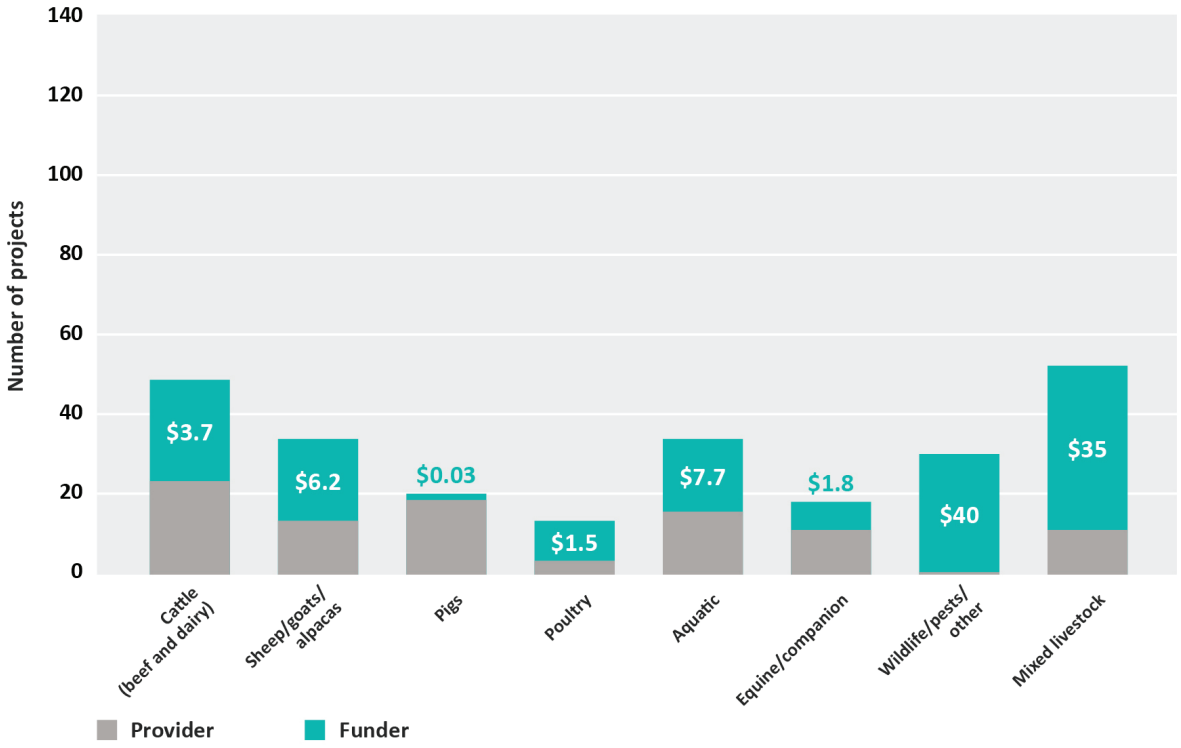


Figure 16. Number of projects completed by species reported by providers and funders and the money invested (million) into projects reported by funders only during July 2015 to June 2019.



Mixed livestock RD&E had the greatest number of projects reported, and the second greatest amount of reported budget behind wildlife and pests (Figure 16). This varied slightly from the findings of current projects (Figure 11), where mixed livestock had a larger funding amount compared to wildlife and pests.

Beef and dairy cattle had the second greatest number of RD&E projects reported. These projects included RD&E into diseases of cattle such as Bovine Johnes Disease, Bluetongue and Pestivirus as well as management programs including dairy extension and data management. Although cattle reported a large number of projects, the total invested was relatively low compared to wildlife/pests, aquatic and sheep. The least number of reported projects was for the poultry industry and the lowest reported money invested was towards pigs.

In order from highest to lowest, the GVP of the main livestock industries are cattle, sheep, poultry and pigs. As cattle have a significantly higher GVP than other livestock industries, the relatively low reported investment may indicate that a low proportion of cattle funds are directed towards biosecurity, or that a large portion of their funding is directed towards mixed livestock projects. Pigs and poultry have somewhat similar GVP figures, questioning the much lower reported funding into the pig biosecurity RD&E space. With the recent risk of African Swine Fever to the pork industry, the amount of funding directed to pig biosecurity is expected to increase.

