Biosecurity Attitudinal Research Report

July 2022

WHERE TO

NSW GOVERNMENT

Published by the Department of Regional NSW

Title: Biosecurity Attitudinal Research Report
First published: July 2022

More information

Biosecurity and Food Safety
Strategic Programs & Partnerships
NSW Department of Primary Industries
Locked Box 21
ORANGE NSW 2800

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Executive Summary

Background, objectives, and methodology

The New South Wales Department of Primary Industries (NSW DPI) purpose is to maximise outcomes for NSW primary industries, the communities they support and the resources they rely on, both today and for the future. Given the implications biosecurity has for the health of humans and animals, as well as productivity, NSW DPI has an important responsibility in protecting and enhancing the biosecurity of NSW.

The Biosecurity and Food Safety branch of NSW DPI fulfils a strategic and operational leadership role within the NSW Government, to protect primary industries, the environment, and the community from the increasing threat of pests, weeds, diseases and contaminants; to ensure markets and consumers are confident that industries and business meet high standards of food safety and animal welfare; and that the impact of adverse events is minimised and rapid recovery, with increasing resilience over time, is supported.

These goals supported by strong traceability and market assurance programs will ensure NSW has access to markets and a reputation for premium value products.

The overarching purpose of the 2021 NSW Biosecurity Attitudinal Research was to assess the following among the NSW population:

- understanding of biosecurity,
- current behaviours and practices,
- perceived barriers to managing biosecurity,
- values that inspire and motivate action,
- awareness of information resources and gaps, and
- their desired tools and trusted sources for advice.

Further, given elements of this study were benchmarked in 2017, the findings provide important insight and understanding of progress that has been made since 2017, key challenges and emerging issues for the future.

The study consisted of a large scale statistically valid survey of NSW residents (n=1,163) and primary producers (n=550), as well as three location based qualitative case studies with metropolitan, regional and peri-urban residents, primary producers and other stakeholders, a case study with Aboriginal and Torres Strait Islander residents, primary producers and other stakeholders and a case study with aquatic producers.

Key findings - general population

Understanding and importance of biosecurity

There have been a range of positive developments in the NSW public's awareness and understanding of the importance of biosecurity since 2017. In particular:

- Importance of biosecurity measures overall have increased significantly.
- Importance of biosecurity for protecting native flora and fauna has increased (8.4 up from 8.0 in 2017), as has importance for public health (8.5 up from 7.2 in 2017).
- Understanding that biosecurity encompasses a broad range of dimensions has also increased, including aspects such as prevention and control, biological threats, environmental protection, and state border protection in addition to significantly greater agreement with the broader definition of biosecurity used by NSW DPI.

These results suggest that the public's understanding of biosecurity has evolved somewhat since 2017, with a broader sense of what it covers, and an increased sense of importance.

While the research findings demonstrate that the broader population has a good general sense of what biosecurity is, what it means for Australia, and the breadth of its scope in relation to environment, industry and society, there is some level of confusion that arises primarily from the sheer breadth of its scope and the range of topics and issues it touches upon.

Although regarded as important, when presented alongside a broader list of issues, biosecurity is less likely to be rated as highly important compared to issues such as health, housing, employment, and environment. This lower rating for biosecurity is likely a reflection of other issues being more prominent (in terms of media coverage or directly impacted by the pandemic), more pressing or seen to have higher direct personal relevance. Nevertheless, the significant increase in the mean importance rating of biosecurity in 2021 (8.3 up from 7.9 in 2017) is encouraging.

When considering the potential impacts of biosecurity issues, consumers are much more likely to rank the environmental impact as the most important impact of biosecurity rather than its economic or social impact. NSW DPI's broad and all-encompassing definition 'Protecting the economy, environment, and community from the negative impacts of pests, diseases, weeds, and contaminants' is regarded as the strongest and most useful definition of biosecurity, and together with the increase in perceived importance of biosecurity overall, suggests there is interest and appetite for a simple and compelling biosecurity narrative for the future.

> *"But I think when it comes to biosecurity, well that just is part of the environmental issue that we're facing in this country and we have a very precious country here that is quite removed from everywhere else…So we have very few terrible pests, etc here, and disease and weeds, etc. There's a real opportunity now with I think people's heightened concern about the environment and particularly after being in lockdown and people spending more time at home. With biosecurity it's a good time to bring that to the forefront to show people you know, how special we've got it here and what the risks are, whether they're fire ants or cane toads that have been deliberately introduced…and that it's up to everyone at the local level."*
>
> ***Source:*** *General population respondent*

Responsibility and personal behaviours

Consumers see the responsibility for biosecurity as shared between government, industry, and primary producers, with government taking the lead role. Since 2017, biosecurity is seen even more to be the responsibility of the NSW Government (8.4 up from 8.1 in 2017), the Commonwealth Government (8.3 from 7.9 in 2017), local councils (8.1 from 7.8 in 2017) and Local Land Services (8.1 from 7.8 in 2017).

While personal responsibility remains unchanged (7.7 in 2021 and 7.5 in 2022), what is clear is that ratings of importance and personal responsibility are highly correlated. That is, the more people know about biosecurity, and the more confident they feel in being able to help, the more personal responsibility they are able and willing to take. This suggests that a continued focus of communication on the behaviours and actions individuals can take to protect biosecurity is likely to eventually result in an increase in both personal responsibilities, and therefore, shared responsibility.

It is also critical that education for the general public continues, given currently less than a third feel confident in identifying, preventing, and responding or managing biosecurity threats, noting of course that these can be very broadly defined. However, the vast majority are keeping weeds in their garden under control, are vigilant about quarantine requirements at airports and ensure fruit is not left unpicked on trees. Further, since 2017:

- Self-rated ability to prevent, manage, or respond to any potential biosecurity issues has increased significantly (6.1 up from 5.5 in 2017).
- More people at least occasionally wash their clothes after bushwalking (84% up from 77%) visiting a farm (88% up from 77% in 2017), or thoroughly check, clean, and dry their boats before moving them to another waterway.

These findings demonstrate that the NSW public has a growing understanding of optimal actions and behaviours to protect biosecurity.

However, **the next step is to migrate behaviours from occasional to habitual.**

For example, the findings demonstrate that strict compliance (consumers citing that they ‘always’ undertake the behaviour) is much less common. For example, a third (31 - 33%) ‘always’ wash their clothes after bushwalking or a visit to a farm, only 44% ‘never’ use food sold for human consumption as bait, and only 39% ‘always’ keep their garden weeds under control. It is a common challenge in behaviour change to move consumers to habitual behaviours, and this is a key opportunity for the future.

While the term non-compliance may suggest deliberate action in many if not most occasions likely to be the result of low awareness or understanding of risk. Encouragingly more than half of NSW consumers would like to know more about biosecurity – particularly as it pertains to their lifestyle – and would most like to hear from their local councils, from NSW DPI, and from plant nurseries and retailers.

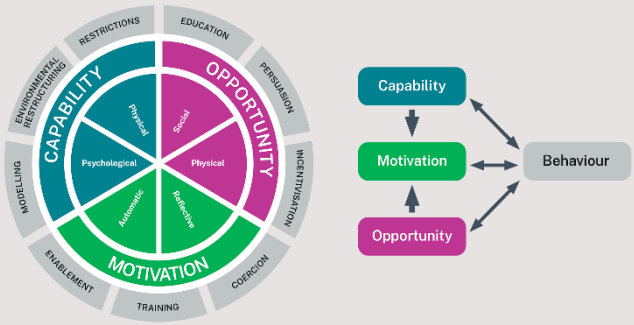
Consumers would prefer this information come to them through the normal day-to-day course of their lives rather than them having to search for it, highlighting the importance of a multi-pronged, partnership-led approach to public communications in this vital area of national biosecurity.

Opportunities for the Future

There are a range of conceptual frameworks that can be used when considering behaviour change. At Where*to* we use the Michie COM-B model because it is used extensively in behaviour change interventions in scientific literature, recognising that behaviour is part of an interacting system involving the three key components (Capability, Opportunity, Motivation). This model is effective because it identifies what component of behaviour needs to be changed in order for an intervention to be successful.

When considering the opportunities for the future we use the synthesised Michie COM-B framework to provide an overview of the range of different mechanisms available to change behaviours. These range from education and persuasion through to incentives, coercion, training, enablement, modelling and environmental restructuring. All of these are applicable to different biosecurity behaviours. Applying such a lens to the general public yields a number of potential avenues for exploration, dependent on the identified behaviour where change should be encouraged.

See below for the Michie COM-B framework:



For example, if the goal was to increase the proportion of people who 'always' wash their boots after a bushwalk or a visit to a farm, one may consider:

- An education approach utilising campaigns or promotions to increase awareness of the importance of washing footwear, and damage done by non-compliance. An education approach would also extend to signage at entry and exit points to state and national parks, in car parks and back of toilet doors to focus on importance of washing shoes.
- An enablement approach that helps consumers track the progress of where their footsteps take them. This could take the form of a partnership with a major workwear/hiking boot manufacturer, many of whom are keen to increase their Environmental and Social Responsibility (ESR) credentials, who provide several trackers so consumers can map the different types of ecosystems they traverse each time they wear them.
- Role-modelling – where known and respected opinion leaders, nature enthusiasts and clubs, and tourism operators raise awareness and education about the need to wash footwear, every time.
- The above encouragements are likely to be more efficient and effective, rather than say, making non-compliance a crime (Coercion approach).

While this is an example of a range of 'nudges' aimed at a specific behaviour, this study also found that consumers who rate biosecurity importance more highly are also better informed, and more willing and able to take action. This suggests that there is a need at an overarching level to increase the importance of biosecurity in the public's mind, through ongoing high-level messaging in the public realm that can direct people to places where they can find out more information about what they can do to protect NSW, and through it Australia and its interests.

Key findings - primary producers

Understanding and importance of biosecurity

Biosecurity is well understood by primary producers who have a much stronger (self-rated) understanding of all it entails compared to the general public, demonstrated both in 2017 and 2021. When asked to define biosecurity the large majority prefer the definition '*Preventing the introduction of diseases, pests and weeds through plants, livestock, and waterways*' (83%). This was similar to '*Controlling or managing the introduction of diseases, pests and weeds through plants, livestock, and waterways*' (82%).

The definition of biosecurity currently being used by NSW DPI - '*Protecting the economy, environment and community from the negative impacts of pests, diseases, weeds, and contaminants*' – was the third most endorsed, with eight in ten (79%) supporting this as a 'good' definition. That these are the three highest ranked definitions indicates that primary producers predominantly think of biosecurity in terms of the impact upon their own day-to-day business operations, as opposed to broader environmental, economic, and societal implications – and this remains unchanged since 2017.

Pleasingly, eight in ten (82%) primary producers rate biosecurity as highly important to primary producers in NSW with key additional reasons including:

- Ensuring sustainability of business (protection of livelihood), and
- Ensuring animal welfare.

A significant increase was apparent in the importance rating of animal welfare (average rating of 8.9 in 2021 up from 7.8 in 2017), with animal welfare now equal fourth in terms of relative importance (previously ranked eighth).

Based on qualitative discussions with primary producers this result is driven by a combination of the increased prices livestock is now commanding, as a response to the impact that both bushfires and drought has had upon required levels of animal husbandry, and in response to media attention in relation to issues such as live exports and mulesing.

> *"There is a lot of variance in my membership (about what they believe about biosecurity) we have some who think it's a government run and led system and others believe they have a role to play. I think they are starting to understand what bridges the gap as well."*
>
> ***Source:*** *Primary producer industry association respondent*

The vast majority of primary producers felt that both their own business and the industry are more attuned to the issues of biosecurity since 2017:

- 65% strongly agreed that their *industry* has increased its focus on biosecurity in the last five years,
- 60% strongly agreed that their *business* has increased its focus on biosecurity in the past five years, and
- 67% have a biosecurity management plan or industry accreditation plan in place, up from 46% having a biosecurity plan in place in 2017[1].

[1] Note question wording changed from 'Have a biosecurity plan in place' (2017) to 'Have a biosecurity management plan or industry accreditation plan in place' (2021).

Qualitatively, this increased level of interest was associated with an increased focus on biosecurity in both government communications and regulations, as well as in industry newsletters and communications.

> *"So we do a lot of work as part of our biosecurity plan, which is registered with DPI that I'm sure that you can access, to ensure that we don't bring any bugs or parasites or diseases on site. We closely monitor and record all chemical uses. And in in that way, over the last especially 15 years, we have pruned a lot of chemicals out of our system and gone back to some very basic ones which are a lot easier on the fish, because being an intensive fish farm, we supplementary feed and we have aeration in every pond."*
>
> ***Source:*** *Primary producer respondent*

Responsibility and personal behaviours

As with the general public, primary producers also recognise that responsibility for biosecurity is shared. There is a strong sense among primary producers that a range of stakeholders are responsible for biosecurity. The NSW DPI was the entity most producers rated as highly responsible (84%), followed closely by:

- Local Land Services (82%), and
- Primary producers, and a shared responsibility between government and industry (both 80%).

Qualitative consultations found that the key roles government plays in regard to biosecurity relates to both border protection (state and international), and to the governance and oversight of biosecurity, namely the introduction of legislation. Primary producers, however, see themselves as responsible for biosecurity prevention and management at the farm level, and rely on their industry associations to educate them as to both the importance of biosecurity and how to comply with relevant industry standards, and laws.

Between 2017 and 2021 the relative ranking of perceived areas of responsibility and average rating of responsibility remains largely unchanged, with the following key exception:

- A significant increase was apparent in the level of responsibility attributed to 'Local Land Services' (average rating of 8.6 in 2021 up from 7.9 in 2017), with Local Land Services also now with the second highest mean rating of responsibility (previously seventh). This result was likely due to Local Land Services having only been formed in 2014, meaning it was a much more established agency in 2021 than it was in 2017.

Importantly, nearly three quarters (71%) of primary producers rated their ability to manage and respond to biosecurity issues highly – this is a critical measure given their confidence to act on those biosecurity issues that affect their day-to-day operations.

However, significantly fewer primary producers rate their ability to identify (63%) or prevent issues (58%) as high. Based on the qualitative consultations the lower rating primary producers gave for their 'ability to prevent' is driven by the perception that while they can take action to minimise the likelihood of incursions of known weeds, diseases and pests onto their property, the biggest biosecurity threat they face is the introduction to Australia of a previously unknown pest, weed or disease.

More specifically primary producers felt powerless to both prevent new threats from reaching Australia and take preventative action that will minimise the incursion of the new threat onto their property if introduced into NSW.

Conversely the higher rating primary producers gave for their ability to **manage** a biosecurity issue is driven by their perception that they do possess both the knowledge and tools to be able to effectively **respond to** incursions of known pests, weeds, or diseases onto their property.

There was no significant change in producer's ability to identify, prevent or respond to an issue between 2017 and 2021.

Importantly, from 2017 to 2021 there has been a significant increase in the adoption of desired behaviours regarding:

- Having a biosecurity management plan or industry accreditation plan in place (67% up from 46% having a biosecurity plan in place in 2017)[2], and
- Having established animal hygiene protocols in place (92% up from 86% in 2017).

Most primary producers claim to 'usually' or 'always' comply with a wide range of the desired biosecurity behaviours relevant to their operation. Behaviours with the highest level of stated compliance tended to be reactive, and those which producers describe as long established and based on principles of sound land management, animal husbandry and established governance requirements.

For each of the desired best practice behaviours a proportion of primary producers stated that this was something they had only commenced doing within the past five years.

The behaviours with the highest instance of recent uptake tended to be related to specific biosecurity initiatives or governance requirements. However, despite the positive uptake of these behaviours in the last five years, a relatively high level of non-compliance is also apparent. These behaviours tend to centre on internal/on-farm biosecurity governance, such as having biosecurity signage at all entry points to premises (58% do not), having a biosecurity management plan or industry accreditation plan in place (33% do not), having established vehicle and machinery protocols in place (30% do not), and maintaining a cash reserve specifically for the management of emergency biosecurity issues (73% do not). This indicates the need for increased education of primary producers as to the importance of both proactive and reactive behaviours.

Few of the potential barriers to best practice provided in the survey were identified as applying to the majority of producers. The one exception to this is 'concerns around chemical residue', with more than half (54%) of primary producers agreeing that concerns around chemical residue is a reason why they do not follow best practise in relation to biosecurity.

While for some this applies only sometimes (7%) or rarely (13%), for one third of primary producers, concerns about chemical residue are a reason for not following best practice in relation to biosecurity that strongly applies to them. This concern was also raised extensively in qualitative consultations with horticulture producers stating that many available sprays were contradictory to both organic and other industry certification requirements.

Additionally, two further barriers were found to have a statistically higher likelihood of being a barrier to practising biosecurity measures, namely:

[2] Note question wording changed from 'Have a biosecurity plan in place' (2017) to 'Have a biosecurity management plan or industry accreditation plan in place' (2021).

- ‘Concern that if I report an issue, I will not receive fair compensation for any animals or plants that need to be destroyed’ with 39% indicating that to some extent this was a reason why they did not follow best practise in relation to biosecurity. This reflects primary producers’ fear of being financially disadvantaged if they report an issue that leads to them being required to destroy plants or animals for which they are not eligible for compensation. Again, this was also raised as a concern within the qualitative consultations.
- ‘Consider risks to be external or out of my control’ with 40% stating that to some extent this was a reason why they did not follow best practise in relation to biosecurity.

A significant number of changes were made to the list of potential barriers measured in 2017 and 2021 with only five consistent across both years. The extent to which each of these five issues are perceived as barriers has declined significantly from 2017 to 2021, with primary producers now less likely to state that biosecurity behaviours are:

- ‘Too costly to do’ (2.7 down from 4.3 in 2017),
- ‘Irrelevant to my operation’ (2.5 from 4.5 in 2017),
- Something they are ‘too busy, don’t have the time’ for (2.2 from 4.0 in 2017),
- Something they ‘do not see the risk to be worth the effort’ for (2.2 from 3.6 in 2017)’, and
- Something they are less likely to ‘not know what best practice measures are’ (2.1 from 4.0 in 2017).

These results align with the earlier finding that the majority of primary producers have increased their focus on biosecurity over recent years.

Further, this increased focus appears to have resulted in a corresponding decline in negative perceptions as to the relevance, value exchange and credibility or legitimacy of behaviour performance. Additionally, the decline in ‘*do not know what best practise behaviours are’* as a barrier to compliance reflects the earlier finding that primary producer’s ability to manage or respond to biosecurity issues has increased.

Priorities for effective biosecurity management

When asked to rate several priorities for effective biosecurity management, producers tended to agree that all should be a high priority. This is a clear indication of strong support among producers for multiple and concurrent initiatives in this area.

Primary producers were most likely to see *increased biosecurity surveillance at international borders* as a high priority (90% rated as a top priority). This reflects producers seeing national border protection both as a key means by which biosecurity incursions to Australia can be prevented, but also the area (i.e., prevention) where they have the least ability to act.

The second highest priority was to *'increase awareness/understanding about biosecurity among hobby farmers/ backyard operators / recreational fishers'* (85% rated as a top priority) – the risk that these audience groups pose to biosecurity was also raised within qualitative consultations with commercial primary producers located in peri-urban area.

'Increased levels of government resources aimed to support primary industry in managing biosecurity' was the third most highly rated priority (84% rated as a top priority). Qualitative consultations indicate that the areas in which additional support was most needed related to navigation of regulations and 'red tape', as well as grants to subsidise biosecurity implementation costs, and more departmental advisors such as horticulturalists, large animal vets and agronomists.

The only strategy for which a significant downward change occurred between 2017 and 2021 was for 'greater education of primary producers as to what best practice biosecurity behaviours are' (8.2 down from 8.5 in 2017). This reflects both the increase in primary producers' ability to manage / respond to biosecurity issues, as well as the lower proportion of primary producers stating that the reason they did not perform best practice biosecurity behaviours was due to not knowing what best practice biosecurity behaviours were.

Primary producers tended to prefer resources that would allow for easier identification and hence prevention of biosecurity issues rather than those aimed at increasing ability to manage such issues. This includes:

- Biosecurity alerts (80% highly interested)
- Industry certification for biosecurity compliant produce / livestock if it meant you could attract a higher price (68%), and
- Fact sheets about pest and disease types, their symptoms and prevalence (63%).

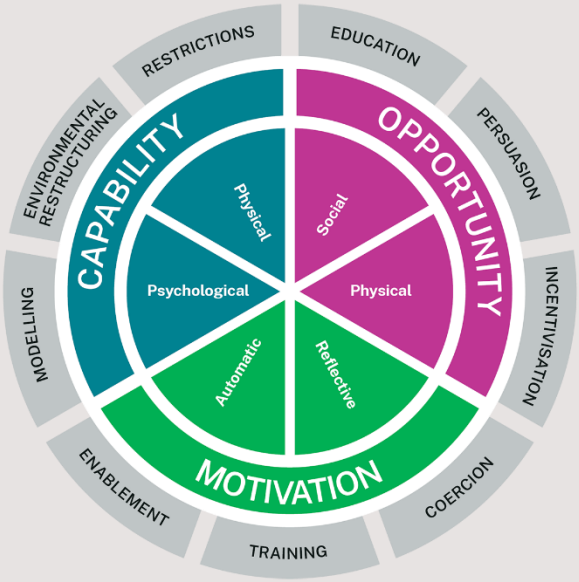
Opportunities for the future

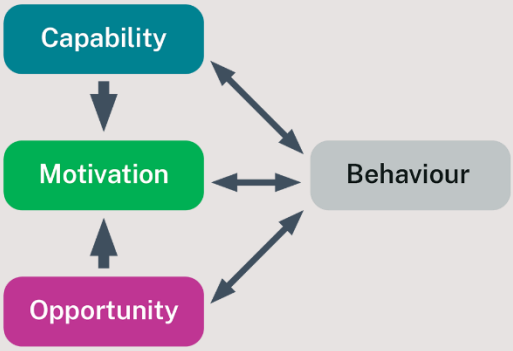
Biosecurity is already an issue of top concern for primary producers, and most are highly engaged in the issues as they relate to their own operations. However, this study identified a range of critical behaviours that currently few producers are engaging in, including:

- Placing biosecurity signage an entry points to their operations (58% don't have this),
- Quarantining new plant matter and livestock (64% plant, 20% livestock don't do this),
- Only purchasing plant matter (and feed) from approved providers (36% plants, 33% feed don't do this),
- Belonging to industry certification schemes (35% don't do this), and
- Having established hygiene protocols for vehicles, machinery (30%) and a lesser extent, humans (21%).

Utilising the Michie COM-B framework again, we would recommend conducting a purpose-built workshop on the desired behaviour and identify the most compelling interventions or actions that may result in the desired behaviours.

See below for the Michie COM-B framework:





The results provide some insightful findings in this regard – for example, the top reasons most primary producers cite for undertaking biosecurity behaviours is 'to ensure sustainability of business' (91%), to maximise quality of goods and prices achieved (90%) and to ensure continued or improved market access (88%).

The high endorsement of the above suggests that utilising these benefits in either education, persuasion or enablement domains will serve to increase perceived legitimacy and credibility, and hence greater contemplation and uptake of desired behaviours). The coercion approach was least compelling (to avoid fines and penalties was seen as being the least impactful driver of practising biosecurity measures).

Finally, given the volume and range of communications that are aimed at time-poor business and farm managers, we would suggest a strategy that focusses on just one or two of these per year. For example, year one could focus on getting biosecurity signage up at farm gates, year two could focus on quarantining biological matter brought onto farm. Communications would need to be considered in the context of other behavioural interventions or strategies being undertaken at the same time.

Background and research objectives

Background to the research

Australia's geographical isolation has contributed to its relatively pest and disease-free status, though the expansion of international trade and travel has increased the need for further rigorous inspection processes for incoming people, ships, parcels, animals, and baggage[3]. However, to maintain Australia's biosecurity status, preventative and reactive measures must not stop at Australia's border. While definitions vary, the Intergovernmental Agreement on Biosecurity (IGAB)[4] defines biosecurity as "the management of risks to the economy, the environment, and the community, of pests and diseases entering, emerging, establishing or spreading".

The New South Wales Department of Primary Industries (NSW DPI) purpose is to maximise outcomes for NSW primary industries, the communities they support and the resources they rely on, both today and for the future. Given the implications biosecurity has for the health of humans and animals, as well as productivity, NSW DPI has an important responsibility in protecting and enhancing the biosecurity of NSW. The Biosecurity and Food Safety branch of NSW DPI fulfils a strategic and operational leadership role within the NSW Government, to protect primary industries, the environment, and the community from the increasing threat of pests, weeds, disease and contaminants; to ensure markets and consumers are confident that industries and business meet high standards of food safety and animal welfare; and that the impact of adverse events is minimised and rapid recovery, with increasing resilience over time, is supported.

These goals supported by strong traceability and market assurance programs, will ensure NSW has access to markets and a reputation for premium value products. The sector contributes significantly to the NSW economy, achieving a record $20.9 billion in total primary industries output in 2020-21. This represented an increase in GVP by 41% on 2018-19 levels, exceeding NSW DPI's planned growth two years ahead of schedule[5].

In order to continue to achieve its goals, NSW DPI must protect and enhance the biosecurity of NSW, given the implications biosecurity has for the health of humans and animals, as well as productivity. For example, diseases such as the Hendra virus pose a potentially fatal health risk to both humans and horses; and weeds and pests cost the NSW economy over $1.4 billion annually in lost productivity and control costs[6]. Other economic consequences of biosecurity incidents include the loss of livestock, decreased tourism, and can negatively impact on the reputation and public image related to health and cleanliness of the environment.

In 2017, DPI undertook research with the NSW population to establish benchmark levels of awareness, understanding and behaviours of key audience groups (industry/ primary producers and community) in relation to biosecurity.

In 2021 NSW DPI engaged Where*to* Research to conduct the 2021 NSW Biosecurity Attitudinal Research Program in order to both obtain updated measures as to current levels of awareness understanding and behaviours, as well as determine whether any change in such measures has occurred since 2017 (and if so, why?).