4. CONCLUSIONS

The 2019 Snapshot report aimed to capture and present a summary of Australian livestock biosecurity RD&E efforts to identify where benefits through coordination and collaboration could be had. Over 70% of organisations that were approached to participate in the Snapshot report provided responses, which demonstrated a high degree of buy-in to the snapshot's key objectives. Participants in the Snapshot included those representing government, industry, universities and other private research providers (CEBRA and CSIRO).

The first section of the Snapshot survey asked participants a series of questions about three main topics; 1) their organisations, 2) how they interact with the NABRDES and 3) what outputs they expect from the NABRDES.

1. Biosecurity funding participants included Australian and State/Territory Governments and the RDCs. RD&E provider participants were dominated by several universities, CEBRA and the CSIRO. It should be noted that the snapshot is bounded by the goodwill of respondents, particularly for sections 3.9 and 3.10. Several other industry bodies participated, including peak industry councils, which have a direct influence and in some cases oversight over where/how funders invest. Despite the variation in participating organisations, there was general agreement around the importance of the NABRDES Tactical Priorities and the challenges of working across different animal sectors (intensive/extensive/species differences) in the animal biosecurity space. Identifying and exploiting commonalities are important for the NABRDES to highlight, particularly if it is to be used to prioritise collaborative opportunities where co-investing resources could be used to address challenges that impact at least 2 sectors.
2. Participants noted the involvement of their organisations with the NABRDES was most likely to ensure they were better informed about biosecurity initiatives at varying scales (regionally, nationally), as well as better positioned to participate in relevant RD&E and accelerate the adoption of NABRDES outputs. Providing funding for RD&E and for the management of the NABRDES was limited to those organisations already active in the funding space. This is reflected in section 3.4, where funding was identified as the greatest challenge for delivering effective RD&E. When the systemic challenges are compared to the available resources and the number of organisations delivering RD&E, it becomes absolutely clear that prioritising biosecurity RD&E based on risk versus benefit will be necessary. This reality places even more of an imperative on the NABRDES mission of reducing duplication, fostering cross sectoral collaboration and benchmarking/identifying biosecurity investments.
3. That point was driven home by surveyed participants when they expressed that they would like to see outputs driven by the NABRDES that benefit cross-sectoral animal

biosecurity RD&E through collaboration and coordination of investments that directly address RD&E gaps. These desired outputs are in close alignment with the aims and priorities of the NABRDES, indicating that the NABRDES fits its stated purpose. Given this, the next phase in the evolution of the NABRDES should assist in the national prioritisation of investment decisions and measuring the performance or estimating return on investment from biosecurity practice change adopted by supply chains. As the NABRDES does not directly fund RD&E, but instead prioritises and facilitates initiatives that warrant cross sectoral investment outcomes, it's next phase aims to deliver on that imperative.

The second part of the Snapshot asked participants to list all animal biosecurity RD&E projects currently being funded, conducted, or co-conducted through their organisation, or had been completed over the past 5 years.

With relation to the NABRDES Tactical Priorities, participants identified surveillance and traceability as the highest priorities for animal biosecurity RD&E. When participants were asked to report on the RD&E their organisations were involved with and to nominate the Tactical Priority the project/s most strongly align with, surveillance was listed more often than any other priority. Being of both high importance and high prevalence, surveillance would be a key field to analyse for duplication risk as well as a field where there could be opportunities for coordination and collaboration, especially as surveillance for one risk could readily be used as a platform for multi-surveillance initiatives very cost-effectively. This approach along with less sophisticated but broad ranging (temporally and geographically) surveillance could be employed in more challenging scenarios e.g. northern Australia.

Although traceability was considered just as important to animal biosecurity RD&E as surveillance, it attracted minor investment and one of the fewest number of projects of all the Tactical Priorities. This may indicate a gap in RD&E for traceability and a need to seek and encourage co-investment and careful coordination of current limited resources. Traceability systems have been developed by some animal industries and supply chains for some time, but the importance of traceability across a greater number of animal commodities (food and textiles) is being recognised as an emerging need of international consumers and investments in this space are likely to increase in the future. A case in point is the investment that the Australian government is making via their Traceability Project[1], which is aiming to establish traceability frameworks for more agricultural commodities.