[3] Department of Agriculture, Water and the Environment, accessed 24 May 2021 at http://www.agriculture.gov.au/biosecurity/australia

[4] The Intergovernmental Agreement on Biosecurity, accessed 24 May 2021 at https://www.coag.gov.au/about-coag/agreements/intergovernmental-agreement-biosecurity-0

[5] Department of Primary Industries Performance, Data & Insights 2021, accessed 28 February 2022 at https://www.dpi.nsw.gov.au/about-us/publications/pdi/2021

[6] NSW Biosecurity Strategy 2013-2021, NSW Government, accessed 24 May 2021 at https://www.dpi.nsw.gov.au/biosecurity/managing-biosecurity/nsw-biosecurity-strategy-2021

Research objectives

The overarching purpose of the 2021 NSW Biosecurity Attitudinal Research Program was to assess both current and longitudinal (2017 – 2021) levels of awareness, attitudes, understanding and behaviours of biosecurity among the NSW population.

More specifically this requirement consisted of two key tasks as detailed below.

Task 1. Assess community and stakeholder awareness and understanding of biosecurity across NSW.

With the above achieved via primary research undertaken with representative (i.e., geographic and demographic / business characteristics) samples of key audience groups (i.e., industry and community) as to:

- The level of understanding as to the meaning of biosecurity, particularly in relation to the environment, plants, invasive species, animals, pests, and aquatic life.
- The level of awareness of biosecurity issues and challenges in NSW and how to manage them.
- The level of awareness and use of biosecurity management programs and tools.
- Which information sources target audiences receive information through on biosecurity, local or NSW issues.
- Whether legislative or policy change was an influencing factor in stakeholder engagement with biosecurity issues.

Task 2. Provide a longitudinal assessment of biosecurity awareness, attitudes, understanding and behaviours in NSW for the period 2017-2021

With Task 2 drawing on the outcomes of the primary research conducted in Task 1 and the data collected as part of the 2017 Biosecurity Attitudinal Research Report, with analysis focussed on determining:

- Whether, and if so in what ways and to what extent, biosecurity awareness, attitudes, understanding and behaviours in NSW have changed or evolved in the period 2017-2021.
- Whether such change or evolution can be attributed to the enactment and subsequent operation of the Biosecurity Act 2015.

Methodology

Research Approach

To deliver a large scale statistically valid survey of NSW residents and primary producers, the research required an iterative and mixed methodology approach, as per the below.

Stage	Methodology	Comprising
1	**Qualitative**	Peri-Urban case study • 8 in-depth interviews with peri-urban producers (mix of producer types) • 4 depths with peri urban stakeholder interviews
		Aquatic case study • 7 in-depth interviews with commercial aquatic operators / enterprises (broad mix of aquatic types and locations required) • 6 depths with stakeholder interviews
2	**Quantitative**	Online survey with general population • n=1163 interviews achieved • Sample inclusive of n=148 interviews with Aboriginal and Torres Strait Islander people
		Telephone survey with primary producers (livestock, cropping and horticulture) • n=550 interviews achieved
		Telephone survey with aquatic producers • Not completed due to it not being possible to sample this audience group effectively. Refer to Appendix (Sec. 8.1) for a detailed explanation
3	**Qualitative**	Metropolitan case study • 1 x group discussion with general population people living in Sydney • 18 in-depth interviews with stakeholders
		Regional Case Study • 1 x group discussion with people living in Tamworth • 1 x group with farmers from Tamworth area • 3 depth interviews with stakeholders
		Aboriginal and Torres Strait Islander population case study • 1 x group with Indigenous residents of NSW who live in town • 2 x interviews with Indigenous primary producers • 8 x interviews with stakeholders

Quantitative sample frames

General population

The following sample size and sub-group distribution was achieved for the general population quantitative survey.

Table 1: General population quantitative sample frame

	TOTAL	Gender		Age				Proximity to Town		Identify as Indigenous
		Male	Female	18 to 34	35 to 49	50 to 69	70 and over	In town	Rural fringe / Out of town	
Total	1158	498	660	272	397	362	127	1036	122	147
Central Tablelands	50	22	28	6	17	21	6	39	11↑	5
Central West	91	32	59	37↑	29	16	9	79	12↑	15
Greater Sydney	341	173	168	62	118	127	34	338	3↓	24
Hunter	81	32	49	21	17	21	22↑	77	4	6
Murray	41	16	25	11	12	14	4	37	4	4
North Coast	109	50	59	28	15↓	39	27	90	19↑	5
North West	47	23	24	17	20	7	3	38	9↑	12
Northern Tablelands	52	12	40	14	16	19	3	38	14↑	6
Riverina	155	55	100	26	86↑	36	7	136	19↑	49↑
South East	132	60	72	23	44	54	11	111	21↑	11
Western	59	23	36	27↑	23	8	1	53	6↑	10

Arrows indicate significant differences compared to 2017. ↑ indicates the datapoint is significantly higher compared to 2017. ↓ indicates the datapoint is significantly lower compared to 2017.

The following sample size and sub-group distribution was achieved for the primary producer quantitative survey.

Table 2: Primary producer quantitative sample frame

TOTAL		Main primary industry			Annual revenue			Size of property hectares		
		Livestock	Cropping	Horti culture	< $100,000	$100,001 $500,000	> $500,001	< 100	100 1000	> 1000
Total	549	412	75	62	158	146	149	135	198	216
Central Tablelands	45	40↑	1	4	17	13	8	14	18	13
Central West	55	41	13	1	11	11	22	3	20	32
Greater Sydney	44	26	0	18↑	18	7	8	39↑	4	1
Hunter	41	39↑	0	2	21↑	13	5	11	22	8
Murray	45	29↓	12	4	5	15	19	8	15	22
North Coast	47	35	4	8	17	12	4	19	22	6↓
North West	52	38	9	5	10	19	15	5	16	31
Northern Tablelands	66	60	4	2	24	16	16	9	32	25
Riverina	50	25↓	18↑	7	7	17	17	6	24	20
South East	54	46	5	3	22	12	14	18	19	17
Western	50	33	9	8	6	11	21	3	6	41↑

Arrows indicate significant differences compared to 2017. ↑ indicates the datapoint is significantly higher compared to 2017. ↓ indicates the datapoint is significantly lower compared to 2017.

Interpreting this report

Percentages and averages

Respondents who completed a survey but did not answer a particular question are excluded from the tabulation of results and calculation of statistics for that question.

Percentages are generally rounded to whole numbers. Some percentages may not add to 100 per cent due to:

- Rounding effects; or
- A question allowing multiple rather than single response.

Some survey questions asked respondents to give a rating from 0 to 10. Responses have then been classified based on level of rating given. Typically, the classification used with ratings is as follows:

- a rating of 0, 1, 2 or 3 is classified as low,
- a rating of 4 or 5 is classified as somewhat low priority,
- a rating of 6 or 7 is classified as somewhat high, and
- a rating of 8, 9 or 10 is classified as high.

Mean scores for rating questions have also been calculated.

Tests of statistical significance

Tests for statistical significance have been conducted between particular subgroups of interest and the total sample. These tests have been undertaken at a 95% confidence level.

An exception reporting approach has been undertaken in that if no statistical significance is mentioned, there are none associated with these groups.

Weighting

Data was weighted in the basis of age, and location (general population) and on the basis of location and industry type (primary producers). While weighting was developed to be consistent with the 2017 weighting approach, in 2021, for primary producers, weights needed to be adjusted to allow for sampling differences (lack of engagement with aquatic producers) and no screening for forestry businesses. As a result of this process, a small number of respondents were removed from the 2017 dataset to ensure its equivalent to 2021 data.

Qualitative

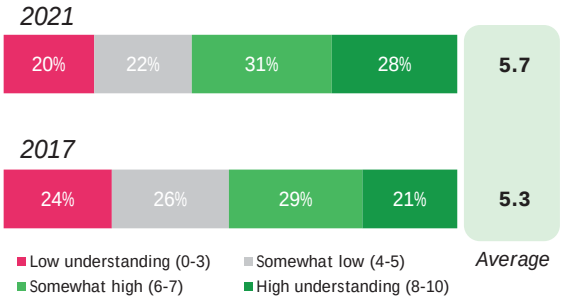
Throughout the report qualitative outcomes, including the use of verbatim quotes, have been used to provide additional context and/or explanation to the quantitative results. Where possible to give an indication of where verbatim quotes have come from without compromising participant confidentiality, this has been included.

General population: Detailed Findings

Understanding of biosecurity

Section Summary

UNDERSTANDING OF BIOSECURITY



TOP 5 RATED DEFINITIONS

1. Prevention/control of spread of diseases, pests & weeds through plants / livestock **(65% rated this as a good definition)**
2. Protecting the economy, environment and community from the negative impacts of pests, diseases, weeds and contaminants **(62%)**
3. Biological threats / biological hazards / bio-terrorism **(58%)**
4. National / Australian border protection / quarantine **(56%)**
5. Environmental protection **(54%)**

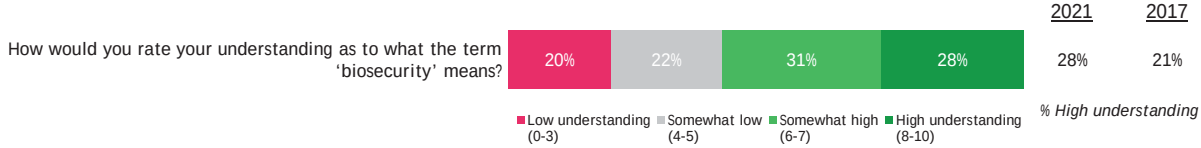
The above results highlight that a large proportion of the NSW general population lack conceptual clarity and understanding as to what biosecurity is. As awareness and understanding of an issue is a necessary precursor for desired behaviours in regard to that issue to be performed, this finding indicates that there is a strong need for increased biosecurity awareness and education initiatives that are targeted at the general population. When prompted with potential definitions those that focus on the environment, encompass both prevention and response strategies, as well as detailing of key risks and areas of impact are most highly rated - suggesting that to drive perceived relevancy of communications there is need to focus messaging on such elements.

How the general population rates own understanding of biosecurity

Although results indicate that, at a population level, the community lack a clear understand of what 'biosecurity' means, understanding of the term has increased since 2017 when only one in five (21%) reported a high level of understanding, compared to more than one quarter (28%) in 2021. A further three in ten (31%) have a somewhat high understanding while one in five (22%) report a somewhat low understanding, and a similar proportion (20%) report having a low understanding of the term.

Awareness and understanding that an issue exists is a necessary precursor for action or behaviour change, this suggests there is a need for increased biosecurity awareness and education initiatives targeted at the general population.

Figure 1: How the general population rates own understanding of biosecurity



Source: Q2 - How would you rate your understanding as to what the term 'biosecurity' means? Please answer using a scale of 0-10 where 0 is 'very low understanding' and 10 is 'very high understanding.'
Base General Population, weighted. 2021, n=1,158. 2017, n=1,149.

Those more likely to report a high (8-10 out of 10) understanding of what biosecurity means include:

- Males (32% compared to 20% of females),
- Those with an annual household income greater of $75,000 or more (28% compared to 23%), and
- Those in Sydney (29% compared to 26% for all other regions excluding Sydney).

Reported understanding of the term biosecurity increased in the following Local Land Services regions from 2017 to 2021:

- Central Tablelands (mean understanding increased to 6.5 in 2021, up from 5.5 in 2017),
- Central West (mean understanding increased to 5.9 in 2021, up from 4.9 in 2017), and
- South East (mean understanding increased to 5.8 in 2021, up from 4.6 in 2017).

How the general population defines biosecurity

When asked how they define biosecurity, one quarter of respondents (25%) centred on prevention or management of disease (with several comments referencing covid as an example of a biosecurity issue). Terms such as security and protection also featured heavily.

Approximately one in five (20%) of respondents related biosecurity to protection of the environment and/or to flora, fauna and to a lesser extent agriculture, while fewer (14%) responses were focussed on aspects such as the impact that pests and weeds have (with these responses most closely aligned to the definition of biosecurity used by the NSW Department of Primary Industries, namely 'Protecting the economy, environment and community from the negative impacts of pests, diseases, weeds and contaminants').

- One in ten (10%) responses referenced biotechnology or the impact of technology advancements including chemicals.
- Slightly more than one in ten (12%) stated that they did not know or were not sure.

These results highlight that 'biosecurity' is broadly and differentially interpreted across the general population, with a significant proportion lacking any real understanding or knowledge. Additionally, when viewed in combination with the awareness levels above these results highlight that a disconnect exists between the proportion claiming to have a reasonable level of understanding and the proportion of people who could articulate that knowledge. This result reinforces that there is a strong need for increased awareness and education initiatives targeted at the general population which focus on what biosecurity is and a shortlist of desired behaviours.

Figure 2: How members of the general population define biosecurity

Source: Q.3 And what do you understand to be meant by the term biosecurity?
Base (General population): 2021 n=1163

How the general population perceive alternative biosecurity definitions

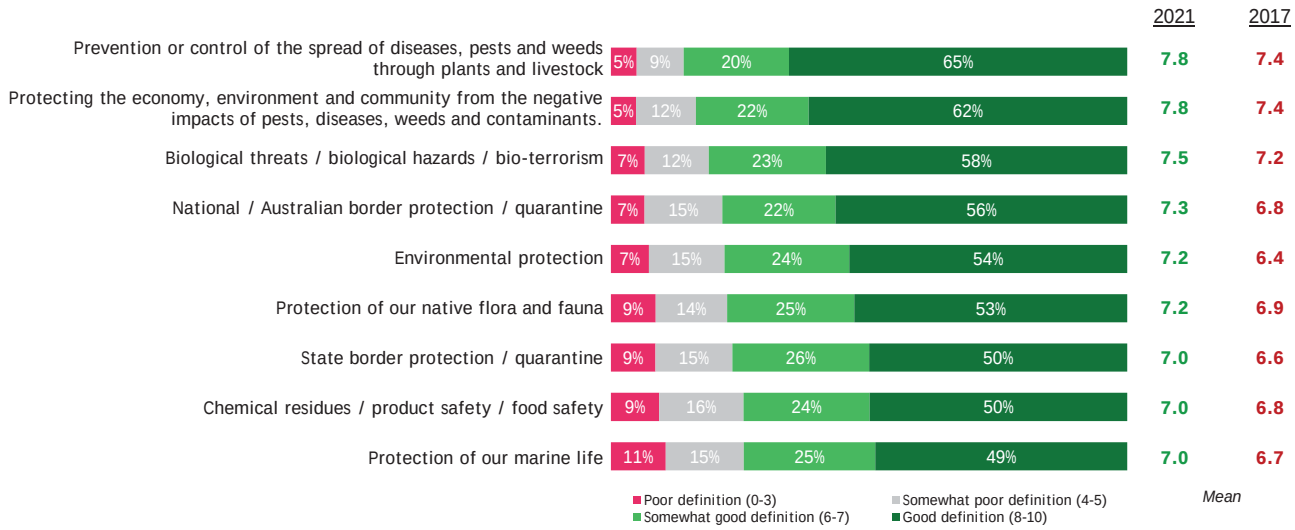
Aligning with the spontaneous responses illustrated above, when presented with a list of potential 'biosecurity' definitions (listed in Figure 3 below), those referring to prevention or control of diseases, pests, and weeds were the most likely to be highlighted as good descriptors. Specifically:

- 65% felt that 'prevention or control of the spread of diseases, pests and weeds through plants and livestock' was a good definition, and
- 62% felt that 'protecting the economy, environment and community from the negative impacts of pests, diseases, weeds and contaminants' was a good descriptor.

It is encouraging that the definition used by NSW DPI ('Protecting the economy, environment and community from the negative impacts of pests, diseases, weeds and contaminants') is one of the two top-rated definitions. This suggests a level of mutual understanding and agreement on a definition of biosecurity between NSW DPI and the public – an important cornerstone for communications.

Other less comprehensive and more specific or limited definitions were much less likely to be identified as good examples. This highlights that although the general population might not have internalised a clear and concise definition of biosecurity that they can confidently state, there is an understanding biosecurity is a complex and multifaceted issue that impacts the economy, environment, and community: the public are broadly aware of its scope.

Figure 3: How the general population perceive alternative biosecurity definitions



Source: Q4 - Below is a list of statements that others have made to define what they believe biosecurity to be. To what extent do you feel each of these is a good definition of what biosecurity is based on your own understanding? Please answer for each using a scale of 0-10 where 0 is 'a very poor definition' and 10 is 'very good definition'
Base General Population, weighted. 2021, n=1,158. 2017, n=1,149.

Different cohorts of the community tended to rate these definitions similarly, suggesting a high degree of homogeneity and consistency. However, those aged 50+ were significantly more likely to rate each definition as 'good' – likely an artefact of the greater confidence older members of the community have with regards to the broad scope of biosecurity.

Also of note, those who live in rural or out of town regions were significantly more likely to rate NSW DPI's definition as 'good' (77% compared to 64%). This might suggest that NSW DPI messaging has been particularly effective with this important cohort.

The results indicate the current definition of biosecurity used by NSW DPI is strongly endorsed across all sub-groups and therefore fit for usage without specific customisation for specific sub-groups.

Between 2017 and 2021, agreement with all provided definitions increased with the largest increase being for 'Environmental protection' for which mean agreement increased from 6.4 to 7.2.

The NSW DPIs definition 'Protecting the economy, environment and community from the negative impacts of pests, diseases, weeds and contaminants' increased from 7.4 to 7.8.

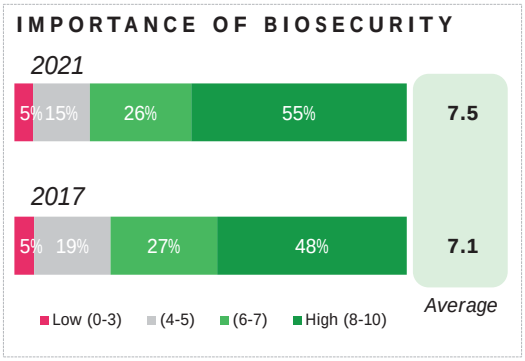
Regions where agreement with the NSW DPIs definition increased significantly from 2017 to 2021 included:

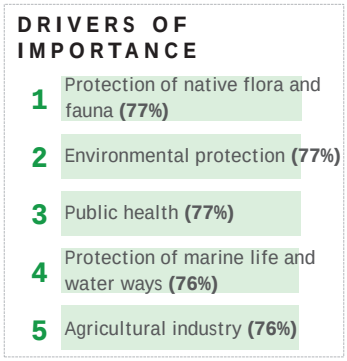
- Central Tablelands (increased from 7.6 to 8.5).
- Murray (increased from 7.7 to 8.6), and
- North West (increased from 7.4 to 8.4).

In these regions, agreement with the NSW DPI definition of biosecurity had been on par with NSW overall in 2017.

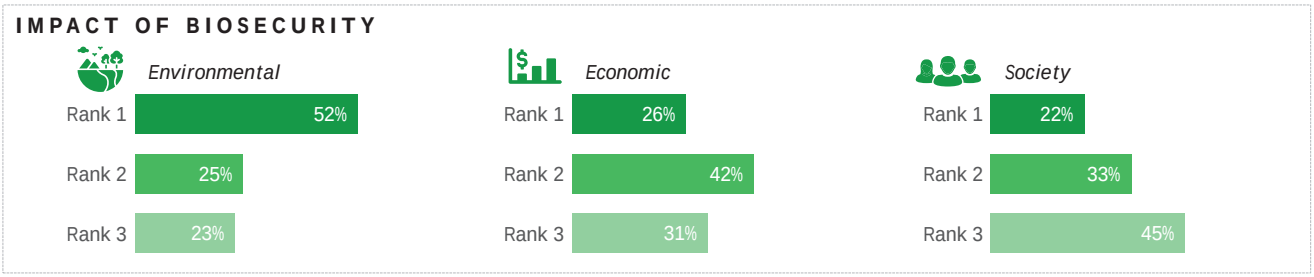
Importance of biosecurity

Section Summary





While the majority of the population see biosecurity as being highly important, its relevance is largely linked to agriculture, and flora and fauna – meaning that its relative importance is seen to be significantly lower than issues such as health, housing, and employment which are felt to be more directly aligned to day-to-day needs. This finding emphasises that in order to drive relevancy of biosecurity communications to the general population key messaging needs to be framed in terms that the general population relate to their day to day life.



The overall level of importance that biosecurity has in terms of 'environmental impact' was seen to be significantly higher than in terms of its economic or social impact – with this reflecting the tendency for the general population to primarily define biosecurity in terms of environmental risks (and associated preventative and management strategies of such risks), as well as the lack of perceived direct relevance of biosecurity to day to day considerations and higher order needs. As such these results add strength to the recommendation that to increase the relevancy of biosecurity to the general population (and hence associated contemplation and uptake of desired behaviours) there is a need for key messaging to be framed in terms of the impact that a biosecurity issue has on day to day life.

How the general population perceives the relative importance of biosecurity

When asked to rate a range of issues on the basis of importance for NSW, biosecurity was rated lower than a number of other issues such as, health which was rated highest, with eight in ten (81%) agreeing it is important. Other issues rated as highly important include:

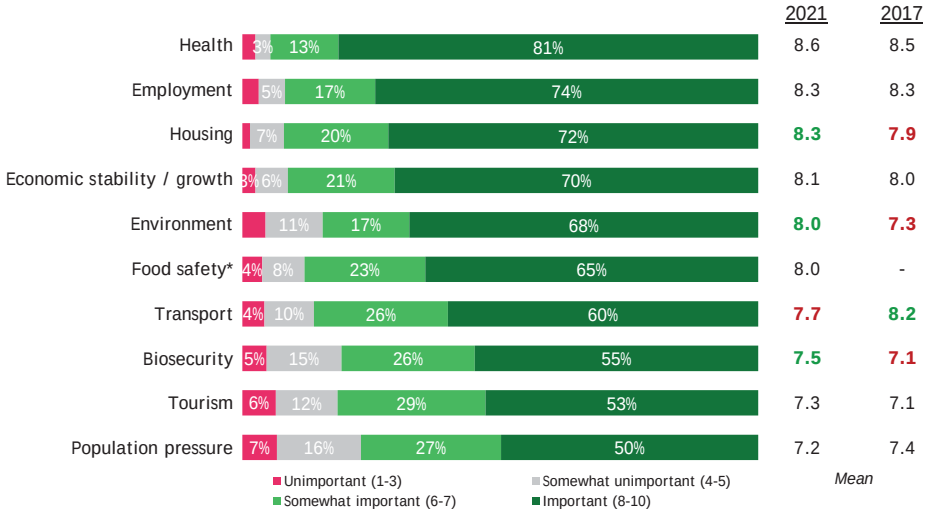
- Employment (74%),
- Housing (72%),
- Economic stability (70%),
- The environment (68%), and
- Food safety (65%).

Just over half (55%) rated biosecurity as highly important, fewer than transport (60%), but slightly more than tourism (53%) and population pressure (50%).

That health, employment, housing and economic stability emerged as the top issues is not surprising given that these issues directly relate to fundamental immediate needs, and all have been impacted by the pandemic across 2020 and 2021. Similarly, it is not surprising that the environment was relatively important (mean 8.0 2021, up from 7.3 in 2017) given that floods and bushfires have dominated media coverage with extremely emotive images and videos at times throughout 2020 and 2021, and voices around climate change become increasingly urgent.

The relatively low rating for biosecurity is likely a reflection of other issues being more prominent (in terms of media coverage or directly impacted by the pandemic), more pressing or seen to have higher direct personal relevance. Nevertheless, the significant increase in the mean importance rating of biosecurity in 2021 (8.3 up from 7.9 in 2017) is encouraging.

Figure 4: How the general population perceives the relative importance of biosecurity



Source: Q1 How important do you feel the following issues are for NSW? For each please answer using a scale of 0-10 where 0 is 'not at all important' and 10 is 'extremely important'
Base General Population, weighted. 2021, n=1,158. 2017, n=1,149.
Note: *Not asked in 2017.

These findings emphasise the challenges faced in trying to drive the importance of biosecurity among the general population– it is less topical, less confronting, less provocative and emotive, and perceived as being less of an existential threat than a range of other issues. When done well it is quiet, smooth, unseen. Only when problems arise does it become important for the average citizen.

Those in the Central Tablelands were significantly more likely to rate biosecurity as an important issue in 2021 (74% up from 59% in 2017) compared to NSW overall (55% in 2021). Furthermore, while not significantly higher than NSW overall, primarily due to the smaller sample sizes in these regions, worth mentioning is the high proportion rating biosecurity as an important issue in Murray (72%), North West (62%) and Northern Tablelands (61%).

Importantly, those with a high self-rated understanding of what biosecurity means (9-10 out of 10) were significantly more likely to consider biosecurity an important issue (75%), compared to 49% of those rating their understanding of biosecurity lower than 8 out of 10.

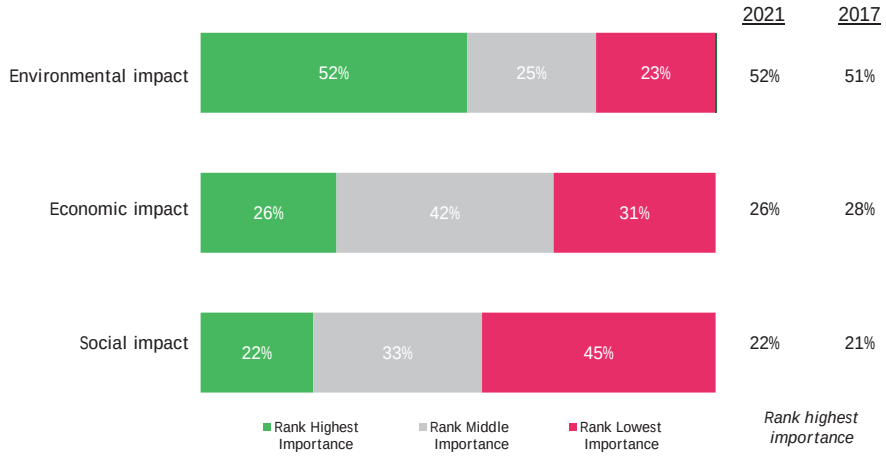
General population perceptions of the economic, environmental, and social impact of biosecurity

Respondents were asked to assess the relative importance of biosecurity in terms of economic, environmental, and social impact, as defined below:

- Environmental impact – i.e., the impact an adverse biosecurity issue or event could have upon our fauna and flora, landscape, and ecosystems.
- Economic impact – i.e., the impact an adverse biosecurity issue or event could have upon primary industries, the broader NSW economy, our trade, and tourism, etc.
- Social impact – i.e., the impact an adverse biosecurity issue or event could have upon our health and wellbeing, our recreational resources, how we view Australia and how the rest of the world views us.

As detailed in figure 5, biosecurity is more likely to be considered important to NSW due to its environmental impact, with over half (52%) rating environmental impact as the most important to the State. In contrast, one in four (26%) consider the economic impact of biosecurity to be most important while one in five (22%) consider the social impact to be most important. These results are in close alignment with those of 2017 and tended to be similar across Local Land Services regions.

Figure 5: General population perceptions of the economic, environmental and social impact of biosecurity



Source: Q5 - The following three areas have been identified as being why biosecurity is important to NSW. Please rank these in what you see to be their order of importance. Base General Population, weighted. 2021, n=1,158. 2017, n=1,149.

This result reflects the core finding discussed above, i.e., the tendency of the general population to define biosecurity in terms of environmental risks (and associated preventative and management strategies of such risks), as well as the lower perceived personal relevance of biosecurity compared to higher order needs (such as health, housing, and employment).

These results add strength to the argument that to increase the perceived relevance of biosecurity among the general population (and hence associated contemplation and uptake of desired behaviours) there is a need for key messaging to be framed in terms of the impact that biosecurity issues have beyond the environment.

Importance of biosecurity

While several results detailed above corroborate that the public lacks clarity on what biosecurity is, there is clearly a sense and understanding that biosecurity is important to a range of industries, settings, and systems. Again, results highlight that biosecurity is primarily contextualised as an environmental issue:

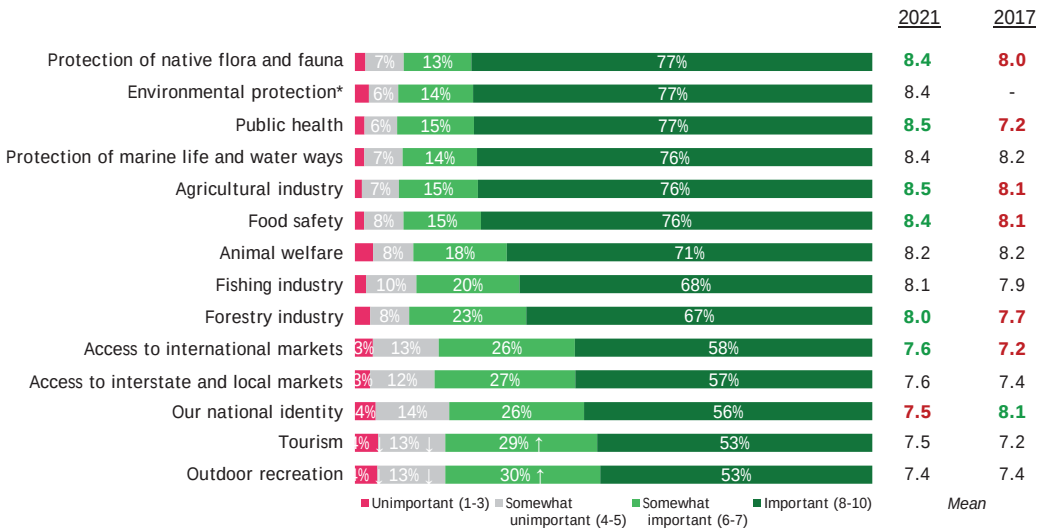
- 77% felt biosecurity is important for protection of native flora and fauna,
- 77% felt biosecurity is important for environmental protection, and
- 76% felt biosecurity is important for protection of marine life and water ways.

Importantly, three-quarters (76%) indicated that biosecurity is important for the agricultural industry, highlighting the public's understanding of the industry and economic impacts that would follow damage to native flora and the environment. Similarly, large proportions also indicated that biosecurity is important for a range of industrial settings, including:

- The fishing industry (68%),
- The forestry industry (67%),
- Access to interstate and local markets (57%),
- Access to international markets (58%), and
- Tourism (53%).

High ratings of the importance of biosecurity for public health, food safety, animal welfare, and outdoor recreation highlight an understanding that threats to biosecurity have broad sweeping impacts and implications.

Figure 6: Importance of biosecurity for other settings



Source: Q6 - And how important do you think biosecurity is to each of the following? Please answer for each using a scale of 0-10 where 0 is 'not at all important' and 10 is 'very important.
Base General Population, weighted. 2021, n=1,158. 2017, n=1,149.
Note: *Not asked in 2017.

Since 2017 there have been significant increases in the perceived importance of biosecurity to the agricultural industry, public health, protection of native flora and fauna, food safety and protection of marine life and water. These results point to a deepening of the public's understanding of the

impacts of threats to biosecurity. Alongside these changes, the perceived importance of biosecurity to our national identity has decreased significantly since 2017 (mean rating 7.5 in 2021 down from 8.1).

Older members of the public, those who rated biosecurity as an important issue, as well as those who felt they had a very high understanding of biosecurity were significantly more likely to indicate that biosecurity is important to most of the above settings.

Unlike other Local Land Services regions and NSW overall where the tendency was to rate higher; in 2021, those in Riverina and Western rated all of the areas mentioned, with the exception of public health, either lower or similarly important to 2017 ratings.

Responsibility for biosecurity

Section Summary

RESPONSIBILITY FOR BIOSECURITY

Where responsibility for biosecurity is seen to sit (% high level of responsibility)

1. NSW Government **(76%)**
2. Federal Government **(74%)**
3. Is a shared responsibility between government and industry **(73%)**
4. NSW Department of Primary Industries **(73%)**
5. Industry (agricultural, horticulture, fishing, etc.) **(73%)**

Perceptions as to where responsibility for biosecurity lies centres around government, and then industry. Awareness that the general population and the individual do have some level of responsibility for biosecurity was significantly below the perceived accountability of government and primary producers. As assignment of responsibility is aligned to perceptions of ability to influence and control, these results indicate that the general population believe that their behaviours in relation to biosecurity are less influential and impactful than the actions taken by government and industry. With this result in turn highlighting that there is a need for increased education as to the impact an individual's action can have.

Who the general population perceive as being responsible for biosecurity

Members of the general population were asked to rate the extent to which they see a range of entities and groups as being responsible for biosecurity in NSW.

All levels of government as well as primary industry are considered to have a high level of responsibility for biosecurity by at least 7 in 10 respondents, demonstrating biosecurity to be a mutual responsibility.

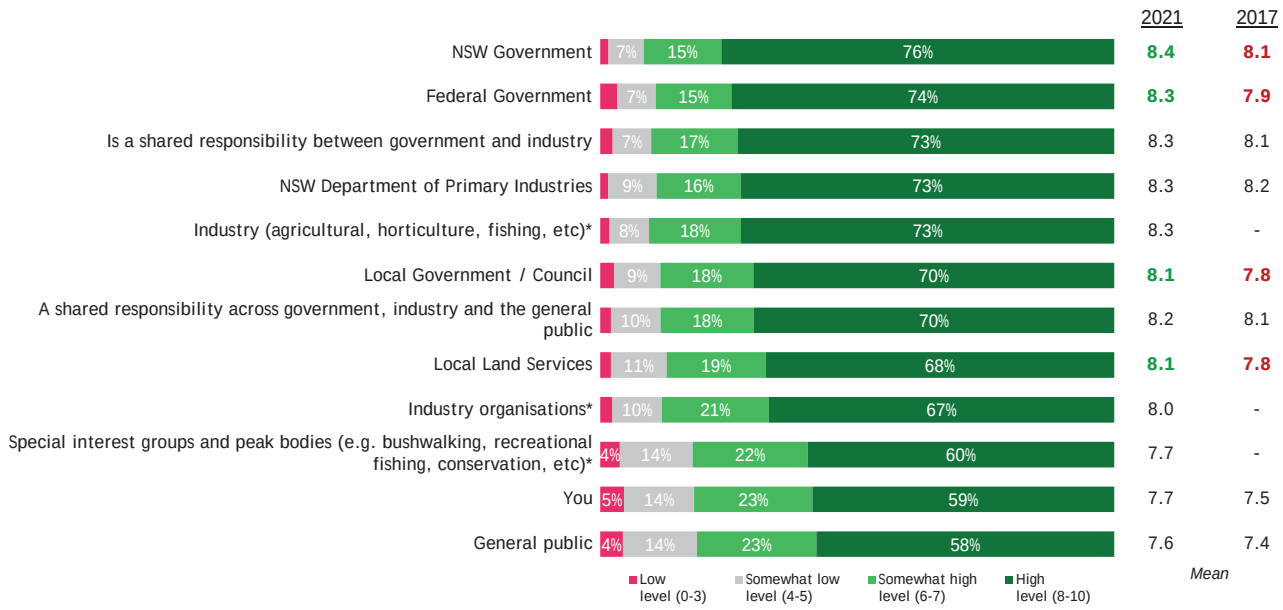
While agreement about the shared nature of responsibility between a range of organisations is strong, fewer individuals tend to see themselves (59%) or the general public (58%) as having a high level of responsibility for biosecurity.

As assignment of responsibility is aligned to perceptions of ability to influence and control, these results indicate that the general population believe that their behaviours in relation to biosecurity are less influential and impactful then the actions taken by government and industry. This result

again highlights the need for increased education around the impact of individual actions on the state's biosecurity.

Consistent with results detailed above, those aged 50+yrs., those who place high importance on biosecurity as an issue, as well as those with a very high understanding of biosecurity were more likely to consider that all the above parties have a high level of responsibility for biosecurity.

Figure 7: Who the general population perceive as being responsible for biosecurity



Source: Q11 -To what extent do you believe that each of the following groups have responsibility for biosecurity in NSW. Please answer for each using a scale of 0-10 where 0 is 'very low level of responsibility' and 10 'very high level of responsibility'.
Base General Population, weighted. 2021, n=1,158. 2017, n=1,149.
Note: *Not asked in 2017.

Since 2017, there has been a significant increase in the level of perceived responsibility for biosecurity as sitting with the Federal Government (mean 8.3 up from 7.9 in 2017), however neither the degree of personal responsibility, nor the extent to which biosecurity is seen to be a shared responsibility (within which the general population plays a part) recorded any significant increase.

This reinforces the need for increased education as to the impact that an individual's action can have across all groups.

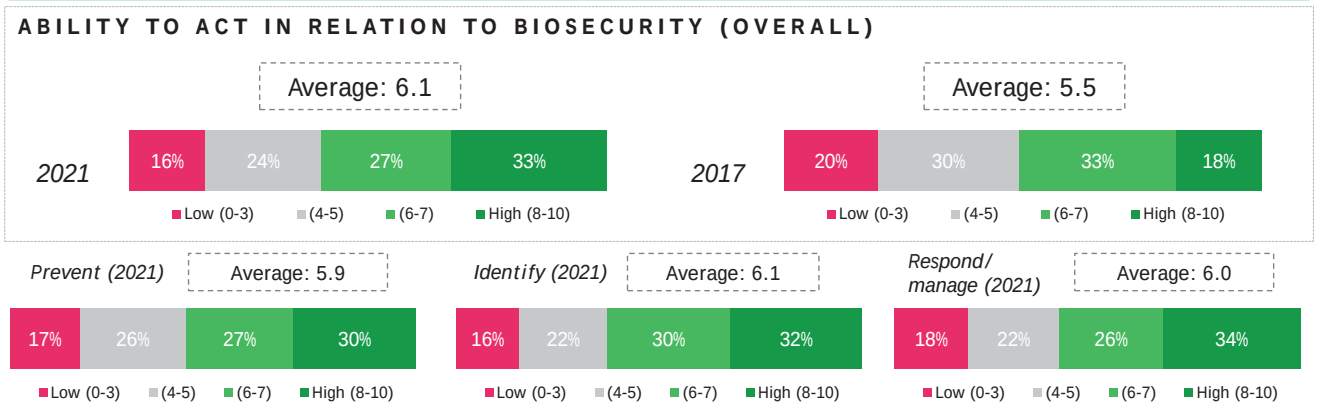
Geographically, three Local Land Services regions contribute most heavily to the increase in perceived responsibility of the Federal Government for biosecurity from 2017 to 2021, these include:

- Greater Sydney (8.4 in 2021 up from 8.0),
- Murray (9.4 in 2021 up from 8.9), and
- South East (8.7 in 2021 up from 8.0).

Conversely, Riverina (7.9 in 2021 down from 8.8) and Western (7.8 in 2021 down from 8.9) attribute a decreased level of responsibility for biosecurity to not only the Federal Government but also several other entities including NSW DPI (Riverina and Western) and Local Land Services (Riverina).

Ability to act in relation to biosecurity

Section Summary



The proportion of the general population rating their ability as 'somewhat low' or 'low' closely reflects the earlier proportion who rated their understanding of what biosecurity as being 'somewhat low' or 'low' and indicate that a lack of understanding and knowledge is aligned to a corresponding lack of ability. This result is also linked to the low level to which biosecurity was seen as an issue of personal responsibility - as ability to act is a precursor to having the ability to influence and control.

How the general population perceive their ability to act in relation to biosecurity

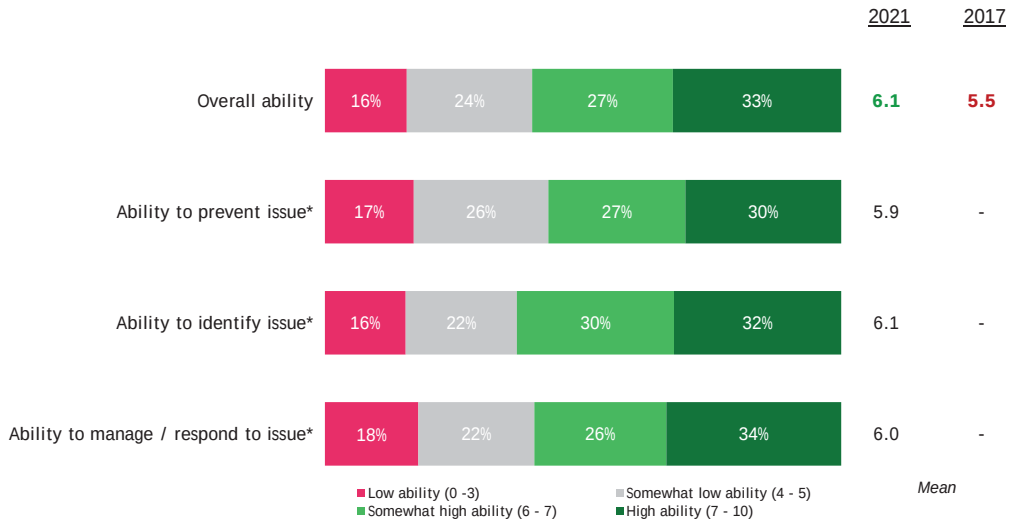
Related to the public's sense that others - but not themselves - are responsible for biosecurity, relatively few feel they have sufficient knowledge and ability to prevent, identify, manage, or respond to any potential biosecurity issues. More specifically only about one third of people feel they have a high ability to:

- identify issues (32%),
- manage or respond to an issue (34%), or
- prevent issues (30%).

However, as detailed in Figure 8, overall ability to act in relation to biosecurity has increased significantly since 2017, to a mean of 6.1 (from 5.5). In 2021, this is comprised of:

- 16% rating their ability as very low,
- 24% rating their ability as low,
- 27% rating their ability as moderate, and
- 33% rating their ability as high.

Figure 8: How the general population perceives their ability to act in relation to biosecurity



Source: Q7 - To what extent do you feel that you have sufficient knowledge and ability to prevent, identify, manage, or respond to any potential biosecurity issues you encounter? For each aspect answer using a scale of 0-10 where 1 is 'very low ability' and 10 'very high ability.'
Base General Population, weighted. 2021, n=1,158. 2017, n=1,149.
Note: *Not asked in 2017.

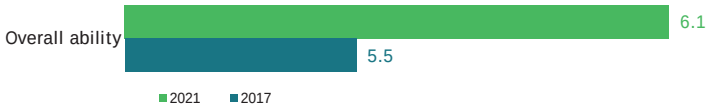
These findings closely reflect the earlier proportions of the general population who rated their understanding of biosecurity as being 'high' or 'low' and indicate that a lack of understanding and knowledge is aligned to a corresponding lack of self-rated ability. Further, those who rated biosecurity as important were more likely to rate their ability as high across each of the four dimensions presented in Figure 8, as were those who have a very high understanding of biosecurity or feel that they have a personal responsibility with regards to biosecurity.

In addition to these differences males were more likely to consider themselves as having a high overall ability (38% compared to 27% of females), as well as high ability in regard to managing and responding to issues (39% compared to 29% of females).

At the overall level, there has been a significant increase in perceived overall ability since 2017, with average rating for overall ability increasing from 5.5 to 6.1. In 2017 the general population was only asked to rate their overall ability to act in relation to biosecurity, with the more granular questioning as to ability to *prevent, identify* and *manage* added in 2021.

At a regional level, only two Local Land Services regions do not consider their overall ability to act in relation to biosecurity issues to have increased significantly from 2017 to 2021; these are Murray (consistent at 5.4) and South East (with a non-significant increase from 5.1 to 5.6).

Figure 9: How the general population perceives their ability to act in relation to biosecurity 2021 vs. 2017



Source: Q7 - To what extent do you feel that you have sufficient knowledge and ability to prevent, identify, manage, or respond to any potential biosecurity issues you encounter? For each aspect answer using a scale of 0-10 where 1 is 'very low ability' and 10 'very high ability.'
Base General Population, weighted. 2021, n=1,158. 2017, n=1,149.

Current biosecurity behaviours

Section Summary

CURRENT BIOSECURITY BEHAVIOURS

Most performed best practice behaviours (% of general pop ever do)

1. Keep garden weeds under control (82%)
2. Dispose of garden weeds through council approved/kerb side collections (e.g., green or red bins) (78%)
3. Wash/clean shoes and clothing after gardening (72%)
4. Check no pests or weeds are trapped in the packaging of any goods you buy (70%)
5. Wash/clean shoes and clothing between visiting different natural environments (e.g., parks, farms, community gardens, nature reserves, etc) (67%)

The majority of the population were found to 'usually' or 'always comply' with desired biosecurity behaviours relevant to them* (noting that this compliance was often coincidental and driven by factors other than biosecurity concerns). However, some areas of potential non-compliance were evident – with increased education re. why the behaviour is both important and recommended needed in order for higher levels of compliance to be achieved. In particular, increased education as to best practice behaviours in relation to livestock is required.

Least performed best practice behaviours (% of gen pop ever do)

1. Belong to a beekeeper's association (5%)
2. Obtain queen bees and package bees from certified source (6%)
3. Monitor hives for pests and/or unusual bee activity (7%)
4. Request a vendor declaration / health report when purchasing new pig(s) (7%)
5. Have pig(s) checked by vet on a regular basis (7%)

Most performed negative behaviours (% of gen pop ever do)

1. Introduce plants to garden that have not been purchased from a nursery / retail outlet (39%)
2. Use food sold for human consumption as bait (including seafood from supermarkets) (25%)
3. Purchase or grow a plant that is classified as a weed (23%)
4. Make an online purchase of plants (including seeds) from overseas (22%)
5. Feed chickens / other poultry' food scraps (16%)

* Note, the data in this section summary reveal the most and least performed best practice behaviours and most performed negative behaviours at an overall population level (not taking into account relevance of behaviour to the individual). In contrast, data for these behaviours in the body of the report (below) is based only on relevant respondents (e.g. people who garden or people who own animals).

Best practice behaviours the general population are currently performing – lifestyle and recreation

Survey results indicate that the degree to which the population adheres to best practice biosecurity behaviours varies greatly across different contexts.

Behaviours that apply to the whole population, and that all members of the community have the opportunity to express, were more rarely demonstrated, indicating they are yet to be normalised across the population.

- 57% of the general population stated that they have never reported any unusual or strange animal or plant sightings to the appropriate authority. However as only one third of the population rated their ability to identify or manage a biosecurity issue as high (32% and 34% respectively), lack of reporting appears largely due to members of the general population not having the required knowledge to recognise unusual animals or plants. Indeed, those who rated their understanding of biosecurity as very high (rating 9 or 10 out of 10) were much more likely to ever make such reports (64%, compared to 40%).

- 33% of the general population stated that they never wash or clean shoes and clothing in between visiting different natural environments. Without understanding of the threat posed by cross contamination, cleaning behaviour is likely motivated by personal hygiene standards
- 30% of the general population stated that they never check whether pests or weeds are trapped in the packaging of any goods they buy. Non-compliance with this behaviour is likely due to belief that occurrences are likely to be rare and/or immediately apparent. Both assumptions result in complacency and a lack of perceived need to actively monitor packaging for pests and weeds.

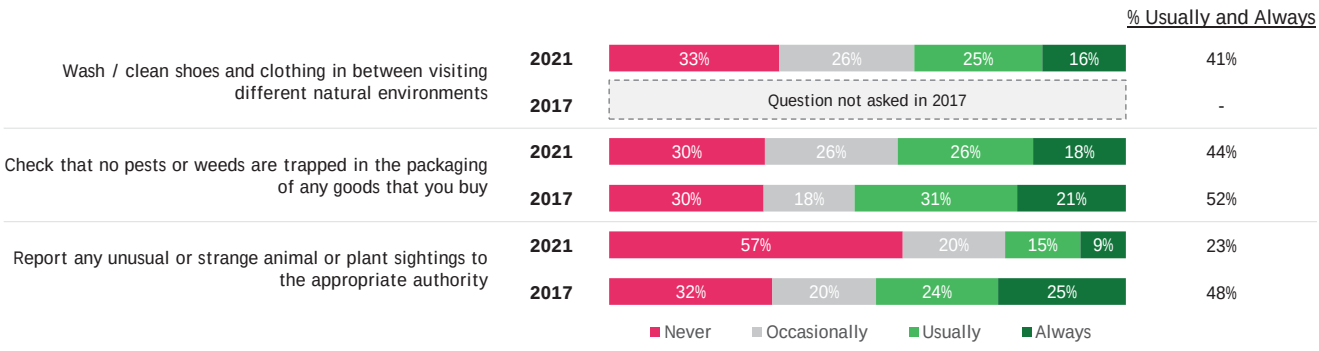
Performance of a number of potentially negative behaviours was also rated. As detailed below, high levels of performance of these negative behaviours (and hence potential non-compliance) were found. These include:

- Using food sold for human consumption as bait, including seafood from supermarkets (56% do this at least occasionally),
- Introducing plants to garden that have not been purchased from a nursery / retail outlet (46% do this at least occasionally),
- Making an online purchase of plants (including seeds) from overseas (26% do this at least occasionally), and
- Purchasing or growing a plant that is classified as a weed (27% do this at least occasionally).

General behaviours (100% of participants)

General behaviours applicable to all appear to have low overall levels of compliance that barely register into consciousness. Only one in six always wash or clean their shoes between visiting different natural environments (16%) or check there are no pests in packaging (18%). Over half (57%) 'never' report unusual or strange animals or plants – while one in eleven (9%) always do. For these findings to improve, there needs to be much greater awareness among the general population that there is risk associated with these common practices.

Figure 10: General behaviours



Source: Q10 - Which if any of the following do you ever do?
Base General Population, weighted. 2021, n=1,158. 2017, n=844-1,027.

Examining responses for each nominated behaviour, significant differences between sub-groups are apparent, indicating a need for targeted messaging to increase compliance among particular subgroups. These differences include:

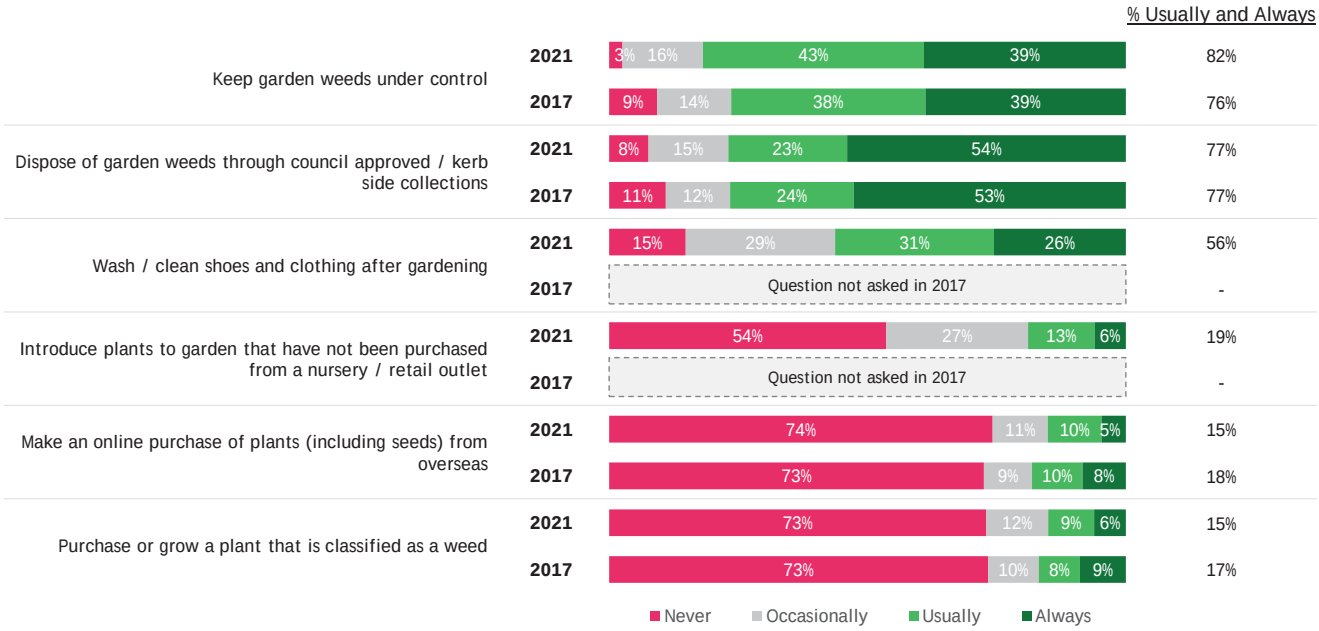
- Reporting any unusual or strange animal or plant sightings to the appropriate authority:
  - Significantly higher non-compliance among those aged 50-69 yrs. (71% never do) and those aged 70+yrs. (78% never do), and
  - Significantly higher compliance among those aged 18-34 (34% never do), among Aboriginal and Torres Strait Islander people (19% never do).
- Checking that no pests or weeds are trapped in the packaging of any goods that you buy: 30% never do:
  - Significantly higher non-compliance among those aged 50-69 (37% never do), and
  - Significantly higher compliance among those aged 18-34 (16% never do) and among Aboriginal and Torres Strait Islander people (10% never do).
- Washing/cleaning shoes and clothing in between visiting different natural environments: 33% never do:
  - Significantly higher non-compliance among those aged 50 and older (37% never do), and
  - Significantly higher compliance among those aged 18-34 (22% never do) and among Aboriginal and Torres Strait Islander people (12% never do).