Pest animals and pasture-based weeds were nominated as the least important Tactical Priority by the range of participants in this survey. However, pests as a category of funded RD&E had the largest reported amount of funding, which may be a function of a greater focus on monitoring and evaluation in that field to estimate returns on investment. Despite pests and weeds being a lower priority across a range of animal sectors, they are likely to impact more than one industry. As such, pest management RD&E are also fields that would benefit from a co-investment model like this strategy. Investment into pest animal and weed management was the only priority that represented a direct reduction in biosecurity threats, while all other priorities related to a social science, service, technology or tool that could potentially be used to address biosecurity threats across the invasion curve interface. Although pests and pasture weeds are combined into a single tactical priority, pasture weeds represent a potential gap as only two projects were reported in the entire Snapshot investment cohort. As no plant industries investment was captured within the Snapshot survey, it may be that investment into pasture weeds falls to organisations outside those involved directly in animal biosecurity. This scenario should be explored as it could also be an opportunity for

1 https://www.agriculture.gov.au/market-access-trade/traceability-project

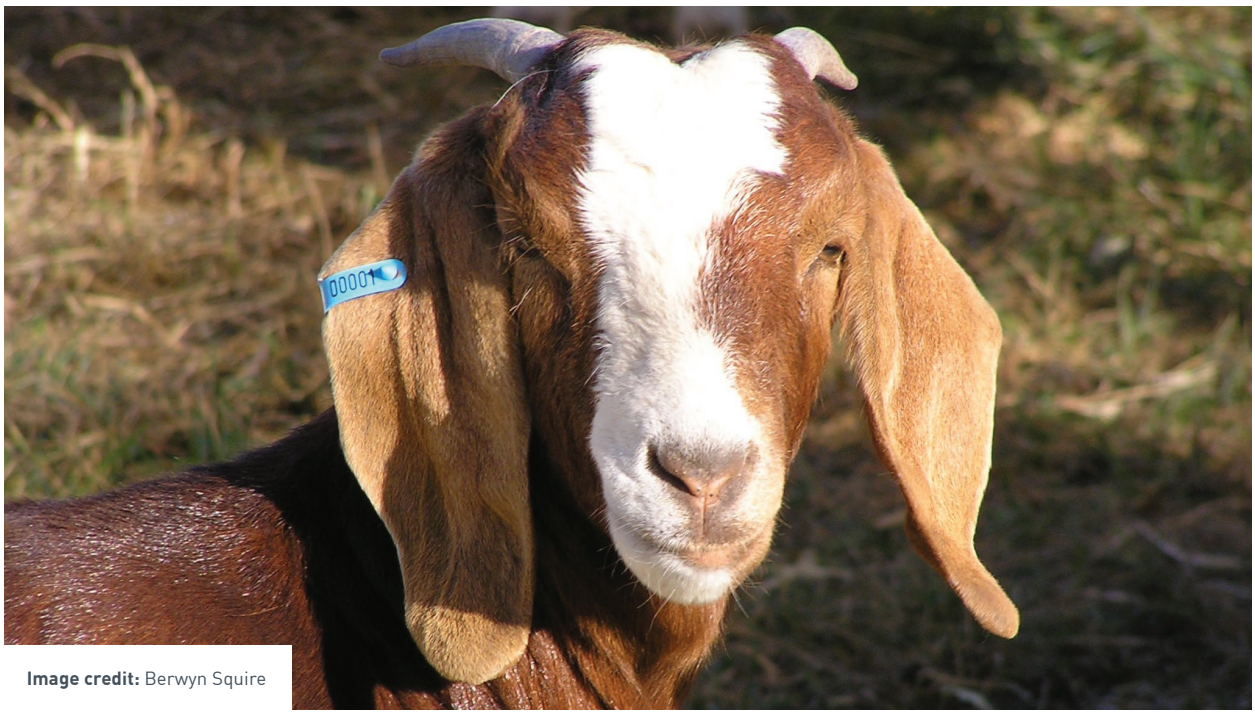


Image credit: Berwyn Squire

cross-sectoral investment that includes plant, environmental and animal sectors as weeds, particularly those impacting livestock, is also a gap not addressed by the National Plant- or the National Environmental and Community-biosecurity RD&E strategies.