While the trend across NSW is a decrease in likelihood to report any unusual or strange animal or plant sightings to the appropriate authority, the exception is the Central Tablelands, where 18% indicate they always do this in 2021, very similar to 2017 (19%).

Among those who garden (88% of participants)

Although very few engage in actively growing weeds or purchasing plants and seeds from overseas, and most are good at keeping weeds in their garden under control and correctly disposing of them, only half (54%) never introduce plants to their gardens that have not been purchased from a nursey or retail outlet.

Figure 11: Gardening behaviours



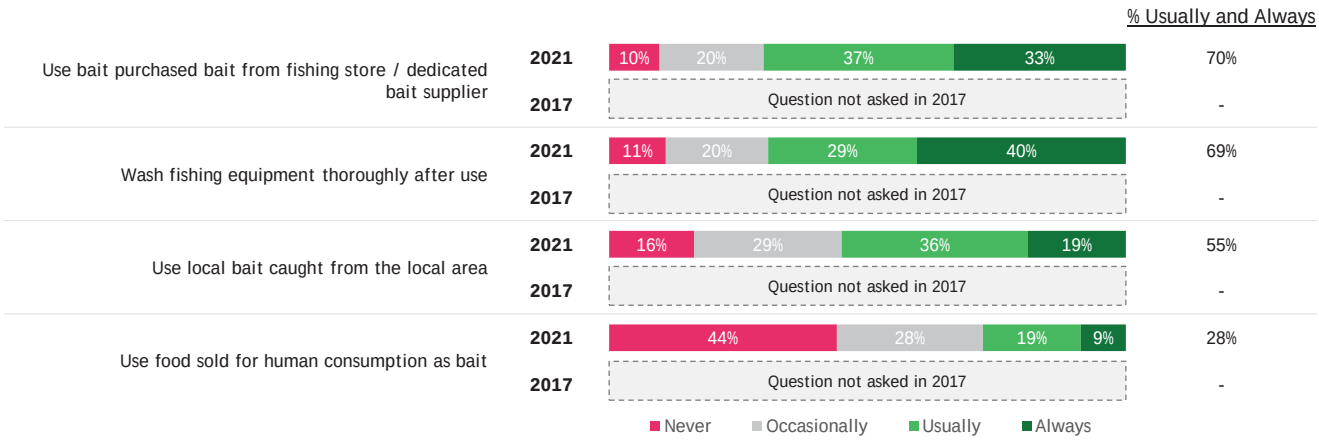
Source: Q10 - Which if any of the following do you ever do?
Base: General Population, weighted. 2021, n=1,022. 2017, n=972-1,046.

Within these behaviours, there appears to be some difference between groups:

- Introduction of plants to a garden that have not been purchased from a nursery / retail outlet (54% never, potential non-compliance 46%):
  - Significantly higher non-compliance among Aboriginal and Torres Strait Islander people (39% never, potential non-compliance 61%).
- Making an online purchase of plants (including seeds) from overseas (74% never, potential non-compliance 26%):
  - Significantly higher compliance among females (84% never, potential non-compliance 16%), those aged 50 and older (92% never, potential non-compliance 8%) and those who live out of town (82% never, potential non-compliance 18%), and
  - Significantly higher non-compliance among males (64% never, potential non-compliance 36%), those aged 18-34 (50% never, potential non-compliance 50%), those aged 35-49 (73% never, potential non-compliance 27%), among Aboriginal and Torres Strait Islander people (37% never, potential non-compliance 63%) and among people in the Riverina (64% never, potential non-compliance 36%).
- Purchasing or growing a plant that is classified as a weed (73% never). As this is a potentially negative behaviour this means that non-compliance was potential 27%):
  - Significantly higher compliance among females (80% never, potential non-compliance 20%), those aged 50 and older (89% never, potential non-compliance 11%), those who live out of town (77% never, potential non-compliance 23%) and among people in the North Coast region (90% never, potential non-compliance 10%), and
  - Significantly higher non-compliance among males (66% never, potential non-compliance 34%), those aged 18-34 yrs. (50% never, potential non-compliance 50%), those aged 35-49yrs. (72% never, potential non-compliance 28%), among Aboriginal and Torres Strait Islander people (39% never, potential non-compliance 61%), and among people in the Riverina (64% never, potential non-compliance 36%).

- Washing/cleaning shoes and clothing after gardening (15% never do):
  - Significantly higher compliance among those who live on rural fringe / out of town (11% never do).
- Ensure all fruit is picked / not left to rot, among those who have fruit trees (6% never do):
  - Significantly higher compliance among those in Hunter region (0% never do).
- Disposal of garden weeds through council approved / kerb side collections (e.g., green or red bins) is similar in 2021 and 2017 at a state level, however, there is:
  - Significantly increased compliance in Hunter (61% always do up from 43% in 2017), and
  - Significantly decreased compliance in Riverina (44% always do down from 69% in 2017).

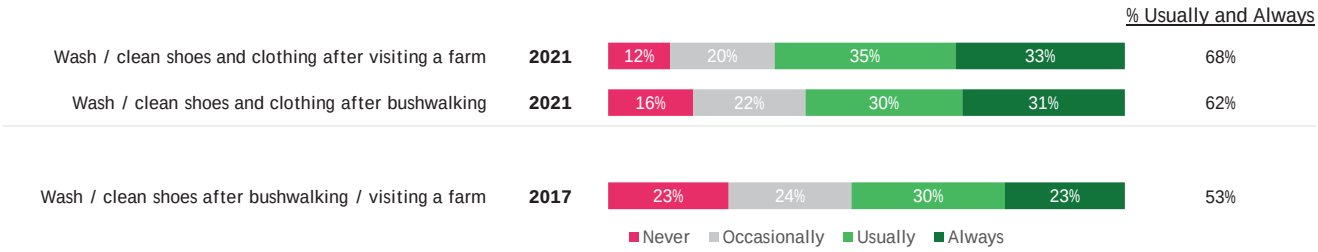
Among those who fish (48.5% of participants)



Source: Q10 - Which if any of the following do you ever do?
Base: General Population, weighted. 2021, n=563.

- Use food sold for human consumption as bait, including seafood from supermarkets, (44% never do). As this is a potentially negative behaviour this means that non-compliance was 56%:
  - Significantly higher compliance among those aged 50 yrs. and older (65% never, non-compliance 35%), and
  - Significantly higher non-compliance among those aged 18 to 49 yrs. (34% never, non-compliance 66%), and among Aboriginal and Torres Strait Islander people (15% never, non-compliance 85%).
- Use local bait caught from the local area, (16% never do):
  - Significantly higher non-compliance among females (21% never do), and
  - Significantly higher compliance among males (13% never do) and among Aboriginal and Torres Strait Islander people (7% never do).
- Use bait purchased from fishing store / dedicated bait supplier, (10% never do):
  - Significantly higher compliance among Aboriginal and Torres Strait Islander people (2% never do).

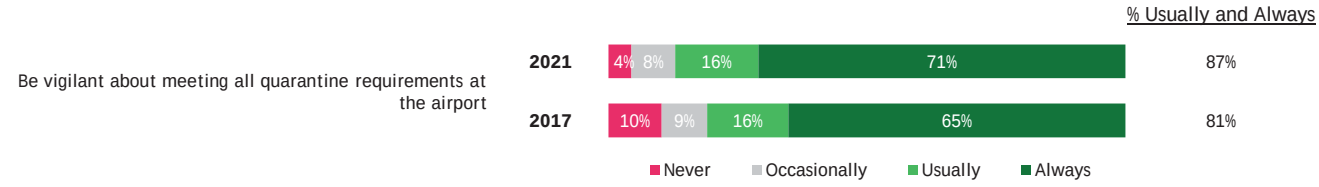
Among those who go bushwalking (64% of participants) and those who visit a farm (61%)



Source: Q10 - Which if any of the following do you ever do?
Base: General Population, weighted. 2021, n=706-748. 2017, n=845.

- Washing/cleaning shoes and clothing after bushwalking (16% never do):
  - Significantly higher compliance among those aged 18-34yrs. (11% never do) and among Aboriginal and Torres Strait Islander people (4% never do).
- Washing/cleaning shoes and clothing after visiting a farm (12% never do):
  - Significantly higher compliance among Aboriginal and Torres Strait Islander people (2% never do).

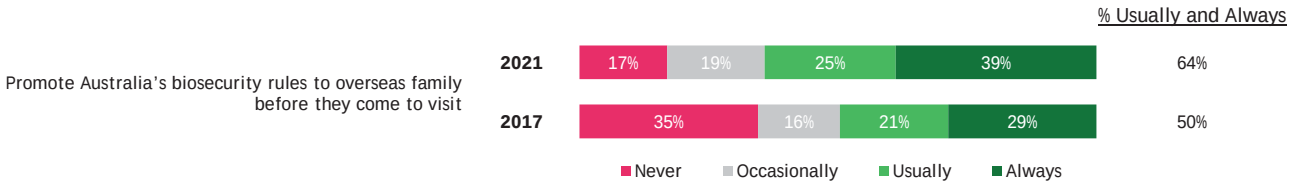
Among those who travel overseas (53% of participants)



Source: Q10 - Which if any of the following do you ever do?
Base: General Population, weighted. 2021, n=619. 2017, n=844.

- Are vigilant about meeting all quarantine requirements at the airport (4% never do):
  - Significantly higher compliance among those who live rural fringe/ out of town (1% never do).

Among those who have international visitors (32% of participants)



Source: Q10 - Which if any of the following do you ever do?
Base: General Population, weighted. 2021, n=373. 2017, n=740.

- Promote Australia's biosecurity rules to overseas family before they come to visit (17% never do):
  - Significantly higher non-compliance among those aged 70 yrs. and older (28% never do), and
  - Significantly higher compliance among Aboriginal and Torres Strait Islander people (10% never do).

What best practice behaviours the general population are currently performing – animal ownership

The majority of the population for whom these behaviours were relevant were found to 'usually' or 'always' comply with desired biosecurity behaviours that involve animals. It is possible that alignment with desired biosecurity behaviours could be coincidental rather than intentional, with motivation to perform animal related behaviours driven primarily by concerns around animal welfare rather than awareness of biosecurity risk. For each behaviour, some level of non-compliance was evident, indicating a need for increased education as to the importance of compliance with all desired behaviours from a biosecurity perspective.

Performance of several potentially negative behaviours relating to animals was also asked, (with potential non-compliance with the desired behaviour indicated by the proportion of respondents who stated they did this at least occasionally). The levels of performance of these negative behaviours (and hence potential non-compliance with desired behaviours) are detailed below – with performance of each of these behaviours likely to be driven by convenience, lack of understanding of the associated risk, and/or a belief that the risk being taken is low. These include:

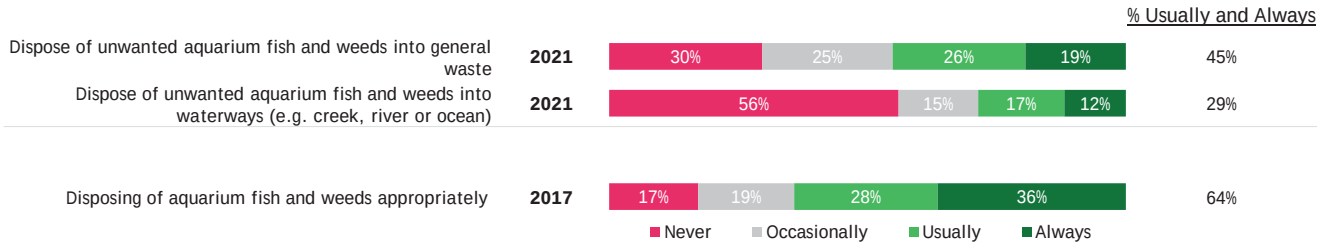
- Obtain chickens/poultry from someone other than a registered breeder (70% do at least occasionally),
- Obtain pig/s from someone other than a registered breeder (84% do at least occasionally),
- Feed pig/s food that contains meat or meat products (84% do at least occasionally),
- Borrow a boar for breeding purposes (70% do at least occasionally),
- Borrow livestock for stud/breeding purposes (62% do at least occasionally),
- Obtain animals from someone other than a registered breeder (75% do at least occasionally),

- Buy pig(s) online (73% do at least occasionally),
- Buy animals online (57% do at least occasionally),
- Dispose of unwanted aquarium fish and weeds into waterways, e.g.: creek, river, or ocean, (44% do at least occasionally), and
- Buy chickens / poultry online (46% do at least occasionally).

There appears to be a need for increased education regarding both: what the risks are; and associated legitimacy of (i.e., need for) the desired behaviour.

With regards to desired behaviours, examining 'never' responses for each type of behaviour (among those for whom it was relevant) in more detail revealed several significant differences for each behaviour by various sub-groups. Instances where non-compliance is higher indicating a heightened need for targeted messaging to increase compliance among that subgroup, and instances where compliance is higher indicating a lesser need.

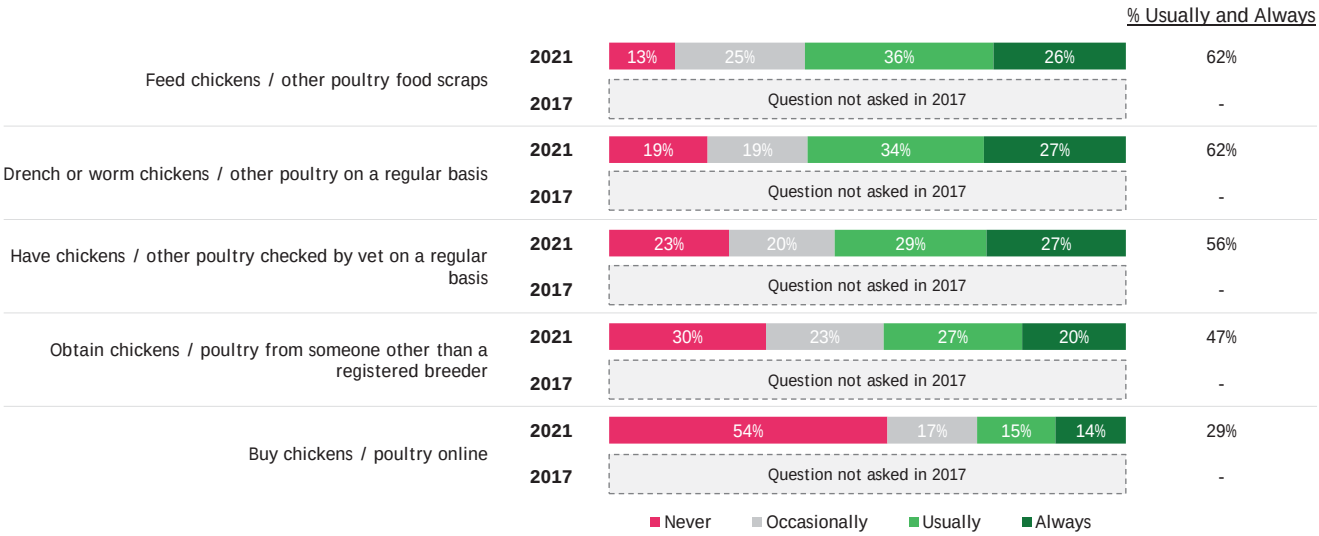
Those who have fish (30% of participants)



Source: Q10 - Which if any of the following do you ever do?
Base: General Population, weighted. 2021, n=349. 2017, n=551.

- Disposal of unwanted aquarium fish and weeds into waterways: 44% do this non-compliant behaviour at least occasionally:
  - Significantly lower non-compliance among those aged 50+yrs. (only 14% do this), and Northern Tablelands (only 8% do this), and
  - Significantly higher non-compliance among Aboriginal and Torres Strait Islander people (63% do this).
- Dispose of unwanted aquarium fish and weeds into general waste, the preferred behaviour, is done by 70% at least occasionally, meaning 30% are never complying:
  - Significantly lower compliance among females (only 63% do this), those aged 50-69 yrs. (only 48% do this), and those in Murray Local Land Services region (only 30% do this), and
  - Significantly higher compliance among males (77% do this), those aged 18-49 (76% do this), Aboriginal and Torres Strait Islander people (80% do this), and those in Greater Sydney (79% do this).

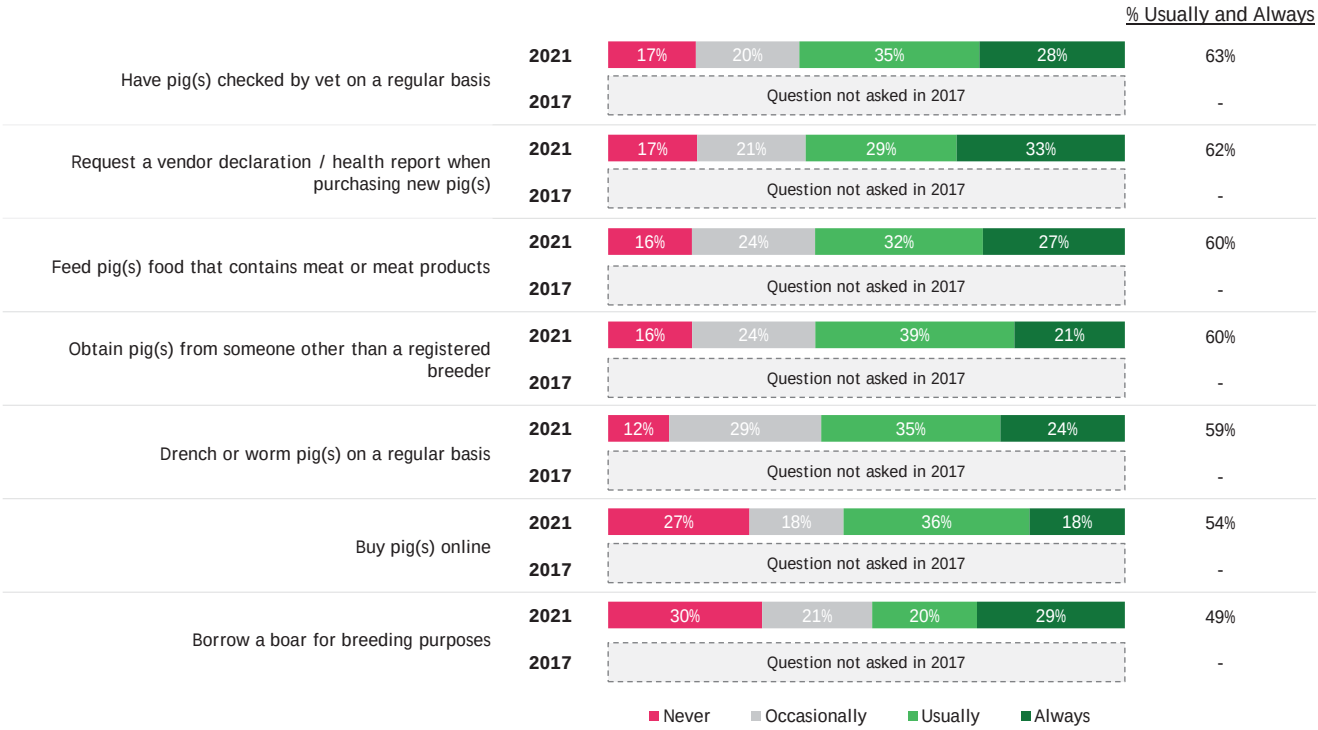
Those who have chickens (19%) of participants)



Source: Q10 - Which if any of the following do you ever do?
Base: General Population, weighted. 2021, n=224.

- Have chickens / other poultry checked by vet on a regular basis (23% never do):
  - Significantly higher compliance among those aged 50+ yrs. (47% never do), and
  - Significantly higher non-compliance among those aged 18-34 yrs. (13% never do) and among Torres Strait Islander people (5% never do).
- Drench or worm chickens / other poultry on a regular basis (19% never do):
  - Significantly higher non-compliance among Aboriginal and Torres Strait Islander people (5% never do).
- Buy chickens/poultry online (54% never do). As this is a potentially negative behaviour this means that non-compliance was 46%:
  - Significantly higher compliance among females (67% never do, non-compliance 33%) and those aged 50+yrs. (88% never do, non-compliance 12%), and
  - Significantly higher non-compliance among males (46% never do, non-compliance 54%) and among Aboriginal and Torres Strait Islander people (35% never do, non-compliance 65%).
- Obtain chickens/poultry from someone other than a registered breeder (30% never do). As this is a potentially negative behaviour this means that potential non-compliance was 70%:
  - Significantly higher non-compliance among those aged 18-34yrs. (19% never do, non-compliance 81%) and among Aboriginal and Torres Strait Islander people (11% never do, non-compliance 89%).

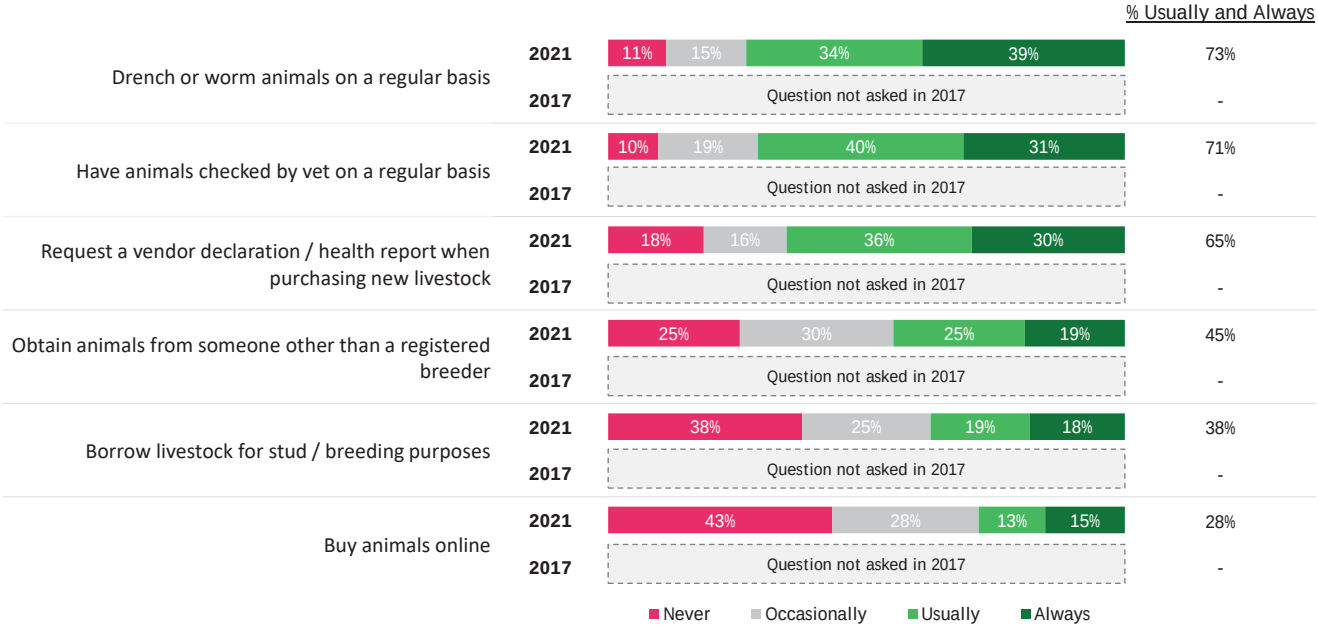
Those who have pigs (7% of participants)



Source: Q10 - Which if any of the following do you ever do?
Base: General Population, weighted. 2021, n=83.

- Buy pig/s online: 27% never do. As this is a potentially negative behaviour this means that potential non-compliance was 73%:
  - Significantly higher compliance among those who live rural fringe/out of town (56% never do, non-compliance 44%).
- Borrow a boar for breeding purposes: 30% never do. As this is a potentially negative behaviour this means that potential non-compliance was 70%:
  - Significantly higher compliance among females (62% never do, non-compliance 38%), and
  - Significantly higher non-compliance among males (22% never do, non-compliance 78%).
- Request a vendor declaration / health report when purchasing new pig/s (17% never do):
  - Significantly higher compliance among males (7% never do), and
  - Significantly higher non-compliance among females (62% never do).