The greatest number of reported RD&E projects addressed exotic and endemic animal diseases. Although not directly linked to a specific Tactical Priority, all of these projects are indirectly aligned with the NABRDES intent as they address priorities across the entire invasion curve from prevention through to management of assets. As with the 2014 Snapshot, the fewest number of reported projects were in the extension space, showing that this is an ongoing gap for livestock sectors. Some industries are known to already invest well in the extension space, such as in the dairy cattle industry, and other emerging projects such as the National Sheep Industry Biosecurity Strategy are driving increased activity in extension. Industries have acknowledged the need to further bolster investment into promoting the adoption of R&D outputs, so that practice change on the ground at local, regional and national levels captures the value of past investment in R&D, improving enterprise sustainability and resilience.

To identify where other potential duplications or gaps exist, the reported projects were categorised to identify project topics for thematic grouping of investment (Appendix 3 and 4). As many participants found it difficult to report on projects that had been completed over the past 5 years, the identification of duplication and gaps is challenging. Furthermore, discussions that took place with a range of participants post completion of the survey highlighted that the interpretation of what projects would be in scope for this report differed. Participants used a generally conservative interpretation of what biosecurity investment meant, which resulted in many relevant projects being excluded from reporting. Without capturing the full scope of RD&E requested for this project, the identification of gaps and duplication risk will be commensurately conservative. For this reason, one recommendation for future Snapshot surveys is to omit requests for information on previously competed projects.

From the projects that were reported, zoonoses and antimicrobials appeared to be two particular areas where RD&E has been undertaken by multiple organisations independent from each other in the recent past. While the projects reported did not appear to directly overlap,

cross-sector collaboration to pool resources for future RD&E may be beneficial, although it is acknowledged that some investigations are species specific.

The decline in detector dog numbers was an issue raised in the most recent inter-governmental agreement on biosecurity review. This decline has been raised as an increasing issue more recently with the threat of African Swine Fever and the increasing risk of other exotic diseases entering Australia within contaminated material transported by people. Only a single current project relating to detector dogs was reported (no budget provided), supporting this as a gap as highlighted in the intergovernmental review. Detector dogs have been shown to be an exceedingly efficient tool in the management of multi-biosecurity risks and, therefore, a proficient barrier protecting many industries from pests and disease. Coordination of RD&E investment into an increased detector dog presence at critical ports of entry into Australia would seem a clear example of a key cross-sectoral priority. Collaboration of the NABRDES and the other related biosecurity strategies (Plant, and Environmental and Community) can be used to drive co-investment in cross-sectoral gaps in concert with other government agencies.

Other potential gaps identified from thematically grouping the reported RD&E projects include:

- the three D's – destruction, disposal and decontamination
- water quality and safety management
- biosecurity and how it interacts with animal welfare
- extension, and how social science can be used to improve behaviour change and adoption
- cross-sector collaboration on RD&E in the early stages of the invasion curve
- pasture weeds and weed seed dispersal through feed transportation.

Key findings and limitations noted from the RD&E projects reported in the Snapshot survey are that:

- not all RD&E in the animal biosecurity space has been captured, particularly from 2014-2019
- whilst all effort was made to allocate a lead organisation to a single biosecurity investment and in doing so minimise duplication in our reporting some duplicates may be present in the final results
- not all projects reported by 'Funders' included budget allocations
- some projects reported an annual budget, and some reported total budget with no distinction of what was reported
- some organisations known to the authors to be active investors or providers in the RD&E space did not respond to the survey request.

To enhance future Snapshots, it is recommended that excel spreadsheets including drop down menus be provided for participants to select:

- if the project is research, development or extension
- which Tactical Priority a project best aligns to
- where on the invasion curve a project best fits
- whether the funding is annual or total and for how long a project runs.

This will ensure that participants can select only one option that is the closest fit for each project and improve the ability to report on and analyse the results.

A final recommendation for future surveys is to refine the list of organisations contacted for participation after each survey to remove any organisations that do not either directly fund, conduct, or use biosecurity RD&E. In addition, improved consultation with each organisation prior to the survey will ensure the key person/ people from each organisation are contacted and concomitantly reduce the effect of under or over reporting as a result of organisational know-how and data accessibility.

5. APPENDIX 1

2019 ANIMAL BIOSECURITY RD&E SNAPSHOT SURVEY

Background

The National Animal Biosecurity Research, Development and Extension Strategy (NABRDES) aims to facilitate greater collaboration between animal biosecurity research, development and extension (RD&E) investors, providers and end-users to address Australia's animal biosecurity needs and priorities.

As part of the implementation of the 2013-2017 NABRDES, Animal Health Australia (AHA) undertook a RD&E Snapshot in 2014 which analysed animal biosecurity research, development and extension activities in Australia, to build a better understanding of the national biosecurity RD&E portfolio. The analysis of that Snapshot was based on evidence provided through:

- an online survey designed to elicit the knowledge and attitudes of biosecurity stakeholders regarding the NABRDES (Part 1)
- a 'project register' of current animal biosecurity RD&E projects, or projects due to commence in the next five years (Part 2).

There were approximately 300 unique projects (as at 1 August 2014) that were reported by 23 different organisations in the first RD&E Snapshot. Projects covered the breadth of the biosecurity continuum and included all types of research (pure and applied research), development, and extension activities. Applied research on established pests and diseases accounted for the majority of reported activities and attracted the highest level of investment at approximately $58 million. Very few development or extension-related projects were reported.

In 2018, the 2017-2022 NABRDES was endorsed, and with that, an updated RD&E Snapshot is required to improve the efficiency and decision-making process in which RD&E recommendations are made.

Purpose

The goal of the RD&E Snapshot is to describe and analyse the current and planned animal biosecurity RD&E activities of all of the major stakeholders across Australia, with reference to the following questions:

- What is the current scope of Australia's animal biosecurity RD&E activities?
- How do these activities align with the priorities and objectives outlined in the NABRDES?
- Who are the key stakeholders and clients (i.e. RD&E funders, recipients and providers)?
- What are stakeholders' interests, expectations and attitudes towards the NABRDES and animal biosecurity RD&E?
- What future animal biosecurity RD&E activities are proposed?

- Are there duplications, gaps, overlaps or potential synergies in current and planned projects?

It was hoped that the RD&E Snapshot findings would inform broad consideration of stakeholder needs and gaps, and identify priorities for future work and investment to address gaps over the long-term.

For the purposes of this Snapshot, biosecurity is defined as:

The management of risks to the economy, the environment and the community from pests and diseases entering, emerging, establishing or spreading.

The scope of this Strategy includes:

- endemic, emergency and emerging animal pests and diseases relevant to market access and livestock health
- animal welfare issues relevant to pests and diseases that impact livestock health
- animal health barriers to market access, where market access relates to any of the stakeholder industries having access to supply a market, whether it be domestic or export
- public health in relation to food and fibre as well as zoonoses
- biosecurity at a national, state, regional and enterprise (farm gate) level
- cross-sectoral RD&E, with cross-sectoral defined as where there are two or more stakeholders who have a shared priority/ investment/ interest in an RD&E issue.

  The Strategy acknowledges the continued importance of single-sector RD&E, but the focus of the Strategy is on cross-sectoral investments
- a strong focus on extension to increase knowledge transfer to the farmer and reduce adoption time.

The scope of the Strategy does not currently include:

- companion animals (other than where there are effects on public health or market access of livestock)
- wildlife (other than if there are effects on market access or livestock or public health)
- funding animal biosecurity RD&E.

This Strategy interprets 'livestock' as animals kept/harvested for use or profit including any class of cattle, sheep, goats, pigs, horses (including mules and donkeys), poultry, emus, ostrich, alpaca, deer, camel or buffalo, and farmed/harvested aquatic species (including crocodiles, finfish, molluscs and crustaceans).

Instructions

Please complete the following Snapshot survey as accurately and completely as possible to help us document current animal biosecurity RD&E efforts. This will help us to identify potential gaps, duplication and opportunities for collaboration to improve our collective RD&E efficiency.

Once complete please return to awildridge@animalhealthaustralia.com.au by COB 20th August.

Image credit: Shutterstock

About your organisation

1) What sector do you represent?

☐	Australian Government
☐	State/Territory government - Funder
☐	State/Territory government – RD or E provider
☐	Research and Development Corporation (RDC)
☐	RD or E provider – University
☐	RD or E provider – Private company (including CSIRO)
☐	Cooperative Research Centre
☐	Funding organisation – Private company
☐	Other:

2) The table below lists the Tactical Priorities of the National Animal Biosecurity RD&E Strategy 2017 - 2022. In your opinion, how important to animal biosecurity RD&E are the following biosecurity priorities?