Those who have other types of livestock (21% of participants)



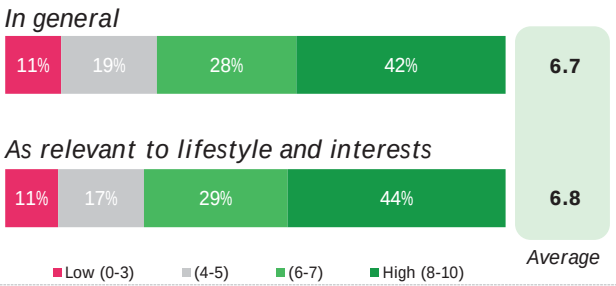
Source: Q10 - Which if any of the following do you ever do?
Base: General Population, weighted. 2021, n=249.

- Obtain animals from someone other than a registered breeder (25% never do):
  - Significantly higher compliance among those who live rural fringe/out of town (45% never do), and
  - Significantly higher non-compliance among Aboriginal and Torres Strait Islander people (23% never do).
- Buy animals online (43% never do):
  - Significantly higher compliance among those aged 50+yrs. (80% never do) and those who live on the rural fringe/out of town (63% never do), and
  - Significantly higher non-compliance among those aged 18-34yrs. (27% never do), among Aboriginal and Torres Strait Islander people (19% never do), those who live in Riverina (24% never do), and those who live in Sydney (34% never do).
- Borrow livestock for stud / breeding purposes (38% never do):
  - Significantly higher compliance among females (59% never), those aged 50 and older (65% never) and those who live rural fringe/out of town (48% never do), and
  - Significantly higher non-compliance among males (23% never do), those aged 18-34 (22% never do), Aboriginal and Torres Strait Islander people (24% never) and among those who live in Riverina (20% never do).
- Request a vendor declaration/health report when purchasing new livestock (18% never do):
  - Significantly higher non-compliance among those aged 50+yrs. (48% never do), and
  - Significantly higher compliance among Aboriginal and Torres Strait Islander people (2% never do).

Interest and access of biosecurity information

Section Summary – Interest in learning more about biosecurity

INTEREST IN LEARNING MORE ABOUT BIOSECURITY



PREFERRED CHANNEL FOR BIOSECURITY INFORMATION

1. Local Council **(54%)**
2. From NSW Department of Primary Industries **(54%)**
3. From plant retailers / nurseries **(51%)**
4. Mainstream media (TV, radio, state / national newspapers) **(50%)**
5. From experts such as Vets or Horticulturalists **(49%)**

TOP 5 BIOSECURITY RESOURCES MOST LIKELY TO USE

1. Purchase plants that are industry certified as being biosecurity compliant **(51%)**
2. Purchase grocery items industry certified as being biosecurity compliant **(50%)**
3. Fact sheets about pest and disease types, their symptoms and prevalence **(46%)**
4. Do business with companies that have biosecurity plans in place **(45%)**
5. Biosecurity alerts **(45%)**

Significantly higher interest is had in learning about biosecurity as relevant to lifestyle than in general - highlighting the need for biosecurity resources to be targeted in order to be seen as relevant and gain cut-through.

Local councils were the most preferred source due to perceived ability to deliver localised information (aligning to desire for biosecurity information relevant to local lifestyles), with NSW DPI the second preferred source (reflecting the strong association between biosecurity and primary industry and the high level of responsibility NSW DPI is seen to have for biosecurity).

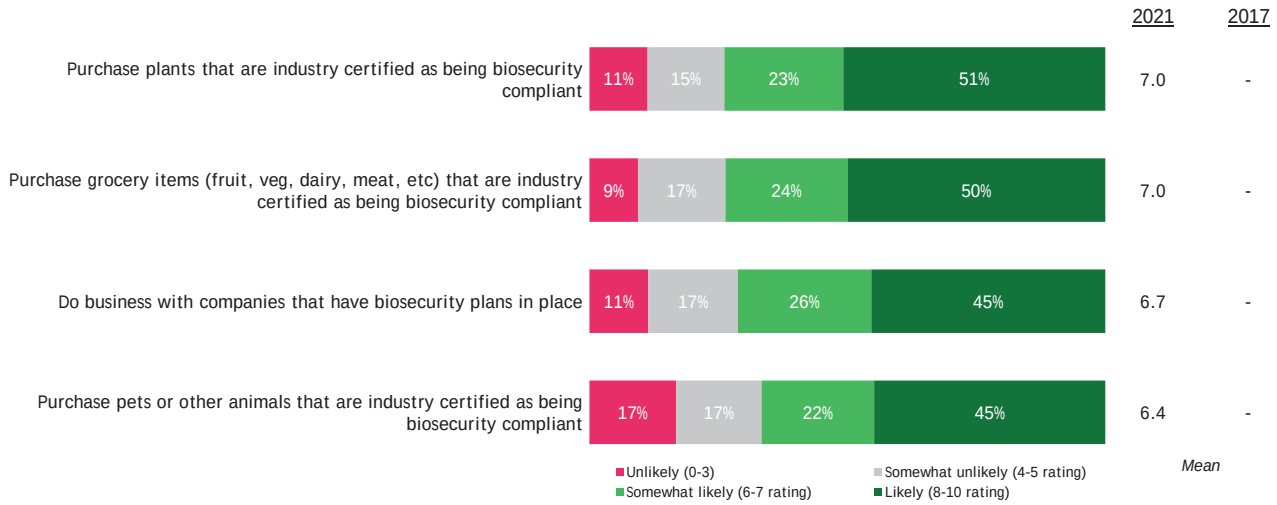
Appetite was highest for resources able to be used as a reference point or tool when needed, as opposed to resources aimed to equip them with broader understanding and skills – reflecting the tendency of the general population to not see biosecurity to have day to day relevance in their lives

Likelihood of the general population to purchase biosecurity compliant goods

When looking to the future the majority of the general population state that they would be likely to purchase goods certified as biosecurity compliant, with 67% or more of the general population rating their likelihood to do so as six or higher in each category.

There was greater interest in buying grocery items (50% likely) or plants (51% likely) that are industry certified as biosecurity compliant than there was for doing business with companies that have biosecurity plans in place or buying pets or other animals that are industry certified as being biosecurity compliant (both 45%).

Figure 12: Likelihood of the general population to purchase biosecurity compliant goods



Source: Q15 Looking to the future, which of the following would you be likely to use or do if available to you? Please answer using a scale of 0-10 where 0 is 'very unlikely' and 10 is a 'very likely'
Base: General Population, weighted. 2021, n=1,158.

Not surprisingly, those who had a higher understanding of biosecurity, rated biosecurity as an important issue, rated their overall ability in identifying biosecurity risks as high, or considered themselves as responsible in managing biosecurity were more far more likely to be interested in each of the above-mentioned behaviours. For example, among those with a very high understanding of biosecurity, eight in ten (83%) were likely to purchase plants that are industry certified as being biosecurity compliant, compared to just half (47%) who do not have a very high understanding of biosecurity.

Again, these results are a clear demonstration of the importance of awareness and familiarity with biosecurity at driving intended behaviours.

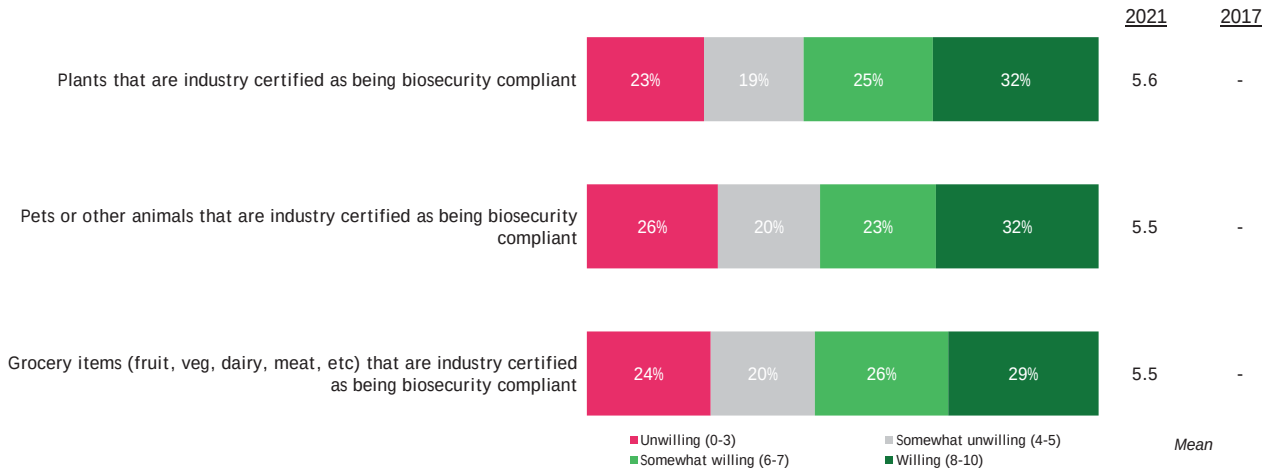
Few differences across Local Land Services regions were observed with only those in Murray Local Land Services region indicating a greater likelihood to 'purchase grocery items that are industry certified as being biosecurity compliant' (mean likelihood 8.3 compared to 7.0 for NSW overall). Those in Murray Local Land Services along with those in North West, also indicated a greater likelihood to 'purchase plants that are industry certified as being biosecurity compliant' (mean likelihood 8.3 and 8.2 respectively compared to 7.0 for NSW overall).

Willingness of the general population to pay for biosecurity compliant goods

While a good proportion were willing to purchase biosecurity compliant goods, fewer were willing to pay for such goods, as detailed in Figure 13. More specifically:

- While 50% were likely to purchase certified groceries, just 29% were willing to pay more for these,
- While 51% were likely to purchase certified plants, just 32% were willing to pay more for these, and
- While 45% were likely to purchase certified pets or other animals, just 32% were willing to pay more for these.

Figure 13: Willingness of the general population to pay for biosecurity compliant goods



Source: Q17 - How willing would you be to pay increased prices for each of the following if it would maintain the biosecurity status of NSW? Please answer for each using a scale of 0-10 where 0 is 'Very unwilling and 10 is 'Very willing'
Base: General Population, weighted. 2021, n=1,158.

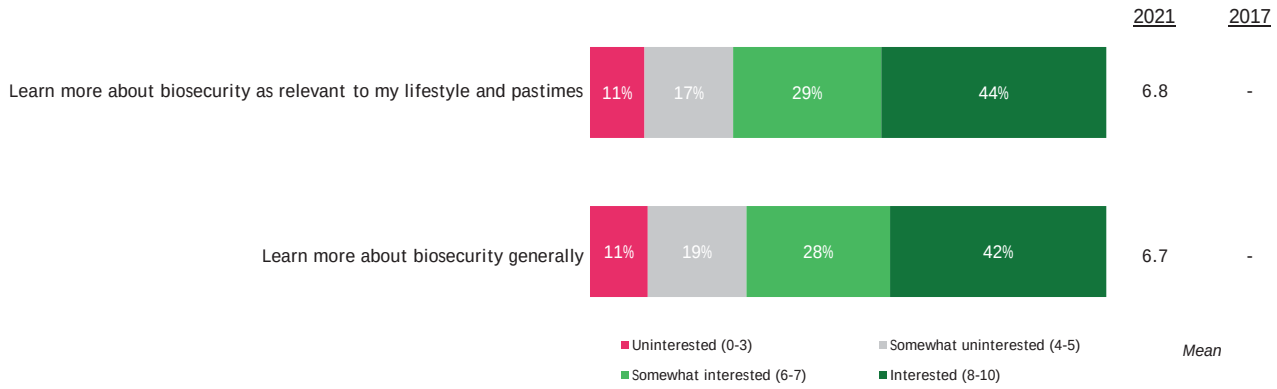
Consistent with willingness to engage with these behaviours, those who had a higher understanding of biosecurity, rated biosecurity as an important issue, rated their overall ability in identifying biosecurity risks as high, or considered themselves as responsible in managing biosecurity were more far more likely to be willing to pay for each of the above.

These results highlight a clear challenge. The profile of biosecurity as a risk to wellbeing or as an issue more broadly is not high enough to drive genuine desire for change among most of the community. Biosecurity certification is currently a 'nice to have', but not pressing enough to warrant increased financial burden. These results also reflect the population's sense of who should be responsible for biosecurity – as there is an overwhelming sense that government and industry are responsible for biosecurity, why should consumers be the ones who foot the bill?

General population interest in learning more about biosecurity resources

Lower willingness to pay more for certified products does not necessarily mean the community are not interested in biosecurity. More than four in ten (44%) are interested in learning more about biosecurity as relevant to their lifestyle and pastimes, with just one in ten (11%) stating they are not interested in this. Slightly fewer (42%) are interested in in learning more about biosecurity at an overall level, whereas just over one in ten (11%) are not interested.

Figure 14: General population interest in learning more about biosecurity resources



Source: Q13 - How interested would you be in each of the following? Please answer for each using a scale of 0-10 where 0 is 'not at all interested and 10 is a 'very interested'
Base: General Population, weighted. 2021, n=1,158.

Echoing earlier results, those who had a higher understanding of biosecurity, rated biosecurity as an important issue, rated their overall ability in identifying biosecurity risks as high, or considered themselves as responsible for managing biosecurity were more far more likely to be interested in learning more about biosecurity.

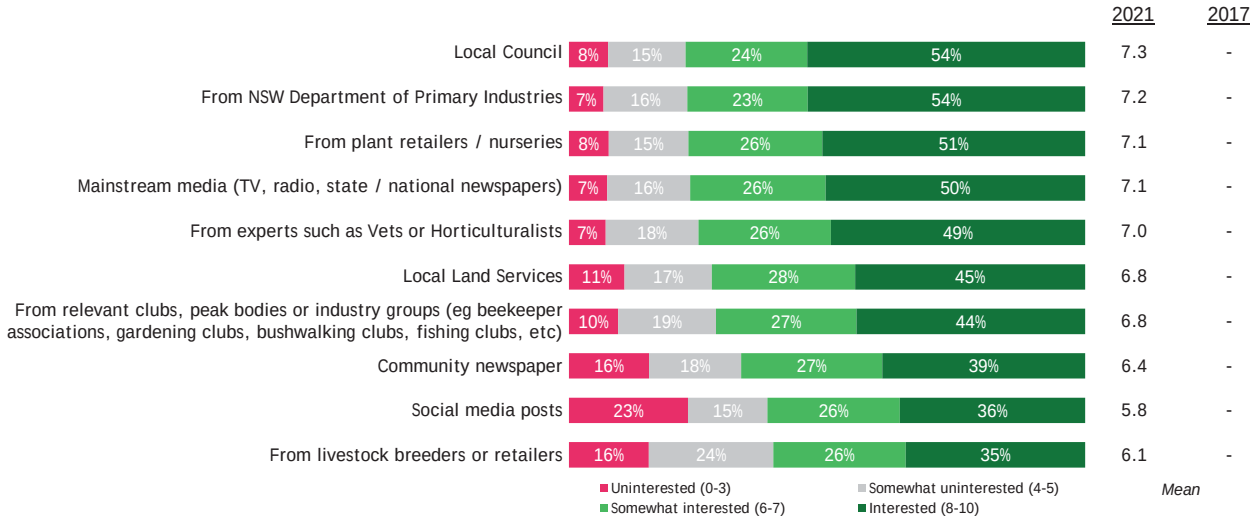
Communication preferences

Members of the general population who were interested in learning more about biosecurity (rated interest as being five or more) expressed a wide variety of preferred information sources and channels was apparent. Generally, results reflect perceptions of who is responsible for biosecurity, with a preference for information from government and industry as follows:

- Local councils were a preferred source (54% interested), this likely aligning with a perceived ability of council to deliver localised information that aligns to the desire for biosecurity information that is relevant to their lifestyle, and
- The NSW Department of Primary Industries was the other preferred source (54%), with this reflecting strong association in the community between biosecurity and primary industry.

While there is clearly appetite for localised information, mainstream media (50%) was seen to be of significantly higher appeal than community newspapers (39%) – however this was potentially due to lower engagement with community newspapers, suggesting it an issue of access rather than suitability.

Figure 15: Channels preferred by the general population for biosecurity information



Source: Q14 You said that you were interested in learning more about biosecurity. How interested would you be in receiving information and advice about biosecurity via each of the following? Please answer for each using a scale of 0-10 where 0 is 'not at all interested and 10 is a 'very interested'
Base: General Population, weighted. 2021, n=1,027.

A number of demographic differences are observed with these results:

- By age;
  - Those aged 49 and younger were significantly more likely to be interested in social media posts (45%), than those aged 50-69 (27%) or 70 and older (15%).
- By indigenous status;
  - Aboriginal and Torres Strait Islander people were significantly more likely to be interested in receiving information from social media posts (52%).
- By proximity to town;
  - Those who live in town were significantly more likely to be interested in information from mainstream media (53%).
- By region;
  - Those in the Central West were significantly more likely be interested in receiving information from social media posts (53%).

Likelihood of the general population to use biosecurity resources

When presented with a range of information and resource types, appetite was highest for concise situational information that requires little investment or commitment. This reflects the tendency of the general population to not see biosecurity relevance in their day-to-day living, and to prefer information that is targeted and relevant, rather than general.

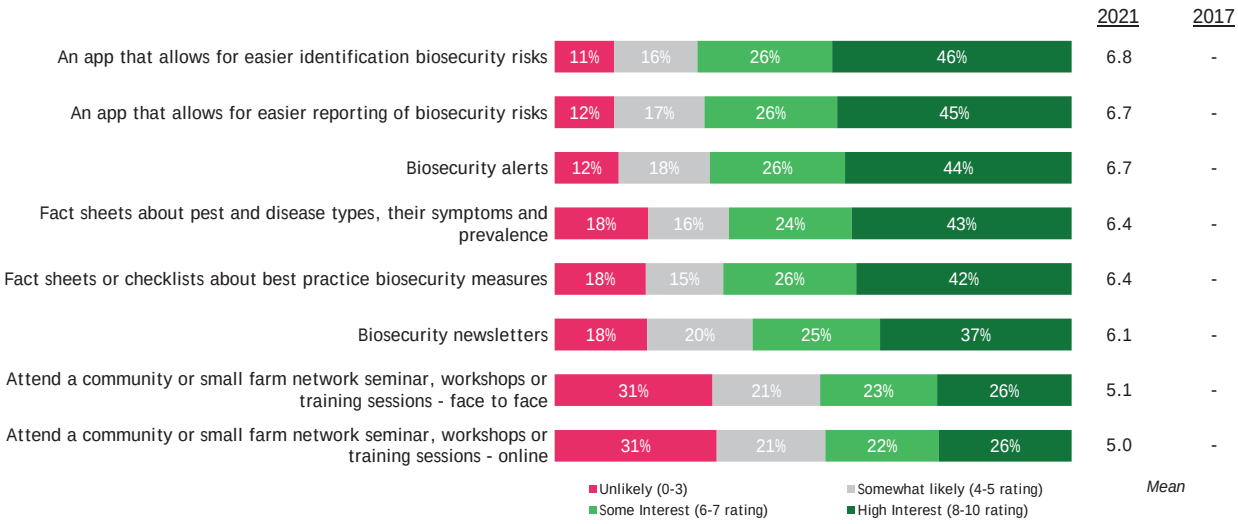
Specifically, the highest level of interest was for:

- Fact sheets about pest and disease types, symptoms and prevalence (43%),
- Biosecurity alerts (44%), and
- Fact sheets or checklists about best practice biosecurity measures (42%).

The likelihood of the population to use each of the above resources was significantly higher than was their likelihood to make use of the below resources:

- Attend online community or small farm network seminar workshop or training session, and
- Attend face-to-face community or small farm network seminar workshop or training session (both 26%).

Figure 16: Likelihood of the general population to use biosecurity resources



Source: Q15 Looking to the future, which of the following would you be likely to use or do if available to you? Please answer using a scale of 0-10 where 0 is 'very unlikely' and 10 is a 'very likely'
Base: General Population, weighted. 2021, n=1,158.

As detailed below a number of significant differences in preferences for each type of resource are apparent across sub-groups within the NSW population:

- Age;
  - Younger people tend to be more interested in an app that allows for easier **reporting** of biosecurity risks (51% of 18-34; 41% of 35-69 and 25% of 70+), and an app that allows for easier **identification** of biosecurity risks (51% of 18-34; 42% of 35-69 and 28% of 70+), and
  - Younger people are also more interested in **online** community or small farm network seminars (31% of 18-34; 37% of 35-69 and 11% of 70+), and **face-to-face** community or small farm network seminars (33% of 18-34; 25% of 35-69 and 13% of 70+).
- By indigenous status;
  - Aboriginal and Torres Strait Islander people were significantly more to be interested in community or small farm network seminars, either online (42%) or face-to-face (43%).

Channels preferred by the general population for provision of biosecurity resources

Those who stated that they were likely to use a specific resource were then asked who these resources should be delivered through. Reflecting lower levels of engagement with biosecurity information, approximately one third had no preference as to who the provider of that resource was, irrespective of the nature of the resource.

Figure 17: Channels preferred by the general population for provision of resources

	Any of these	NSW Department of Primary Industries	Local Land Services	Local Council	Organisation such as a community group or club	Organisation such as peak body or industry Group	An expert such as a vet or horticulturalist	Plant or animal breeder or retailer
Fact sheets or checklists about best practice biosecurity measures	31%	39%	18%	31%	8%	10%	16%	12%
Fact sheets about pest and disease types, their symptoms and prevalence	32%	29%	17%	28%	8%	12%	20%	10%
A face to face community or small farm network seminar, workshop or training	31%	17%	13%	28%	17%	12%	18%	11%
An online community or small farm network seminar, workshop or training sessions	31%	19%	13%	25%	19%	14%	17%	10%
Biosecurity newsletters	33%	33%	14%	29%	7%	15%	10%	6%
Biosecurity alerts	33%	35%	17%	28%	7%	11%	12%	7%
An app that allows for easier identification biosecurity risks	33%	34%	18%	21%	7%	14%	8%	9%
An app that allows for easier reporting of biosecurity risks	34%	34%	16%	26%	6%	11%	9%	6%

Source: Q16 - For each of the following resources that you have said you would be likely to use or do, please tell me who you would like to receive this from: NSW Department of Primary Industries, Local Land Services, Industry Associations or Peak Bodies, Expert advisors such as Vets, Agronomists or Horticulturalists, or someone else. For each you can say just one of these, several of these, or say you would be happy to receive from any of them.
Base: General Population, weighted. 2021, n=573-983.

Similar levels of preference were demonstrated for the NSW Department of Primary Industries to be the provider of most types of biosecurity resources, with the exception of face-to-face or online community or small farm network seminars which could appropriately be delivered by a broader range of organisations. Again, this is reflective of the strong association that was observed between biosecurity and primary industry, and perceptions that NSW DPI was seen to have responsibility for biosecurity.

The third most popular provider of biosecurity resources was Local Councils, with this again likely to be aligned to the perceived ability of council to deliver localised information that aligns to the desire for biosecurity information that was relevant to their lifestyle. The preference for Local Council provision was most pronounced for delivery of training.

Examining responses for each type of resource in more detail, as detailed below a number of significant differences in preferences as to provider across sub-groups within the NSW population are apparent, with these able to be used to inform targeted dissemination strategies for each resource type.

For **'Fact sheets about pest and disease types, their symptoms and prevalence'**:

- Overall;
  - 32% of the general population stated they had no preference for provider, and
  - NSW Department of Primary Industries (29%) and Local Council (28%) are the preferred named providers for this resource.
- By age;
  - Younger people had a significantly lower level of preference for delivery by NSW DPI (20% of those aged 18-34 compared to 33% of those aged 35 and older) and a greater interest in delivery by an organisation such as a community group or club (14% of those aged 18-34 compared to 6% of those aged 35 and older).
- By indigenous status;
  - Aboriginal and Torres Strait Islander people had a significantly higher preference for delivery by Local Land Services. (31%) compared to those not identifying as Aboriginal and Torres Strait Islander 16%).

For **'Biosecurity alerts'**:

- Overall;
  - 33% of the general population stated they had no preference for provider, and
  - NSW Department of Primary Industries is the preferred named provider for this resource (35%).
- By age;
  - Younger people had a significantly higher level of preference for delivery by an expert such as a vet or horticulturalist (21% of 18-34 compared to 8% of those over 34) and for delivery via a plant or animal breeder or retailer (11% compared to 5%), or organisation such as a community group or hub (14% compared to 4%).
- By indigenous status;
  - Aboriginal and Torres Strait Islander people had a significantly higher preference for delivery by an expert such as a vet (27% compared to those not identifying as Aboriginal or Torres Strait Islander 10%) or a plant or animal breeder or retailer (22% compared to 5%).

For **'Fact sheets or checklists about best practice biosecurity measures'**:

- Overall;
  - 31% of the general population stated they had no preference for provider, and
  - NSW Department of Primary Industries was the preferred named provider for this resource (39%), followed by Local Council (31%).
- By gender;
  - Males had a significantly higher preference for delivery by NSW DPI (45%) compared to females (32%) while females were more likely to not have a particular preference (40%) compared to males (22%).

For **'An app that allows for easier reporting of biosecurity risks'**:

- Overall;
  - 34% of the general population stated they had no preference for provider, and
  - NSW Department of Primary Industries the preferred named provider for this resource (34%).
- By gender;
  - Males had a significantly higher preference compared to females for delivery by NSW DPI (39% vs. 30%), delivery via Local Land Services (23% compared to 9%) and delivery by Local council (31% compared to 20%) while females were more likely to indicate preference for delivery by any means (43% compared to 25%).
- By age;
  - Those aged 18-34 tended to be less likely, though not significantly, to prefer delivery by NSW DPI (28%) compared to 37% of those aged 35 and older, with preferences significantly more likely to go to delivery by an organisation such as a community group or club (10% compared to 4%), an expert such as a vet or horticulturalist (15% compared to 7%), or delivery via a plant or animal breeder or retailer (9% compared to 4%).
- By indigenous status;
  - Compared to people who do not identify as Aboriginal and Torres Strait Islander, those who do, had a significantly higher preference for delivery by a plant or animal breeder or retailer (16% compared to 4%).