	Not a priority	Low priority	Unsure	Medium priority	High priority
Communication	☐	☐	☐	☐	☐
Surveillance systems	☐	☐	☐	☐	☐
Collaboration	☐	☐	☐	☐	☐
Traceability	☐	☐	☐	☐	☐
Education/training	☐	☐	☐	☐	☐
Pest animal/pasture weeds	☐	☐	☐	☐	☐
Policy/legislation	☐	☐	☐	☐	☐

3) The table below lists the Tactical Priorities of the National Animal Biosecurity RD&E Strategy 2017 - 2022. In your opinion, how important to your organisation are the following biosecurity priorities?

	Not a priority	Low priority	Unsure	Medium priority	High priority
Communication	☐	☐	☐	☐	☐
Surveillance systems	☐	☐	☐	☐	☐
Collaboration	☐	☐	☐	☐	☐
Traceability	☐	☐	☐	☐	☐
Education/training	☐	☐	☐	☐	☐
Pest animal/pasture weeds	☐	☐	☐	☐	☐
Policy/legislation	☐	☐	☐	☐	☐

4) With regards to animal biosecurity, select the three most important RD&E challenges your organisation is facing today?

☐	Funding
☐	Resource (physical and organisational infrastructure) availability
☐	Collaboration/knowledge sharing
☐	Staff skills and capability
☐	Institutional barriers (e.g. competing priorities)
☐	Communication
☐	Lack of specific tools and technologies
☐	Are there any other challenges that your organisation is facing or specific points you would like to raise? Please note below.

5) What animal biosecurity related challenges do you think your organisation will face over the next 5-10 years?

☐	Funding
☐	Resource (Physical and organisational infrastructure) availability
☐	Collaboration/knowledge sharing
☐	Staff skills and capability
☐	Institutional barriers (e.g. competing priorities)
☐	Communication
☐	Lack of specific tools and technologies
☐	Are there any other challenges you think you will face in the next 5-10 years or any other specific points you would like to raise? Please note below.

About the Strategy

6) Before receiving this survey, were you aware of the National Animal Biosecurity RD&E Strategy?

☐ Yes ☐ No ☐ Unsure

7) How would you characterise your organisation's involvement in the National Animal Biosecurity RD&E Strategy? Please select the top three drivers of this involvement.

☐	Financial/economic
☐	Political
☐	Scientific/technical
☐	Public health/public good/societal issues
☐	Trade/access to international markets
☐	Other (please specify):

8) What is the importance of this Strategy to your organisation and its RD&E goals? e.g. Avoiding duplication of effort, identifying opportunities for collaboration, identifying previously unknown areas of research, etc.

☐	Unimportant
☐	Little importance
☐	Somewhat important
☐	Important
☐	Very important
☐	Other (please specify):

9) What activities and/or outcomes do you expect to see over the next 3-5 years as a result of the National Animal Biosecurity RD&E Strategy?

10) In what way do you think your organisation could best contribute to the ongoing development and implementation of the National Animal Biosecurity RD&E Strategy? Select all that apply.

☐	Providing practical advice and/or experience on biosecurity RD&E issues and priorities
☐	Provide funding for biosecurity RD&E in alignment with the strategy priorities
☐	Provide funding for the Strategy (e.g. coordination and administration)
☐	Conduct biosecurity RD&E in alignment with the Strategy priorities
☐	Adoption of deliverables/outputs of this Strategy
☐	No further contribution
☐	Other (please specify):

11) Is there anything else you would like to comment about the current and future challenges of animal biosecurity RD&E, the role of your organisation or any other wider outputs you would like to see from the National Animal Biosecurity RD&E Strategy?

12) **Please populate the following tables with as much detail as possible of all animal biosecurity RD&E projects currently underway (or finished since 1 July 2019). For all tables, add as many item lines as required.**

Table 1: Research providers please complete the following table.

Project number (Funding body number)	Project title	Project objective	Industry/ species	Alignment with strategy priorities*	FTE involved	Funding body	Is it research, development or extension?

Table 2: Research funders please complete the following table.

Project number (Funding body number)	Project title	Project objective	Industry/ species	Alignment with strategy priorities*	FTE involved	Funding body	Is it research, development or extension?

*Select a maximum of two Tactical Priorities from the NABRDES that the project aligns to; communication, surveillance, collaboration, traceability, education/training, pest animal/weed in pasture management, policy/legislation.