For **'An app that allows for easier identification biosecurity risks'**:

- Overall;
  - 33% of the general population had no preference for provider, and
  - NSW Department of Primary Industries was the preferred named provider for this resource (34%).
- By gender;
  - Males had a significantly higher preference compared to females for delivery by via Local Land Services (24% compared to 12%) and delivery by an expert such as a vet or horticulturalist (11% compared to 5%) while females were more likely to indicate preference for delivery by any means (43% compared to 24%).
- By age;
  - Those aged 18-34 were more likely to nominate a particular organisation compared to those aged 35 or older with a significantly higher preference for delivery by an organisation such as a community group or club (14% compared to 4%) or a plant or animal breeder or retailer (15% compared to 6%).
- By indigenous status;
  - Aboriginal and Torres Strait Islander people had a significantly higher preference for delivery by an expert such as a vet (17% compared to those not identifying as Aboriginal or Torres Strait Islander 7%) or a plant or animal breeder or retailer (23% compared to 7%).

For **'Biosecurity newsletters'**:

- Overall;
  - 33% of the general population stated they had no preference for provider, and
  - NSW Department of Primary Industries was the preferred named provider for this resource (33%).
- By gender;
  - Females had a significantly higher preference for delivery by any means than males (42% compared to 24%), while males' preferences were more broadly spread across the options provided, with NSW DPI being the most popular among males (37%).
- By age;
  - Those aged 18-34 had a significantly higher preference for delivery by a vet or horticulturalist (16%) compared to 8% of those aged 35 and older.
- By indigenous status;
  - Aboriginal and Torres Strait Islander people had a significantly higher preference for delivery by organisations such as peak bodies or industry groups (29% compared to those not identifying as Aboriginal or Torres Strait Islander 13%), and
  - a significantly lower preference for delivery via any means (18% compared to 35% of those not identifying as Aboriginal or Torres Strait Islander).

For **'Community or small farm network seminar, workshops or training sessions – online'**:

- Overall;
  - 31% of the general population stated they had no preference for provider,
  - Local Council was the preferred named provider for this resource (25%), and
  - 19% of the general population named the NSW Department of Primary Industries as their preferred provider, while the same proportion preferred an organisation such as a community group or club.
- By gender;
  - Females had a significantly higher preference for delivery by any means than males (41% compared to 23%), while males' preferences were more broadly spread across the options provided including a significantly greater likelihood of nominating Local Land Services compared to females (16% compared to 9%).
- By indigenous status;
  - Aboriginal and Torres Strait Islander people had a significantly lower preference for delivery via any means (13% vs. 34% of those not identifying as Aboriginal or Torres Strait Islander) and were more likely to specify particular type of organisations including Local Council (34%), organisations such as community groups or clubs (27%), and experts such as a vet or horticulturalist (29% compared to 15% of those not identifying as Aboriginal or Torres Strait Islander).

For **'Community or small farm network seminar, workshops or training sessions - face to face'**:

- Overall;
  - 31% of the general population stated they had no preference for provider,
  - Local Council was the preferred named provider for this resource (25%), and
  - 19% of the general population named the NSW Department of Primary Industries as their preferred provider.

- By gender;
  - Females had a significantly higher preference for delivery by any means than males (42% compared to 23%), while males were more likely than females to nominate Local Land Services (16% compared to 9%) or organisations such as community groups or clubs (24% compared to 13%).
- By indigenous status;
  - Similar to those not identifying as Aboriginal or Torres Strait Islander, one third (32%) of Aboriginal and Torres Strait Islander people preferred Local Council to deliver this information. Aboriginal and Torres Strait Islander people also had a significantly higher preference for delivery via Local Land Services (31% compared to 10% of those not identifying as Aboriginal or Torres Strait Islander) and a significantly lower preference for delivery via any means (19% compared to 33%).

Implications for communications

While some results detailed in this section (such as high levels of interest in engaging with biosecurity information), are promising it is important that they be considered in the broader context of the issues and information needs of the public. As detailed earlier in earlier sections of this report, biosecurity tended to be considered a lower order issue when compared with health, housing, and employment. Therefore, while responses indicate there may be appetite for more biosecurity information, it would be difficult for this information to compete with issues perceived as more pressing. Exacerbating this is the fact that biosecurity tends considered the responsibility of government and industry rather than individuals.

Responses regarding preferred types of information and resources reflect this, while also providing clear direction for NSW DPI. Until biosecurity is regarded as a higher-order concern, it would be unrealistic to expect the public to engage with information that requires more than little effort or commitment. As such, information needs to be provided in concise formats that can be quickly digested.

- This information should be situational, providing the public with bottom-up solutions to specific situations and issues, rather than broad and sweeping top-down information that requires effort on the reader's part to contextualise and apply.

Importantly, regression analysis reveals a potential pathway for increasing the appetite for biosecurity information as relevant to individuals' lives. Analysis reveals significant relationships between interest in this information and:

- Perceived ability to recognise and act on biosecurity threats,
- Understanding of biosecurity,
- Perceived importance of biosecurity, and
- Perceptions than oneself is responsible for biosecurity.

Of these factors, the latter two have the strongest effect sizes. As such, efforts to increase public engagement with biosecurity should aim to drive increases in perceptions of the importance of biosecurity and the sense of personal responsibility.

Primary Producer: Detailed findings

Understanding of Biosecurity

Section Summary

UNDERSTANDING OF BIOSECURITY

Top 5 rated definitions

1. Preventing the introduction of diseases, pests and weeds through plants, livestock and waterways **(83%)**
2. Controlling or managing the spread of diseases, pests and weeds through plant, livestock and waterways **(82%)**
3. Protecting economy, environment & community from negative impacts of pests, diseases, weeds & contaminants **(79%)**
4. National / Australian border protection / quarantine **(68%)**
5. Biological threats / biological hazards / bio-terrorism **(59%)**

Primary producers define biosecurity in terms of the implications for their own business operations, as opposed to broader environmental, economic and societal implications – indicating that the relevancy of biosecurity communications to primary producers can be maximised by focussing messaging on strategies or behaviours can be undertaken as part of day to day operations.

How primary producers define biosecurity

When asked to define biosecurity, the large majority of responses from primary producers mentioned pests, diseases and weeds, with the specific focus of comments alternating between risk factors, preventative strategies, management responses and associated impact. This highlights that top-of-mind associations of biosecurity among primary producers is centred upon the impact that biosecurity has upon their day-to-day operations.

Figure 18: How primary producers define biosecurity

Source: Q.2 And what do you understand to be meant by the term biosecurity?
Base (Primary producers): 2021 n=550

How primary producers perceive alternative biosecurity definitions

After providing their own definition of biosecurity, primary producers were asked to rate the quality of a range of biosecurity definitions. The definition most endorsed as 'good' by primary producers was 'Preventing the introduction of diseases, pests and weeds through plants, livestock, and waterways' (83%). This was similar to 'Controlling or managing the introduction of diseases, pests and weeds through plants, livestock, and waterways' (82%).

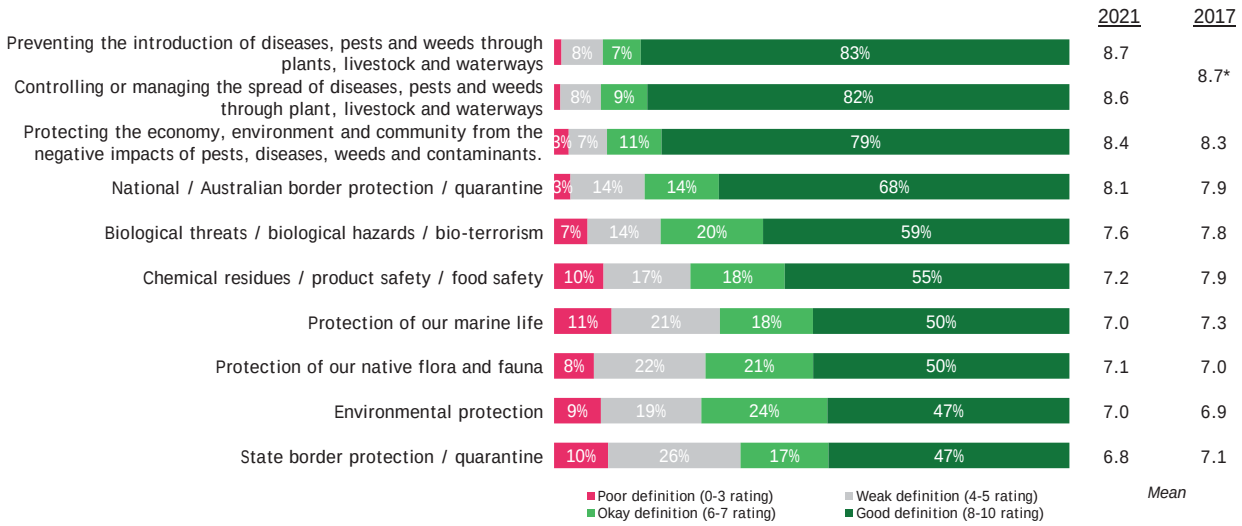
The definition of biosecurity currently being used by NSW DPI - 'Protecting the economy, environment and community from the negative impacts of pests, diseases, weeds, and contaminants' – was the third most endorsed, with eight in ten (79%) supporting this as a 'good' definition.

That these are the three highest ranked definitions indicates that primary producers predominantly think of biosecurity in terms of the impact upon their own business operations, as opposed to broader environmental, economic, and societal implications. This demonstrates that the immediate relevancy of biosecurity to primary producers can be leveraged in communications, by focussing key messages on the preventative and management strategies or behaviours that a primary producer can undertake as part of their day-to-day operations.

While just under seven in ten (68%) agree that 'National / Australian border protection and quarantine' was a good definition, far fewer (just 47%) agreed that 'State border protection / quarantine' was a good definition – the lowest ranked of all tested definitions.

The qualitative discussions with primary producers showed that they feel better able to identify, prevent and manage pests, diseases and weeds already found in Australia, as they know what to look for and are able to readily access sprays, drenches, etc to drench and treat as required. However, if new pests, weeds, or disease enter from overseas, their ability to identify, prevent and manage these is lower (due to being unfamiliar with signs of incursion and emergent disease, pets or weeds being potentially resistant to available drenches, sprays, etc). Mention was also made that Australia's island status provides a form of protection against new incursions, while states borders offer little internal protection due to airborne spread of pest and weed incursions across state lines.

Figure 19: How primary producers perceive alternative biosecurity definitions



Source: Q3. I am now going to read you a list of statements that others have made to define what they believe biosecurity to be. To what extent do you feel each of these is a good definition of what biosecurity is based on your own understanding?
Base: Primary Producer, weighted. 2021, n=573-983. 2017, n=400.
Note: *Statement combined in 2017.

Between the different sub-groups of NSW primary producers, a high degree of homogeneity was found as to the perceived quality of the proposed biosecurity definitions, with 'Preventing the introduction of diseases, pests and weeds through plants, livestock and waterways' receiving the highest rating across all sub-groups, (with a significantly higher rating for this definition by those based in the Northern Tablelands region).

Regarding lower rated definitions, it is of note that primary producers with an annual turnover of under $100,000 were significantly more likely to give **higher** ratings to 'Protection of our native flora and fauna', 'Protection of our marine life, and 'State border protection'.

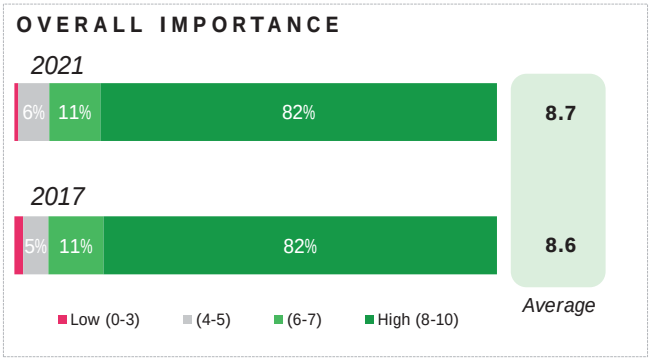
Conversely, those with an annual turnover greater than $500,000 were significantly more likely to give **lower** ratings to 'Protection of our native flora and fauna', 'Environmental protection' and 'State border protection'. The implication is that the extent to which primary producers focus upon the impact biosecurity has upon their own business operations, as opposed to broader environmental, economic, and societal implications, becomes more pronounced as size of operation grows.

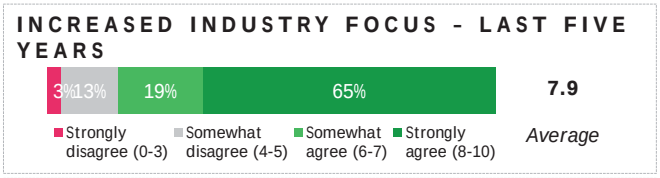
Little change has occurred between 2017 and 2021 as to how primary producers assess definitions of biosecurity, with no significant changes occurring in the average ratings received for each definition in 2021 vs. 2017. Additionally, the relative ranking of the top results remained unchanged over this time (noting that in 2017 the top ranked code was 'Preventing, controlling, or managing the introduction of diseases, pests and weeds through plants, livestock and waterways' and in 2021 when this was split into two codes preventing was ranked first and controlling second), while 'Environmental protection' and 'State border protection' remain in the lowest two position ranks.

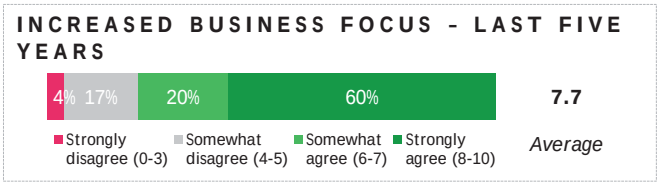
At a region level, in 2021, primary producers in Hunter are increasingly likely to agree the definition used by NSW DPI 'Protecting the economy, environment and community from the negative impacts of pests, diseases, weeds and contaminants' is a good definition of biosecurity (81% rating it 8-10 out of 10 in 2021 compared to only 58% in 2017).

Importance of biosecurity

Section Summary







93% of primary producers see biosecurity as an important issue for primary production in NSW, with the average importance score for biosecurity of 8.7 consistent with the 2017 result. However while the perceived level of biosecurity importance has not changed over time, 84% of primary producers stated that their industry has increased its focus on biosecurity in the past five years, and 80% that their business has increased its focus - with this seen to be due to the increased focus upon biosecurity in government communications and regulations and corresponding increase in understanding and acceptance of biosecurity as an umbrella term to encompass a wide range of behaviours and considerations previously thought of in terms of weed control, animal health and land management.

How primary producers perceive the relative importance of biosecurity

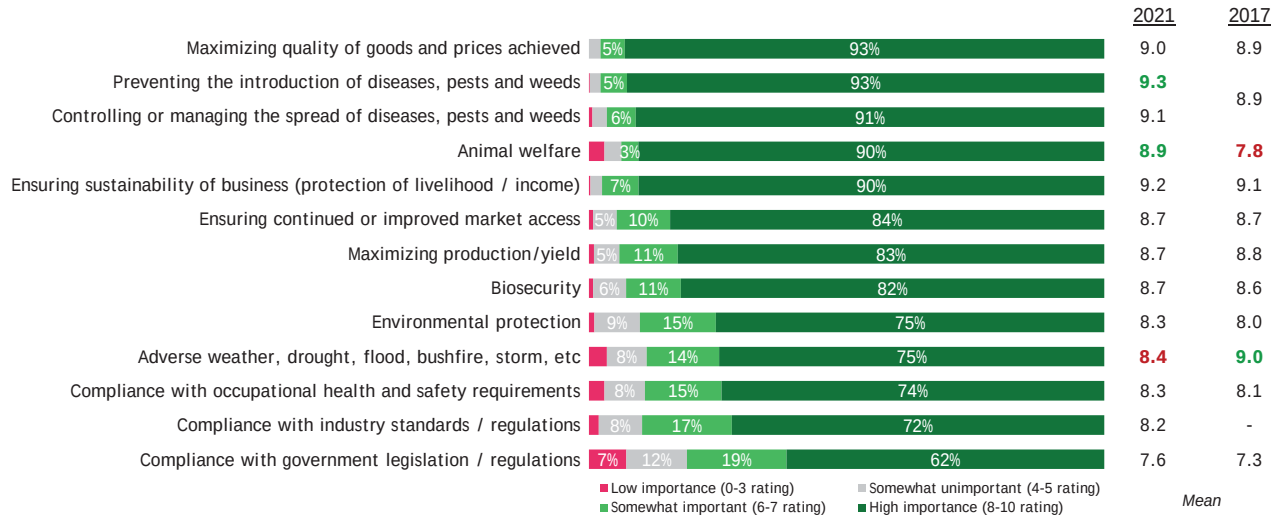
At an overall level, eight in ten (82%) primary producers rated biosecurity as highly important to primary producers in NSW. A further one in ten (11%) rated biosecurity as being 'somewhat important' (rated 6-7 out of ten). Although this is lower than seven other issues listed in Figure 20, other top-rated issues related to specific facets of biosecurity including:

- Maximising quality of goods and prices achieved (93%),
- Preventing the introduction of diseases, pests and weeds through plants, livestock, and waterways (93% rated as highly important),
- Controlling or managing the spread of diseases, pests and weeds through plants, livestock, and waterways (91%),
- Animal welfare (92%), and
- Ensuring sustainability of business (90%).

Therefore, the relatively lower ranking of biosecurity should not be interpreted to mean that biosecurity was not seen to be important. Instead, the relative ranking indicates that primary producers determine importance based on specific threats to their day-to-day operations and livelihood, as opposed to broader and potentially nebulous issues, i.e., 'biosecurity'.

This further emphasises that relevance of biosecurity communications to primary producers can be maximised by focussing key messages upon the preventative and management strategies or behaviours that a primary producer can undertake as part of their day-to-day operations. Biosecurity messaging should be pragmatic, focussed, and specific.

Figure 20: How primary producers perceive relative importance of biosecurity



Source: Q1 - How important do you feel the following issues are for primary producers in NSW?
Base: Primary Producer, weighted. 2021, n=550. 2017, n=392.

Analysis of different cohorts of primary producers confirms that importance is based on the day-to-day contexts in which they operate. Livestock producers placed significantly higher importance on 'animal welfare' (94%), compared to horticulture producers a significantly (78%).

Between 2017 and 2021 the relative ranking of issues on the basis of importance has changed somewhat, whereas in 2017 the top ranked issues on the basis of the mean rating, were 'Ensuring sustainability of business' (9.1) and 'Adverse weather, drought, flood, bushfire, storm etc' (9.0). In 2021, the top ranked issue is 'Preventing, the introduction of diseases, pests and weeds through plants, livestock and waterways' (9.3) followed by 'Ensuring sustainability of business' (9.2). So, while the mean importance of 'Ensuring the sustainability of business' has increased from 2017 to 2021, currently, 'Preventing, the introduction of diseases, pests and weeds through plants, livestock and waterways' is considered more important. Also note, in 2021 'Controlling and managing the spread of disease, pests and weeds' has been separated from 'Preventing the introduction of diseases, pests and weeds.' revealing both of these issues to be highly important.

Also apparent is a significant increase in the importance rating of 'animal welfare' (average rating of 8.9 in 2021 up from 7.8 in 2017), with 'animal welfare now fifth in terms of relative importance (previously ranked tenth). Based on qualitative discussions with primary producers this result is driven by a combination of the increased prices livestock is now commanding, as a response to the impact that both bushfires and drought has had upon required levels of animal husbandry, and in response to media attention in relation to issues such as live exports and mulesing.

Regional differences include a tendency for primary producers in the North West region to be less likely to rate issues as highly important in 2021, compared to 2017, including:

- Biosecurity (63% down from 92% in 2017),
- Adverse weather, drought, flood, bushfire, storm, etc (66% down from 91% in 2017),
- Compliance with government legislation / regulations (50% down from 81% in 2017),
- Compliance with occupational health and safety requirements (57% down from 91% in 2017), and
- Maximizing production/yield (72% down from 95% in 2017),

In contrast, primary producers in Northern Tablelands region tended to be more likely to rate issues as highly important in 2021, compared to 2017, including:

- Animal welfare (97% up from 84% in 2017),
- Preventing the introduction of diseases, pests and weeds through plants, livestock and waterways (94% up from 81% in 2017),
- Maximizing quality of goods and prices achieved (94% up from 81% in 2017),
- Compliance with government legislation / regulations (76% up from 32% in 2017), and
- Compliance with occupational health and safety requirements (81% up from 58% in 2017).

Primary producers in Central West region also rated a number of issues as more important in 2021, compared to 2017, bringing these ratings more into line with other regions including:

- Animal welfare (82% up from 44% in 2017),
- Environmental protection (78% up from 43% in 2017),
- Compliance with government legislation / regulations (67% up from 29% in 2017), and
- Adverse weather, drought, flood, bushfire, storm, etc (82% up from 46% in 2017).

Responsibility for biosecurity

Section Summary

RESPONSIBILITY FOR BIOSECURITY

Where responsibility for biosecurity is seen to sit

1. NSW Department of Primary Industries **(84%)**
2. Local Land Services **(82%)**
3. Individual primary producers **(80%)**
4. Is a shared responsibility between government and industry **(80%)**
5. NSW Government **(76%)**

While primary producers saw biosecurity as a responsibility they shared with government, the roles that each party plays were seen to be more standalone than collaborative. More specifically, government was seen to be responsible for protecting and managing Australia's and NSW's biosecurity via governance and regulation (including border protection), while primary producers saw themselves as responsible for biosecurity prevention and management at the farm level.

This indicates that the credibility (and hence uptake) of desired biosecurity behaviours among primary producers is best maximised by linking non-compliance to the resultant impact on individual producers.

Who primary producers perceive as being responsible for biosecurity

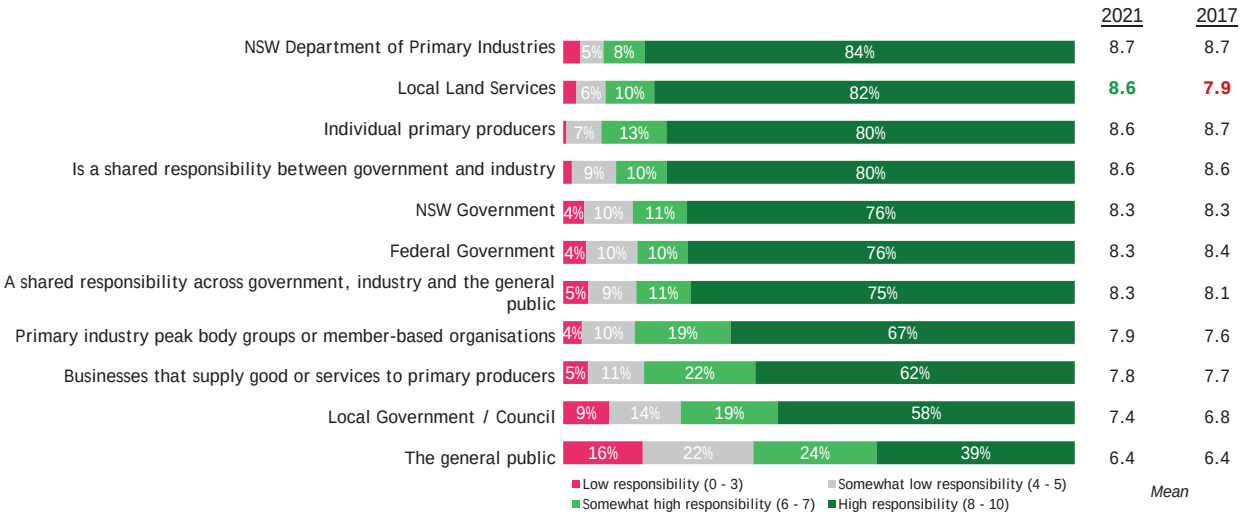
There is a strong sense among primary producers that a range of stakeholder are responsible for biosecurity. The NSW Department of Primary Industries was the party most producers rated as highly responsible (84%), followed closely by:

- Local Land Services (82%), and
- Primary producers, and a shared responsibility between government and industry (both 80%).

Qualitative consultations found that the key roles government plays in regard to biosecurity relates to both border protection and to the governance and oversight of biosecurity, while primary producers see themselves as being responsible for biosecurity prevention and management at the farm level.

Few producers (39%) felt the general population were highly responsible - significantly lower than the proportion that nominated government entities, themselves or other agri-businesses and organisations as highly responsible.

Figure 21: Who primary producers perceive as being responsible for biosecurity



Source: Q10 - Thinking now about where the responsibility for biosecurity sits, to what extent do you believe that each of the following groups is responsibility for biosecurity in NSW as it relates to primary producers. Please answer for each using a scale of 0-10 where 0 is 'very low level of responsibility' and 10 'very high level of responsibility'.
Base: Primary Producer, weighted. 2021, n=550. 2017, n=392.