13) **Please populate the following tables with as much detail as possible of all animal biosecurity RD&E projects completed from 1 July 2015 to 30 June 2019 (inclusive). For all tables, add as many item lines as required.**

Table 3: Research providers please complete the following table.

Project number (Funding body number)	Project title	Project objective	Industry/ species	Alignment with strategy priorities*	FTE involved	Funding body	Is it research, development or extension?

Table 4: Research funders please complete the following table.

Project number (Funding body number)	Project title	Project objective	Industry/ species	Alignment with strategy priorities*	$ invested	Is it research, development or extension?	Is it research, development or extension?

*Select a maximum of two Tactical Priorities from the NABRDES that the project aligns to; communication, surveillance, collaboration, traceability, education/training, pest animal/weed in pasture management, policy/legislation.

6. APPENDIX 2

Organisation	Number of projects
Agriculture Victoria	18
Australian Centre for International Agricultural Research (ACIAR)	3
Department of Agriculture	25
Department of Primary Industries and Regions South Australia	7
Environment Australia	0*
NSW Department of Primary Industries	45
Queensland Department of Agriculture and Fisheries	2
Biosecurity Queensland	4
Tasmanian Department of Primary Industries, Parks, Water and Environment	9
Australian Alpaca Association	Initiatives delivered through AHA or private consortia
Australian Chicken Meat Federation (ACMF)	11
Australian Duck Meat Association (ADMA)	1
Australian Lot Feeders' Association (ALFA)	Initiatives delivered through MLA, AHA or private consortia
Australian Meat Industry Council (AMIC)	Initiatives delivered through MLA, AHA or private consortia
Cattle Council of Australia (CCA)	Initiatives delivered through MLA, AHA or private consortia

Cont'd

*Insufficient time to report on RD&E projects

Sheep Producers Australia	3, Initiatives delivered through MLA, AHA or private consortia
Wool Producers Australia (WPA)	Initiatives delivered through MLA, AHA or private consortia
Invasive Species Council	Initiatives delivered through government or private consortia
AgriFutures	47
Australian Eggs	13
Australian Pork Limited (APL)	14
Australian Wool Innovation (AWI)	18
Council of Rural Research and Development Corporations	Initiatives delivered through RDC membership
Dairy Australia	42
Fisheries, Research and Development Corporation	61
LiveCorp	2
Meat and Livestock Australia	44
CSIRO Australian Animal Health Laboratory (AAHL)	60
Centre of Excellence for Biosecurity Risk Analysis (CEBRA)	28
NSW farmers	Support or inform biosecurity investments delivered through government or private consortia
Agforce QLD	1
Charles Sturt University (CSU) + Graham Centre for Agricultural Innovation	35
James Cook University	6
University of Adelaide	14
University of New England	6
University of Queensland	17
University of Sydney	54
University of Tasmania - IMAS	0*
University of Western Sydney	0*
Macquarie University	3
Murdoch University	16

Cont'd

*Insufficient time to report on RD&E projects

Deakin University + Geelong Centre for Emerging Infectious Diseases	0*
Animal Health Australia (AHA)	60
Centre of Invasive Species Solutions	72
Harness Racing Australia	Support or inform biosecurity investments delivered through government or private consortia
Wildlife Health Australia (WHA)	Support or inform biosecurity investments delivered through government or private consortia
Equestrian Australia	Support or inform biosecurity investments delivered through government or private consortia
Australian Abalone Growers Association	3
Tasmania Salmonid Growers Association	5
Tasmanian Farmers Graziers Association	1
Australian Seafood Industries	1
Northern Territory Buffalo Industry Council	1
Porosus Pty Ltd	1
Northern Territory Cattlemen's Association	Support or inform biosecurity investments delivered through the northern Australian beef research council, government or private consortia
Total:	**753**

*Insufficient time to report on RD&E projects

7. APPENDIX 3

The number of current projects of a particular topic area within the categories of disease, management and pest.

Disease	Count
Acute hepatopancreatic necrosis disease	1
Anthrax	3
Antimicrobial	21
Aquareovirus	1
Arbovirus	1
ASF	3
Avian Influenza	3
Bonamiasis	2
Bovine respiratory disease	4
Brucella abortus	1
Brucella suis	1
BVDV	2
Campylobacteriosis	3
Chlamydia	2
Colitis	1
Detection	2
Diagnosis	5
E.coli	1
EAD	6
Eczema	1
Emerging disease	1
Endemic	1
ESBL-Coli	1

Cont'd

Evidence of Absence	3
FMD	5
Footrot	2
Hepatopancreatitis	1
Herpesvirus	1
Infectious bursal disease	1
Infectious spleen and kidney necrosis virus	1
Information and engagement (e.g. guidelines, strategies, workshops)	1
Invertebrate pest	2
Johnes	2
Kunjin virus	1
Laboratory	1
Lameness	1
Laryngotracheitis	1
Measles	1
Mycoplasma	1
Newcastle disease	1
One health	2
Overseas	8
Pacific Oyster Mortality Syndrome	1
Paramyxovirus	1
Pathogens	3
Peri-urban	1
Pilchard orthomyxo virus	2
Pink eye	1
Pneumonia	1
Resistance	1
Salmonella	4
Surveillance	4
Tools	1
Toxoplasma gondii	1
Training	2
Ulcer	1
Vaccine	5
White spot	5
Yellow head virus	1
Zoonoses (e.g. Q-fever, Hendra)	14

Management	Count
Antimicrobial	1
AUSVETPLAN	1
Biofouling	3
Biomarkers	1
Decontamination	1
Detection	2
Diagnosis	2
Disposal	1
Dung beetles	1
EAD	3
Enteropathogen	1
Epidemiology	1
Hygiene	4
Illegal trade	1
Immunity	1
Information and engagement (e.g. guidelines, strategies, workshops)	34
Laboratory	3
Market access	2
One health	1
Overseas	3
Pathogens	2
Policy	3
Stress	1
Surveillance	7
Survival	1
Tools	1
Traceability	3
Training	7
Vaccine	1
Vertebrate pest	1
Vet chemicals	1
Water quality	1

Pest	Count
Detection	2
Information and engagement (e.g. guidelines, strategies, workshops)	2
Invertebrate pest (e.g. insect pests, worms, parasite)	25
Pathogens	1
Risk analysis	1
Surveillance	2
Tools	1
Vertebrate pest (e.g. feral pigs, rabbits, carp)	61
Weeds	2

8. APPENDIX 4 – PAST PROJECT TOPICS

The number of past projects of a particular topic area within the categories of disease, management and pest.

Disease	Count
Anthrax	1
Antimicrobial	2
Aquareovirus	1
Arbovirus	3
Arthritis	4
Avian influenza	2
Balanitis	1
Bluetongue	5
Bonamiosis	1
Brucellosis	2
BVDV	5
Capripox	2
Chilodonella	1
Dermatitis	1
Diagnosis	6
EAD	4
Eczema	1
Enzootic bovine leukosis	2
Erysipelothrix rhusiopathiae	1
Evidence of absence	2
Flaviviral	1
FMD	10
Footrot	2

Cont'd

Herpesvirus	5
Ileitis	1
Infectious bursal disease	1
Johnes	7
Lawsonia	1
listeria	1
Management	10
Mastitis	2
Megalocytivirus	1
Modelling	1
Mycoplasma	2
Newcastle disease	2
Orthomyxo-like virus	1
Overseas	4
Oyster oedema disease	1
Pacific oyster mortality syndrome	3
Perkinsus olseni	2
Pithomyces chartarum	1
Porcine endemic diarrhea virus	1
Rotavirus	1
Salmonella	3
Scour	2
Staphylococcus aureus	2
Streptococcus	1
Training	2
TSE	3
Vaccine	3
White spot	2
Zoonoses (e.g. Q-fever, Hendra)	17

Management	Count
Antimicrobial	3
Data	4
Diagnosis	2
Information and engagement (e.g. guidelines, strategies, workshops)	18
Overseas	4
Surveillance	5
Swill	1
Tools	1
Traceability	2
Training	1
Water treatment	1

Pest	Count
Invertebrate pest (e.g. insect pests, worms)	15
Vertebrate pest (e.g. feral pigs, rabbits, carp)	34
Information and engagement (e.g. guidelines, strategies, workshops)	2
Management	10
Risk analysis	1
Surveillance	2
Tools	1
Vertebrate pest (e.g. feral pigs, rabbits, carp)	61
Weeds	2

Image credit: Fisheries Research and Development Corporation