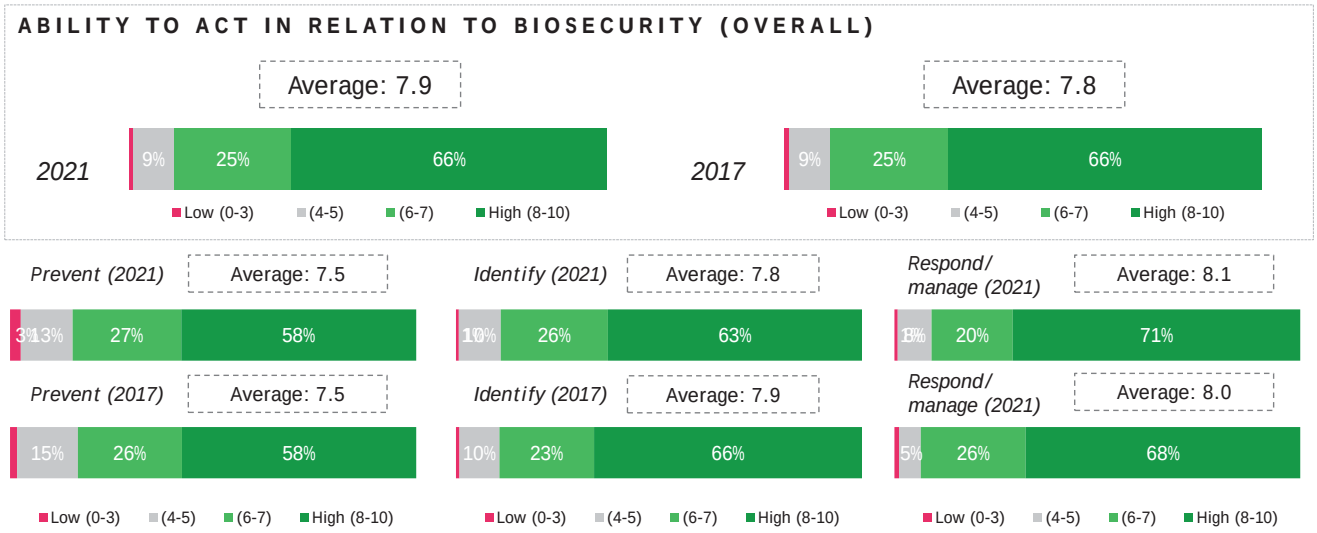
Between 2017 and 2021 the relative ranking of perceived areas of responsibility and average rating of responsibility remains largely unchanged, with the following exception of the significant increase in importance rating for 'Local Land Services' (average rating of 8.6 compared to 7.9 in 2017), meaning 'Local Land Services is also now second in terms of relative responsibility (previously ranked seventh). This result was likely due to Local Land Services having only been formed in 2014, meaning it was a much more established agency in 2021 than it was in 2017.

While perceived responsibility for biosecurity of Local Land Services increased overall and in most Local Land Services regions, the exception was Greater Sydney which remained stable; with 69% of primary producers in 2021, and 72% in 2017 nominating Local Land Services as highly responsible for biosecurity. The most notable increases in responsibility for biosecurity being attributed to Local Land Services came from:

- Central West (95% up from 67% in 2017),
- North Coast (79% up from 44% in 2017), and
- Western (83% up from 42% in 2017).

Ability to act in relation to biosecurity

Section Summary



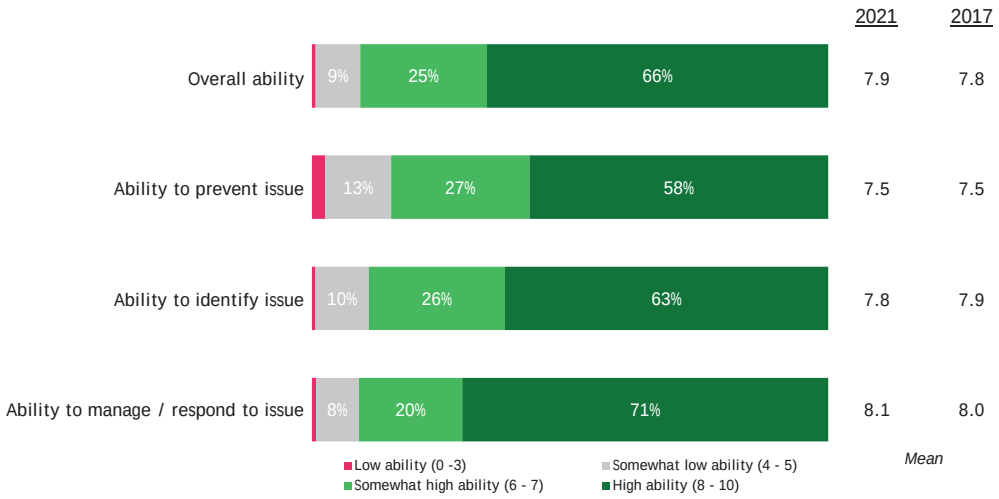
The above results reflect that while primary producers see the prevention of new biosecurity incursions occurring as being more outside of their control, they are more confident in their ability to identify and respond to any incursions of known pests, weeds, or diseases onto their property. Since 2017 no change has occurred in terms of ability to prevent, however directional increases have occurred in overall ability, ability to identify, and ability to respond - indicating that the increased focus on biosecurity by government and industry is gradually extending to increase understanding and ability at the producer level.

How primary producers perceive their ability to act in relation to biosecurity

Primary producers are clearly confident in their knowledge with respect to biosecurity. Two-thirds (66%) rated their overall ability as ‘high’, further quarter (25%) as ‘somewhat high’. This leaves less than one in ten rating their ability as ‘somewhat low’ (9%) or ‘low’ (1%).

Drilling into specific aspects of biosecurity, nearly three quarters (71%) rated their ability to manage and respond to biosecurity issues highly. Significantly more than the proportion who rated their ability to identify issue (63%) or prevent issue (58%) as high.

Figure 22: How primary producers perceive their ability to act in relation to biosecurity



Source: Q8 - To what extent do you feel that you have sufficient knowledge and ability to prevent, identify, manage, or respond to any potential biosecurity issues you encounter in your business? For each aspect answer using a scale of 0-10 where 1 is 'very low ability' and 10 'very high ability.'
Base: Primary Producer, weighted. 2021, n=550. 2017, n=392.

Based on the qualitative consultations the lower rating primary producers gave for their 'ability to prevent' is driven by the perception that while they can take action to minimise the likelihood of incursions of known weeds, diseases and pests onto their property, the biggest biosecurity threat they face is the introduction to Australia of a previously unknown pest, weed or disease.

More specifically primary producers felt powerless to both prevent new threats from reaching Australia, as well as powerless take preventative action (at least in the short term) that will minimise the incursion of the new threat onto their property. Conversely the higher rating primary producers gave for their ability to manage a biosecurity issue is driven by their perception that they do possess both the knowledge and tools to be able to effectively respond to incursions of known pests, weeds, or diseases onto their property.

There was no significant change in producer's ability to prevent an issue between 2017 and 2021 (7.5 in both 2017 and 2021). However, the non-significant increase in ability to manage / respond to an issue (8.1 in 2021 from 8.0 in 2017, is reflective of qualitative feedback from primary producers, indicating some are feeling better prepared to respond to biosecurity incursions then they previously have.

Primary producers in Central West Local Land Services region rate their ability to prevent and respond to issues significantly higher in 2021 compared to 2017; ability to prevent an issue 8.1 in 2021 up from 6.7 in 2017 and ability to manage or respond to an issue 8.1 in 2021 up from 7.4 in 2017.

Current biosecurity behaviours

Section Summary – Current biosecurity behaviours

MOST PERFORMED BEST PRACTICE BEHAVIOURS (% EVER DO)

1. Take steps to eradicate known disease, weeds, or pests **(99%)**
2. Regularly monitor plants, livestock and/or waterways for disease, weeds, or pests **(97%)**
3. Use all chemicals in accordance with APVMA or manufacturer guidelines **(96%)**
4. Ensure feed stored in optimal environment **(95%)**
5. Recording movement of livestock (e.g., NLIS / PigPass) **(95%)**

LEAST PERFORMED BEST PRACTICE BEHAVIOURS (% DO NOT DO)

1. Maintain a cash reserve specifically for management of emergency biosecurity issues **(73%)**
2. Quarantine new plant matter **(64%)**
3. Have biosecurity signage at all entry points to premises **(58%)**
4. Only purchase feed from certified providers **(36%)**
5. Only purchase plant matter from certified providers **(34%)**

The behaviours with the highest level of stated compliance tended to be reactive behaviours aimed at managing and responding to biosecurity issues based on long standing principles of sound land management and animal husbandry, with lesser performed behaviours tending to be more proactive in nature and relating to internal / on farm biosecurity governance protocols primarily focussed on preventing tracked incursions. While high levels of last 5 years uptake of some internal / on farm biosecurity governance behaviours was apparent (e.g., 20% stated they put a biosecurity plan in place in the last 5 years), a need for greater education as to the importance of compliance with proactive as well as reactive behaviours is nonetheless apparent.

DRIVERS OF BEST PRACTICE BEHAVIOURS

1. To ensure sustainability of business **(91%)**
2. To maximise quality of goods and prices achieved **(90%)**
3. To ensure continued or improved market access **(88%)**
4. To ensure animal welfare **(86%)**
5. It's the right thing to do **(86%)**

BARRIERS TO BEST PRACTICE BEHAVIOURS

1. Concerns about chemical residue **(34%)**
2. Concern will not receive fair compensation **(15%)**
3. Is irrelevant to my operation **(12%)**
4. Consider risks to be external or out of my control **(11%)**
5. My actions have no impact on my industry **(11%)**

A high level of agreement was had for each of the above drivers of best practice, indicating that utilising these benefits as a key outcome message in any future communications promoting best practice biosecurity measures will serve to increase the perceived legitimacy and credibility of such communications (and hence greater contemplation and uptake of desired behaviours).

Concern about chemical residue is the key driver of non-compliance (largely relating to non-spraying for pests and weeds due to many available sprays seen to be contradictory to both organic and other industry certification requirements).

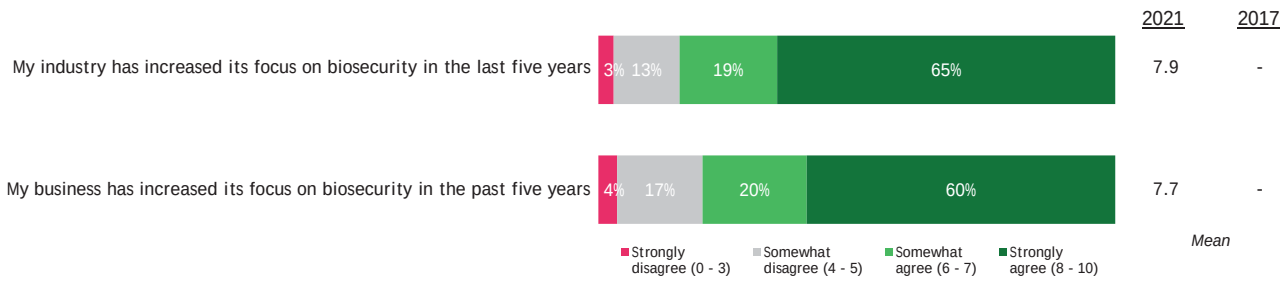
Changes in level of focus placed on biosecurity in last 5 years

In 2021, the vast majority of primary producers felt that both their own business and the industry to be more attuned to the issues of biosecurity:

- 65% strongly agreed that their industry has increased its focus on biosecurity in the last five years, and
- 60% strongly agreed that their business has increased its focus on biosecurity in the past five years.

Qualitatively, this increased level of focus was associated with an increased focus on biosecurity in both government communications and regulations, as well as in industry newsletters and communications. Of note however is that several primary producers stated that the increased focus on biosecurity was a change in semantics only, with biosecurity now being used as the umbrella term (or accepted shorthand) to encompass a wide range of behaviours and considerations previously referred to individually by terms such as weed control, animal health and land management.

Figure 23: Changes in level of focus placed on biosecurity in last 5 years



Source: Q4 - I will now read out two statements that other primary producers have made about biosecurity. Please answer for each using a scale of 0-10 where 0 is 'strongly disagree and 10 is 'strongly agree
Base: Primary Producer, weighted. 2021, n=550.

Best practice behaviours

At an overall level most primary producers, claim to 'usually' or 'always comply' with a wide range of the desired biosecurity behaviours relevant to their operation. Behaviours with the highest level of stated compliance tended to be reactive, and those which producers describe as long established and based on principles of sound land management, animal husbandry and established governance requirements. These include:

- Taking steps to eradicate known disease, weeds, or pests (99%),
- Regularly monitoring plants, livestock and/or waterways for disease, weeds, or pests (97%),
- Using all chemicals in accordance with APVMA or manufacturer guidelines (96%),
- Ensuring feed is stored in optimal environment (95%), and
- Recording movement of livestock, e.g., NLIS / PigPass (95%).

For each of the desired best practice behaviours a proportion of primary producers stated that this was something they had only commenced doing within the past five years. The behaviours with the highest instance of recent uptake tended to be related to specific biosecurity initiatives or governance requirements such as:

- Having a biosecurity management plan or industry accreditation plan in place (20% started last 5 years),
- Having biosecurity signage at all entry points to premises (18% started last 5 years),
- Following biosecurity behaviours or protocols suggested by industry association (15% started last 5 years),
- Having established vehicle and machinery hygiene protocols in place (13% started last 5 years),
- Limiting non-employee movements on site (12% started last 5 years),
- Belonging to industry certification / registration scheme/s (12% started last 5 years), and
- Having established human hygiene protocols in place (11% started last 5 years).

However, despite the positive uptake of the above behaviours in the last five years, a relatively high level of non-compliance with each of these behaviours is also apparent – indicating that there is a need for increased education of primary producers as to the benefit of performing such actions. For example:

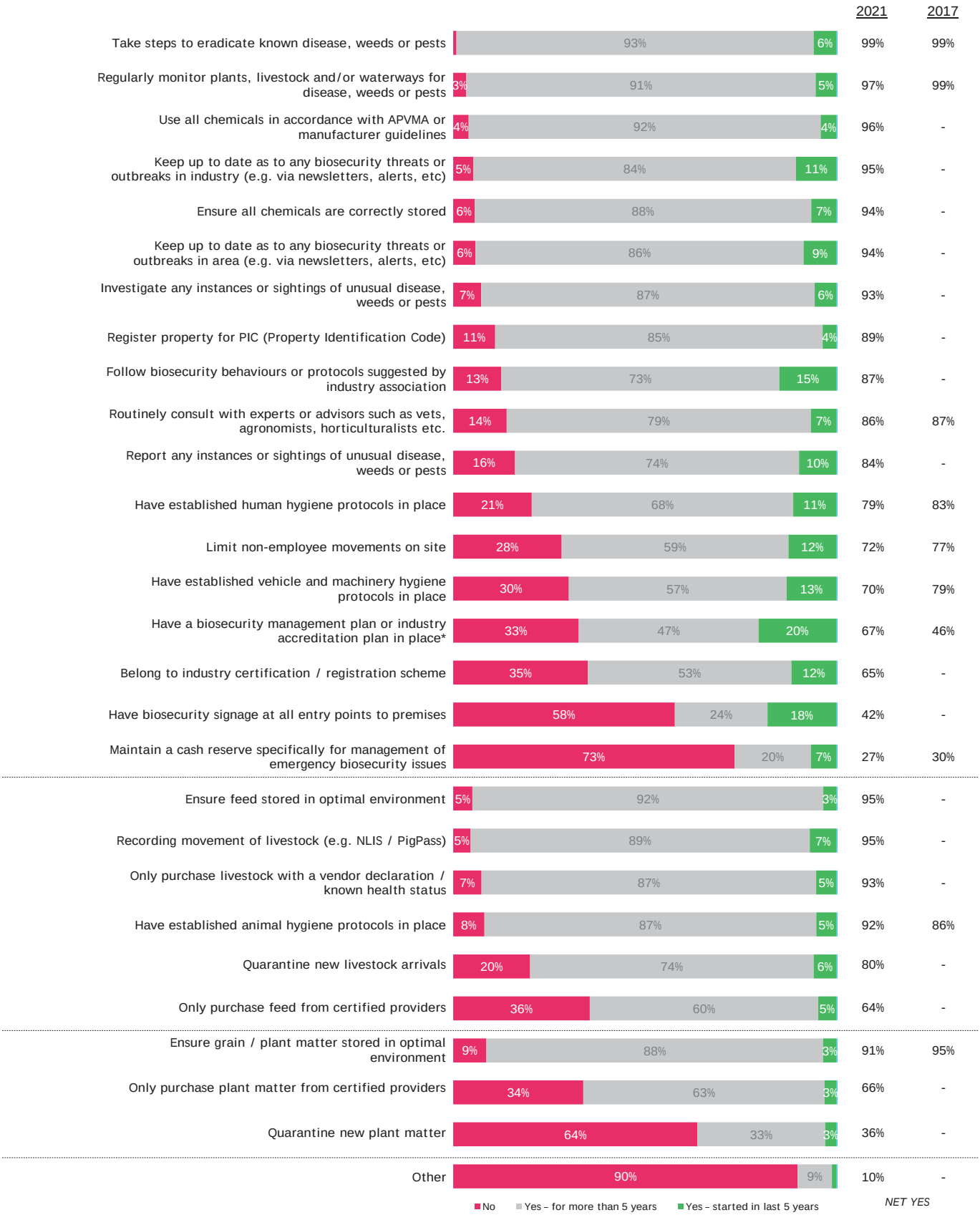
- Having biosecurity signage at all entry points to premises (58% do not do),
- Belonging to industry certification / registration scheme/s (35% do not do),
- Having a biosecurity management plan or industry accreditation plan in place (33% do not do),
- Having established vehicle and machinery hygiene protocols in place (30% do not do),
- Limiting non-employee movements on site (28% do not do),
- Having established human hygiene protocols in place (21% do not do),
- Following biosecurity behaviours or protocols suggested by industry association (13% do not do).

Further areas of potential non-compliance were also evident, including the below behaviours where over one in ten primary producers stated that they did not comply:

- Maintaining a cash reserve specifically for management of emergency biosecurity issues (73% do not do),
- Quarantining new plant matter (64% do not do),
- Only purchasing feed from certified providers (36% do not do),
- Only purchasing plant matter from certified providers (34% do not do),
- Quarantining new livestock arrivals (20% do not do),
- Reporting any instances or sightings of unusual disease, weeds, or pests (16% do not do), and
- Routinely consulting with experts or advisors such as vets, agronomists, horticulturalists etc. (14% do not do).

Of note is that these behaviours tend to centre on internal/on-farm biosecurity governance, indicating the need for increased education of primary producers as to the importance of both proactive and reactive behaviours.

Figure 24: What best practice behaviours primary producers are currently performing



Source: Q5 Thinking now about the different biosecurity related practices that you may follow in your day-to-day business operations, which of the following do you do? As I read each one out just say yes or no. IF YES: Did you start doing this in the past 5 years or more than 5 years ago?
Base: Primary Producer, weighted. 2021, n=550. 2017, n=345-390
*'Have a biosecurity plan in place' in 2017.

Note that in 2017 this question was presented as yes/no. Did not have yes, within 5 years and yes, more than 5 years option.

Examining 'do not do' responses for each type of behaviour among those for whom it was relevant in more detail a number of significant differences across key primary producer sub-groups are apparent.

- Register property for PIC (Property Identification Code)':
  - Significantly higher proportion of 'do not do' responses among those with properties of between 0 to 99 hectares in size (21%) among those involved in horticulture (31%) and among those based in the Sydney region (32%).
- 'Routinely consult with experts or advisors such as vets, agronomists, horticulturalists etc.':
  - significantly higher proportion of 'do not do' responses among those with annual turnover below $100,000 (41%) compared to those with a turnover over $100,000 (38%) and among those on properties of between 0 and 99 hectares in size (24%), with significantly lower proportions of 'do not do' responses among those involved in cropping (2%) and among those with an annual turnover of more than $500,000 (5%).
- 'Ensure grain / plant matter stored in optimal environment':
  - Significantly higher proportion of 'do not do' responses among and those involved in horticulture (29%).
- 'Only purchase livestock with a vendor declaration / known health status':
  - Significantly higher proportion of 'do not do' responses among and those with an annual turnover under $100,000 (13%)
- 'Use all chemicals in accordance with APVMA or manufacturer guidelines':
  - Significantly higher proportion of 'do not do' responses among those on properties of between 0 and 99 hectares in size (10%).

From 2017 to 2021 there has been an increase in the adoptions of desired behaviours regarding:

- Having a biosecurity management plan or industry accreditation plan in place (67% up from 46% in 2017), and
- Having established animal hygiene protocols in place (92% up from 86% in 2017).

This corroborates results detailed above, where these behaviours are characterised by a high proportion of primary producers stating they had commenced these behaviours in the last five years.

More surprisingly however is that a significant decrease was recorded for 'have established vehicle and machinery hygiene protocols in place' (70% compared to 79% in 2017) given that 13% stated they had commenced this behaviour in the past five years. We do however note that results for these analyses may be impacted by time periods not aligning directly and changes in how the question was framed (previously asked as yes or no).

Reasons for practising biosecurity measures

When presented with an array of motivators for practising biosecurity behaviours, producers widely endorsed most of these.

As shown in Figure 25, the reason endorsed by most producers was 'to ensure sustainability of business' - with nine in ten (91%) primary producers rating this as a top reason or benefit. This is consistent with the high level of importance placed on this issue.

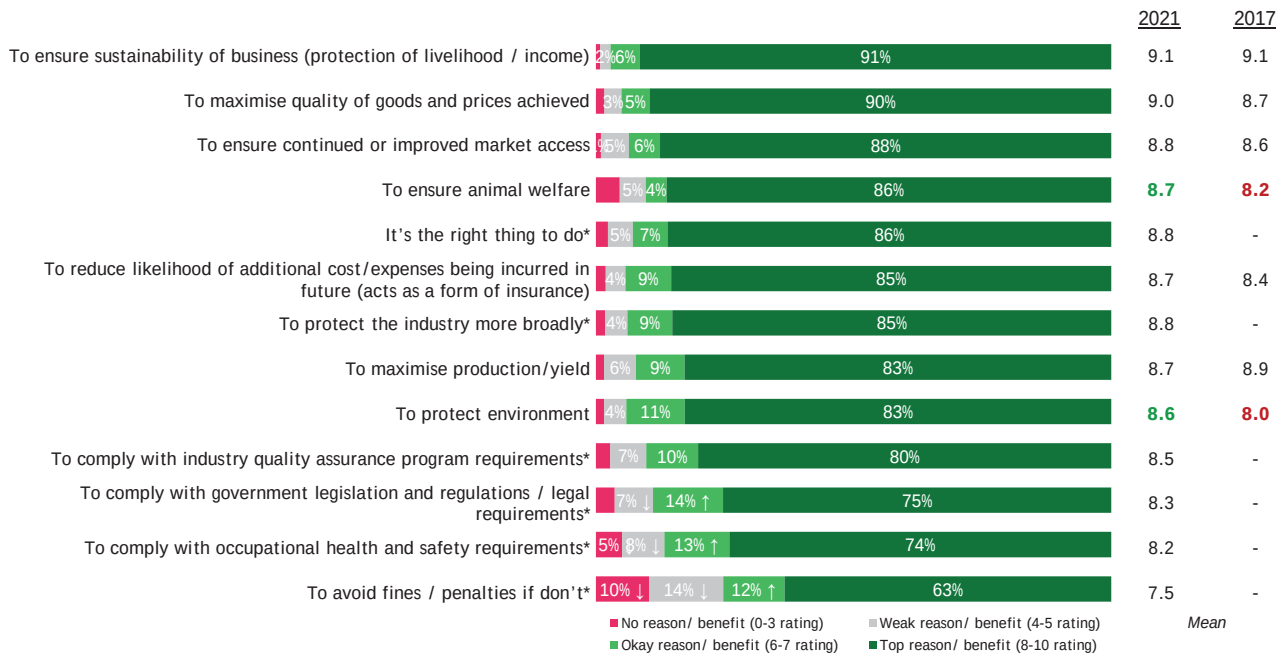
Other reasons and benefits selected as top drivers include:

- To maximise quality of goods and prices achieved (90%),
- To ensure animal welfare (86%), and
- To ensure continued or improved market access (88%).

The high endorsement of the above suggests that utilising these benefits as key outcomes in any future communications promoting best practice biosecurity measures will serve to increase the perceived legitimacy and credibility of such communications (and hence greater contemplation and uptake of desired behaviours).

To avoid fines and penalties was seen as being the least impactful driver of practising biosecurity measures, however despite this low relative ranking the overall impact of fines in reinforcing the benefits of compliance should not be underestimated given that six in ten (63%) of primary producers stating this was a top reason / benefit as to why they do comply.

Figure 25: What primary producers perceive to be the drivers of biosecurity behaviours



Source: Q6 - To what extent do you consider each of the following to be a reason why you practice biosecurity measures, or is a benefit you receive because of the biosecurity actions you take? Please answer for each using a scale of 0-10 where 0 is 'not at all' and 10 is 'very much so'.
Base: Primary Producer, weighted. 2021, n=550. 2017, n=392.
Note: * Not asked in 2017.

Compared with 2017 results, the only significant differences are the increase in the extent to which 'Protecting the environment is considered the top reason for complying with best practice biosecurity' (mean 8.6 in 2021 up from 8.0 in 2017) and the increase in relevance of 'Ensuring animal welfare' to biosecurity (8.7 up from 8.2 in 2017). This result is consistent with the increase in perceived importance of animal welfare to primary producers overall that was noted prior.

The increase in 'Ensuring animal welfare' as a reason for practicing biosecurity measures is significant in:

- Central West (91% in 2021 up from 46% in 2017),
- Northern Tablelands (97% in 2021 up from 87% in 2017),
- Riverina (91% in 2021 up from 56% in 2017), and
- Western (89% in 2021 up from 43% in 2017).

In contrast, 'Ensuring animal welfare' is significantly less likely to be nominated as a top reason for practicing biosecurity measures in North West region (83% in 2021 down from 96% in 2017).

The increase in 'Protecting the environment' as a reason for practicing biosecurity measures is significant in:

- Central West (78% in 2021 up from 39% in 2017),
- North Coast (89% in 2021 up from 52% in 2017), and
- Northern Tablelands (90% in 2021 up from 74% in 2017).

Barriers to biosecurity behaviours

Few of the potential barriers provided in the survey were identified as applying for the majority of producers. The one exception to the this is 'concerns around chemical residue, with 54% stating that to some extent this was a reason why they did not follow best practise in relation to biosecurity. This concern was also raised extensively in qualitative consultations with horticulture producers stating that many available sprays were contradictory to both organic and other industry certification requirements.

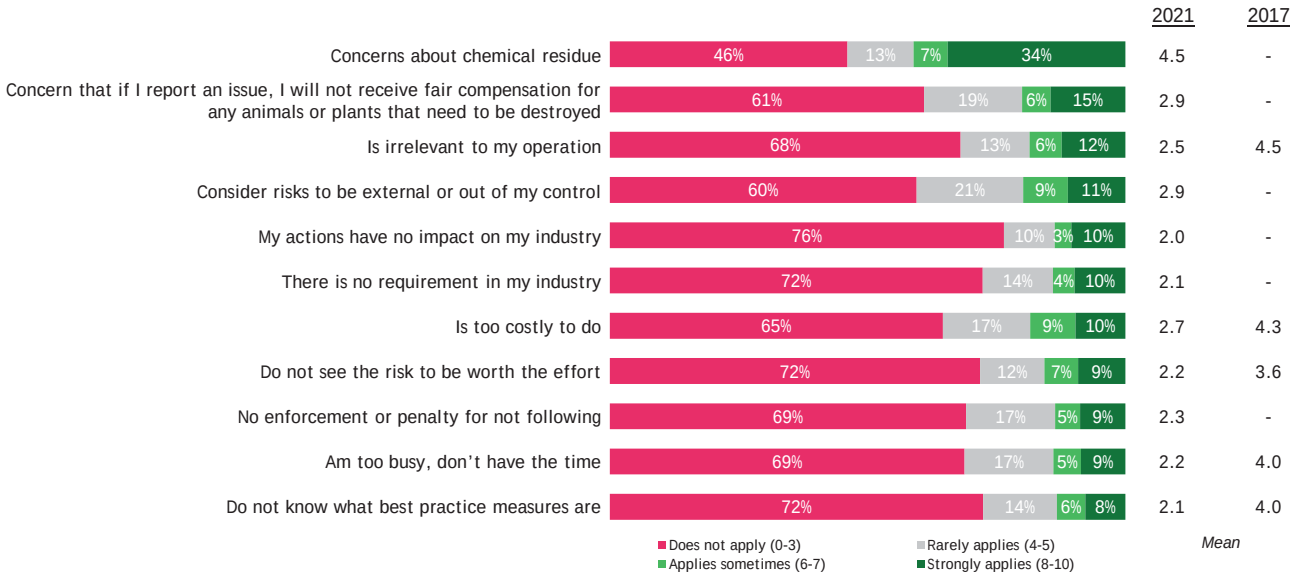
Additionally, and although the majority stated that the below concerns did not apply to them, two additional barriers were found to have a statistically higher likelihood of being a barrier to practising biosecurity measures, namely:

- 'Concern that if I report an issue, I will not receive fair compensation for any animals or plants that need to be destroyed' with 39% indicating that to some extent this was a reason why they did not follow best practise in relation to biosecurity – again this was also raised as a concern within the qualitative consultations, and
- 'Consider risks to be external or out of my control' with 40% stating that to some extent this was a reason why they did not follow best practise in relation to biosecurity.

By way of contrast the below concerns were found to have a lower statistical likelihood of being a barrier to practising biosecurity measures:

- My actions have no impact on my industry (24% stating that to some extent this was a reason why they did not follow best practice in relation to biosecurity),
- There is no requirement in my industry (28% stating that to some extent this was a reason why they did not follow best practice in relation to biosecurity),
- Do not know what best practice measures are (28% stating that to some extent this was a reason why they did not follow best practice in relation to biosecurity), and
- Do not see the risk to be worth the effort (28% stating that to some extent this was a reason why they did not follow best practice in relation to biosecurity).

Figure 26: What primary producers perceive to be the barriers to biosecurity behaviours



Source: Q7 - Likewise, there are a number of potential reasons why primary producers do not follow best practices in relation to biosecurity. To what extent does each of the following apply to you? Please answer for each using a scale of 0-10 where 0 is 'Does not apply at all' and 10 is 'Strongly applies'.
Base: Primary Producer, weighted. 2021, n=550. 2017, n=392.
Note: * Not asked in 2017.

Among key primary producer sub-groups, no significant differences as to the extent to which barriers exist was apparent.

A significant number of changes were made to the list of potential barriers between 2017 and 2021 with only five potential barriers consistently asked in both years.

The extent to which each of these comparable barriers was perceived to be a barrier in 2021 has declined significantly since 2017, with primary producers now less likely to state that biosecurity behaviours are:

- 'Too costly to do' (2.7 in 2021 down from 4.3 in 2017),
- 'Irrelevant to my operation' (2.5 in 2021 down from 4.5 in 2017),
- Something they are 'too busy, don't have the time' for (2.2 in 2021 down from 4.0 in 2017),

- Something they 'do not see the risk to be worth the effort' for (2.2 in 2021 down from 3.6 in 2017)', and
- Something they are less likely to 'not know what best practice measures are' (2.1 in 2021 down from 4.0 in 2017).

These results align with the earlier finding that the majority of primary producers have increased their focus on biosecurity over the last few years. Further, this increased focus appears to have resulted in a corresponding decline in negative perceptions as to the relevance, value exchange and credibility or legitimacy of behaviour performance. Additionally, the decline in 'do not know what best practise behaviours are' as a barrier to compliance reflects the earlier finding that primary producer's ability to manage or respond to biosecurity issues has increased.

Management of biosecurity in the future

Section Summary

TOP 5 STRATEGIES TO PRIORITISE

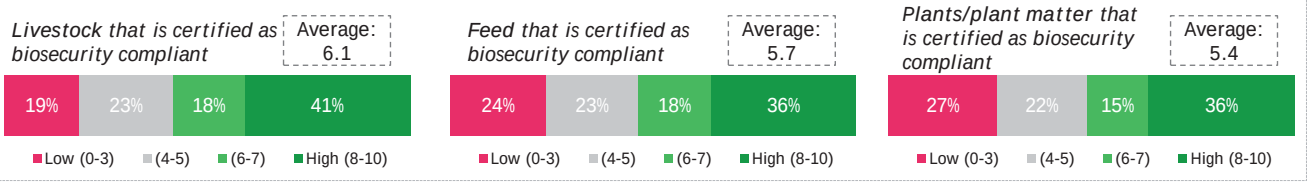
1. Increased biosecurity surveillance at international borders **(90%)**
2. Increased awareness / understanding about biosecurity among hobby farmers / backyard operators / recreational fishers **(85%)**
3. Increased level of government resources aimed to support primary industry in managing biosecurity **(84%)**
4. Increased focus on reducing contamination or pollution of waterways and oceans **(78%)**
5. Greater education of primary producers as to what best practice biosecurity behaviours are **(76%)**

TOP 5 BIOSECURITY RESOURCES MOST LIKELY TO USE

1. Biosecurity alerts **(80%)**
2. Obtain biosecurity compliant industry certification if meant could attract higher price **(68%)**
3. Fact sheets about pest and disease types, their symptoms and prevalence **(63%)**
4. Fact sheets or checklists about best practice biosecurity measures **(62%)**
5. Regular biosecurity newsletters **(57%)**

Looking to the future, primary producers see strategies aimed at preventing biosecurity incursions, be that at the border level or within local area (via greater inducement to comply and/or report), as key strategies to prioritise, with appetite highest for resources that will enable easier identification of emergent risks.

WILLINGNESS TO PAY



What primary producers saw as priorities for more effective management of biosecurity

When asked to rate several priorities for effective biosecurity management, producers tended to agree that all should be a high priority. This is a clear indication of strong support among producers for any and all initiatives in this area.

Primary producers were most likely to see increased biosecurity surveillance at international borders as a high priority (90% rated as a top priority). This reflects producers seeing national border protection both as a key means by which biosecurity incursions to Australia can be prevented, but also the area (i.e., prevention) where they have the least ability to act.

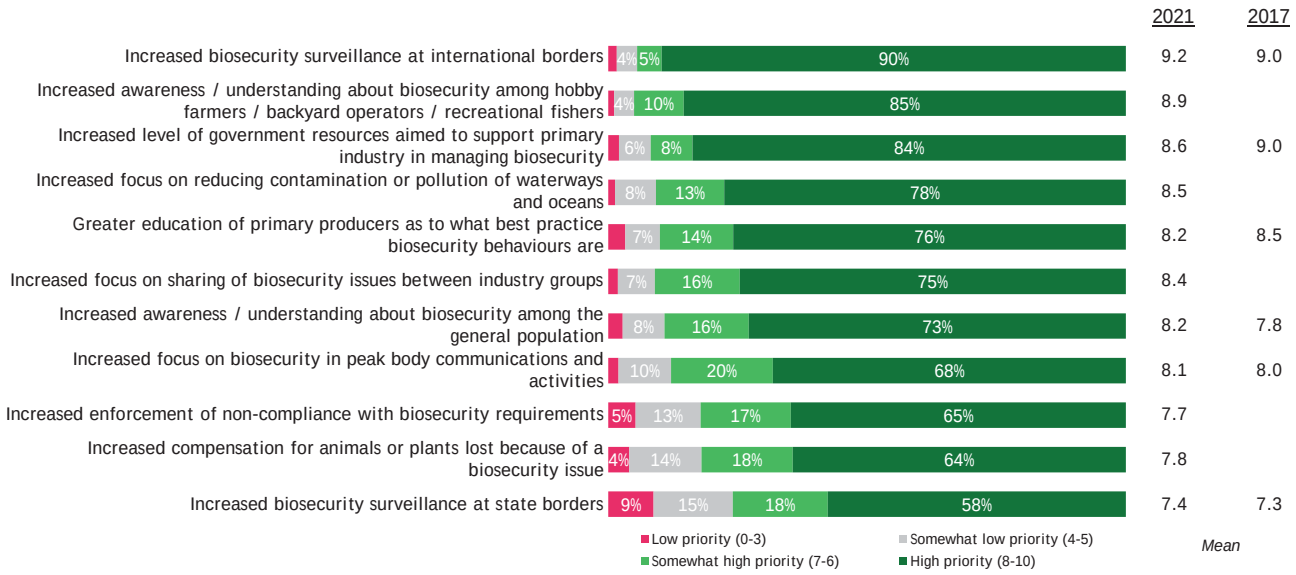
The second highest priority was to 'increase awareness / understanding about biosecurity among hobby farmers / backyard operators / recreational fishers' (85% rated as a top priority) – the risk that these audience groups pose to biosecurity was also raised within qualitative consultations with commercial primary producers located in peri-urban area. (Note that because of the peripheral involvement of hobby farmers / backyard operators / recreational fishers in primary production they are seen to be distinct from the general population at large).

'Increased levels of government resources aimed to support primary industry in managing biosecurity' was the third most highly rated priority (84% rated as a top priority). Qualitative consultations indicate that the areas in which additional support was most needed related to navigation of regulations and 'red tape', as well as grants to subsidise biosecurity implementation costs, and more departmental advisors such as horticulturalists, large animal vets and agronomists.

Additionally, and although the majority or primary producers rated each of the below initiatives as being top priorities overall, the associated rating given to each of the below was statistically lower than that given to other initiatives:

- Increased focus on biosecurity in peak body communications and activities (68% rated as a top priority),
- Increased compensation for animals or plants lost because of a biosecurity issue (64% rated as a top priority) – echoing concerns regarding compensation not being a key barrier to practising biosecurity measures,
- Increased enforcement of non-compliance with biosecurity requirements (65% rated as a top priority) –reflective of fine avoidance not being key driver of practising biosecurity measures, and
- Increased biosecurity surveillance at state borders (58% rated as a top priority) – with this aligning with primary producers' belief that it is near impossible to stop pests and weeds from crossing state lines, and that when an inevitable breach of state lines occurs, they have a greater ability to prevent and respond to pests and weeds already within Australia.

Figure 27: What primary producers see as priorities for more effective management of biosecurity



Source: Q12 There are a number of potential ways that biosecurity management in NSW could be made more effective. To what extent do you think each of the following strategies should be a priority moving forward? Please indicate to what extent you see each of these being a priority moving forward using a scale of 0-10 where 0 is 'very low priority' and 10 is a 'very high priority'.
Base: Primary Producer, weighted. 2021, n=550. 2017, n=392.

Relatively little difference exists across key primary producer sub-groups in NSW, with the exception of the below:

- 'Increased understanding about biosecurity among the general population' - significantly higher prioritisation rating among those with properties of 100 to 1,000 hectares in size,
- 'Increased focus on reducing contamination or pollution of waterways' - significantly lower prioritisation rating among those with an annual turnover of greater than $500,000 and those with properties of greater than 1,000 hectares in size, and
- 'Increased biosecurity surveillance at state borders' - significantly lower prioritisation rating among those with an annual turnover of greater than $500,000.

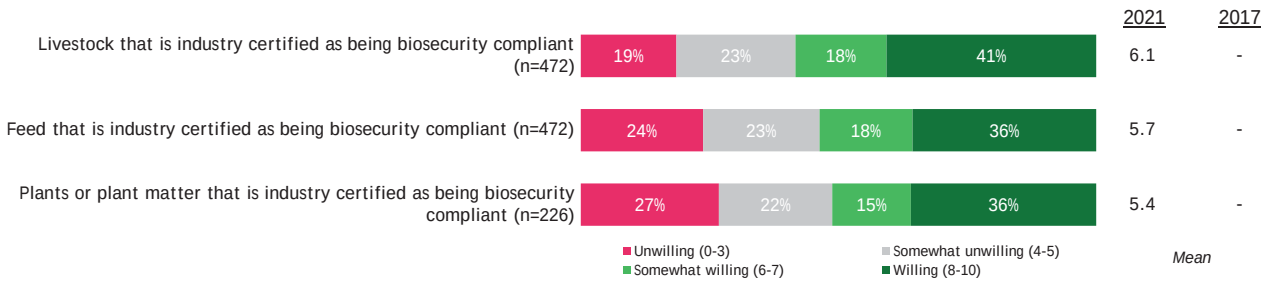
The only strategy for which a change approaching significance occurred between 2017 and 2021 was for 'Increased understanding about biosecurity among the general population' (8.2 in 2021 up from 7.8 in 2017). This is consistent with findings among consumers. The lower tendency to prioritise 'greater education of primary producers as to what best practice biosecurity behaviours are' while not significant (8.2 in 2021 down from 8.5 in 2017) reflects both the increase in primary producers' ability to manage / respond to biosecurity issues, as well as the lower proportion of primary producers stating that the reason, they did not perform best practice biosecurity behaviours was due to not knowing what best practice biosecurity behaviours were.

Willingness of primary producers to pay for biosecurity compliant goods

Although many producers are willing to pay more for biosecurity compliant goods, there is a degree of polarisation:

- 41% are willing to pay for livestock industry certified as biosecurity compliant, while 19% are unwilling,
- 36% are willing to pay for feed that is certified as biosecurity compliant, while 24% are unwilling, and
- 36% are willing to pay for plants or plant matter certified as biosecurity compliant, while 27% are unwilling.

Figure 28: Willingness of primary producers to pay for biosecurity compliant goods



Source: Q15 How willing would you be to pay for each of the following if it would help maintain the biosecurity status of NSW? Please answer for each using a scale of 0-10 where 0 is 'Very unwilling and 10 is 'Very willing'
Base: Primary Producer, weighted. 2021, n=550.

Resource preferences

Primary producers tended to prefer resources that would allow for easier identification and hence prevention of biosecurity issues rather than those aimed at increasing ability to manage such issues. This includes:

- Biosecurity alerts (80% highly interested), aligning with producer's desire to be informed of emergent risks,
- Industry certification for biosecurity compliant produce / livestock if it meant you could attract a higher price (68%), and
- Fact sheets about pest and disease types, their symptoms and prevalence (63%) – reflecting primary producer's rating their ability to identify threats as lower than their ability to respond or manage to the threat itself (once identified).

Of note however is that in the absence of industry certification for biosecurity compliant produce

enabling a primary producer to obtain higher prices, the appetite for such certification was significantly lower in comparison (68% if attached to higher prices vs. 53% when not attached to higher prices).

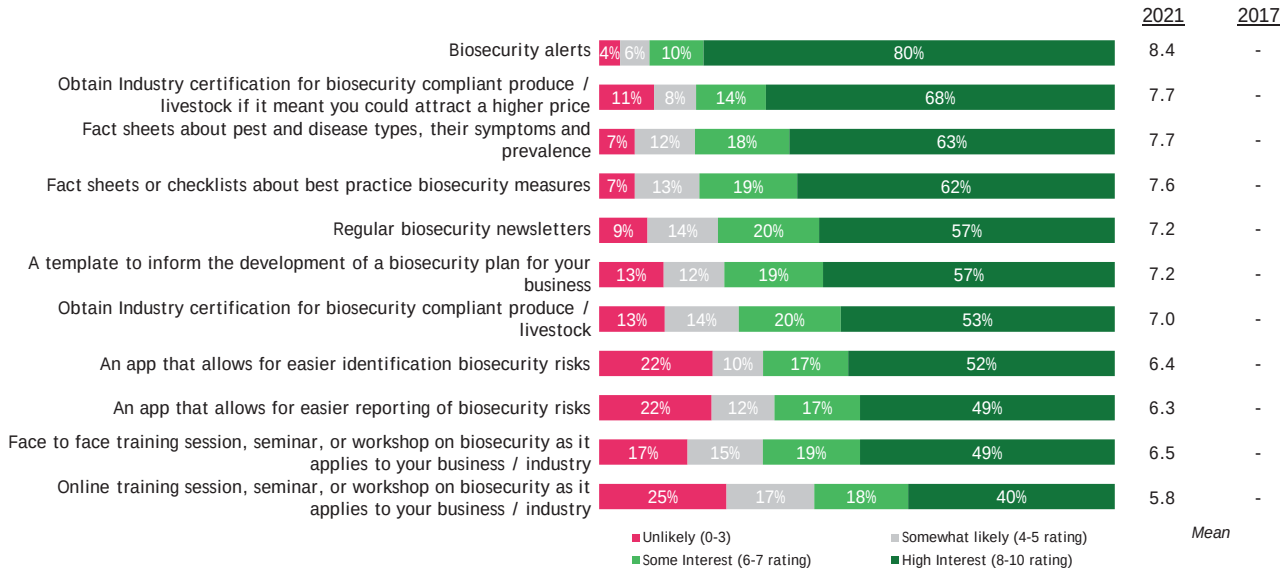
Compared to each of the above, appetite was significantly lower for resources such as training sessions (within which the appetite for face-to-face training was significantly lower than for online). This reflects a belief that producers are already highly conversant with best practice biosecurity behaviours and well equipped to manage and respond to any known biosecurity threats which it could be assumed is what the focus of such training would be:

- Online training session, seminar, or workshop on biosecurity as it applies to your business / industry (40%), and
- Face-to-face training session, seminar, or workshop on biosecurity as it applies to your business / industry (49%).

Appetite was also relatively low for apps, including:

- An app that allows for easier reporting of biosecurity risks (average rating 49%), and
- An app that allows for easier identification of biosecurity risks (52%).

Figure 29: Likelihood of primary producers to use biosecurity resources



Source: Q13 Looking to the future, which of the following would you be likely to use or do if available to you? Please answer using a scale of 0-10 where 0 is 'very unlikely' and 10 is a 'very likely.
Base: Primary Producer, weighted. 2021, n=550.

In terms of differences in likelihood to use resources across key sub-groups of primary producers in NSW, only one significant difference is apparent, with those involved in horticulture having a significantly higher likelihood to use 'Fact sheets about pest and disease types, their symptoms and prevalence'.

Geographically, primary producers in Murray region are more likely express interest in 'An app that allows for easy identification of biosecurity risks' (mean interest 8.0 compared to 6.4 overall).

Channels preferred by primary producers for provision of resources

For each of the biosecurity resources of interest to primary producers, approximately one in four producers have no preference as to who the provider of that resource is. In terms of specific providers of biosecurity resources, a high level of preference for the NSW Department of Primary Industries is apparent. This aligns with both the strong association between biosecurity and primary industry as well as the high level of responsibility attributed to the Department.

The next most popular provider of biosecurity resources was Local Land Services, corresponding to primary producer's perception of Local Land Services being the Governments 'boots on the ground' and able to deliver resources contextualised to local needs and industry profile.

Figure 30: Channels preferred by primary producers for provision of resources

%	Any	NSW DPI	LLS	Industry or Peak Body	Expert
Biosecurity alerts	23%	41%	36%	13%	11%
Obtain Industry certification for biosecurity compliant produce / livestock	22%	39%	27%	23%	12%
Fact sheets about pest and disease types, their symptoms and prevalence	22%	40%	39%	15%	12%
Fact sheets or checklists about best practice biosecurity measures	23%	41%	36%	18%	13%
Regular biosecurity newsletters	23%	36%	40%	15%	10%
A template to inform the development of a biosecurity plan for your business	22%	42%	33%	16%	7%
Face to face training session, seminar, or workshop on biosecurity as it applies to your business / industry	25%	35%	40%	15%	8%
An app that allows for easier identification biosecurity risks	24%	43%	34%	12%	8%
An app that allows for easier reporting of biosecurity risks	23%	45%	34%	14%	9%
Online training session, seminar, or workshop on biosecurity as it applies to your business / industry	26%	39%	36%	17%	10%

Source: Q14 - For each of the following resources that you have said you would be likely to use or do, please tell me who you would like to receive this from: NSW Department of Primary Industries, Local Land Services, Industry Associations or Peak Bodies, Expert advisors such as Vets, Agronomists or Horticulturalists, or someone else. For each you can say just one of these, several of these, or say you would be happy to receive from any of them.
Base: Primary Producer, weighted. 2021, n=550.

Among key NSW primary producer sub-groups some level of variation does exists as to the level of preference for providers for the different resources. More specifically:

- For fact sheets about pest and disease types, their symptoms and prevalence;
  - Livestock producers have a significantly higher preference for 'Local Land Services' (46%), followed by NSW Department of Primary Industries (34%), and a significantly lower preference for 'Industry or peak bodies (11%),
  - Horticulture producers have a significantly higher preference for NSW Department of Primary Industries (45%) followed by Industry or Peak Body' (31%),and a significantly lower preference for 'Local Land Services' (15%), and
  - Crop producers have a preference NSW Department of Primary Industries (47%) followed by Local Land Services (39%), and a significantly lower preference for 'Local Land Services' (21%).
- For fact sheets about best practice biosecurity measures;
  - Livestock producers have a significantly higher preference for 'Local Land Services' (44%), followed by NSW Department of Primary Industries (38%), and a significantly lower preference for this to come from an 'Industry or Peak Body' (15%), and

  - Horticulture producers have a significantly higher preference for NSW Department of Primary Industries (47%), 'Industry or Peak Body' (34%) and compared to livestock producers, a significantly lower preference for 'Local Land Services' (21%).
- For obtaining industry certification for biosecurity compliant produce / livestock;
  - All producer types are most likely to prefer NSW Department of Primary Industries, horticulture (50%), crop producers (38%), and livestock (36%), and
  - Horticulture producers have a significantly lower preference for 'Local Land Services' (7%) compared to livestock (32%) and crop producers (27%).
- For an app that allows for easier identification biosecurity risks;
  - Horticulture producers have a significantly lower preference for 'Local Land Services' (12%).
- For an app that allows for easier reporting of biosecurity risks;
  - Horticulture producers have a significantly lower preference for 'Local Land Services' (10%).

Qualitative case studies

Peri-urban case study

A qualitative case study focussing on peri-urban primary production was conducted in September 2021, with the purpose of this case study being to firstly to provide an understanding of biosecurity as it relates to peri-urban areas and activity, and secondly to inform the development of associated lines of questioning for inclusion within the quantitative surveys with primary producers and the general population.

The peri-urban case study was centred around the Hawkesbury basin located within the Greater Sydney region and comprised a total of 12 qualitative in-depth interviews, stratified as per the below:

Industry consultation:

Eight individual in-depth interviews with commercial peri-urban producers in the Hawkesbury basin whose primary area of focus was:

- Orchards/ fruit
- Vegetables
- Flowers
- Turf
- Horses
- Alpacas
- Pigs
- Poultry

Stakeholder consultation:

Four individual in-depth interviews with representatives of the following peak body organisations.

- Goat Industry Council
- Amateur Beekeepers Association
- Hawkesbury District Agricultural Association
- AusVeg

Outcomes of qualitative consultation

Biosecurity awareness and attitudes

Among the peri-urban primary producers and relevant stakeholders who participated within the case study the term biosecurity was one with which there was a high degree of familiarity, with all participants in the case study understanding this to refer to the actions taken to prevent or manage pest, weed and disease incursions.

"What you do to prevent disease or weeds taking over" Peri-urban producer

For stakeholders in particular the term biosecurity was seen to be part of their everyday lexicon.

"It's a core work stream, as in its actually called that" Peri-urban stakeholder

In contrast the majority of primary producers stated that biosecurity was a term that they actively used in reference to compliance related issues and paperwork, and that they understood to be the collective descriptor for preventing and managing the spread of pests, weeds, or diseases – however when considering or performing related tasks the behavioral descriptor (e.g., drenching, spraying, contacting vet if signs of sickness, separating or isolating new arrivals, etc.) was used as the point of reference, as opposed to the term biosecurity.

"If it's not something I've seen before, am straight onto the vet" Peri-urban producer

"Spraying to keep the weeds under control is never ending" Peri-urban producer

"They always spend a few weeks in a separate paddock when they get here" Peri-urban producer

When asked the extent to which biosecurity issues were an area of focus for their operations, all primary producers stated that it was a key area of focus due to the potential impact a biosecurity outbreak would have upon their business, with this seen to be on par with experiencing a catastrophic weather event and associated perceived impact largely relating to a significant downturn in financial position due to losses of:

- Livestock

  "If we lose just one that has a huge impact" Peri-urban producer

- Yield

  "They can seriously wipe out half a crop in a day" Peri-urban producer

- Market access – with compliance with biosecurity regulatory requirements now seen to be a key requirement for market access, particularly if assessing markets in other states.

"If you don't have the paperwork you can't sell, especially to WA" Peri-urban stakeholder

Mention was also made that the level of focus placed on biosecurity had increased in recent years, however this observation was made primarily in reference to usage of the term biosecurity and to increased biosecurity compliance regulation, as opposed to meaning that there had been an increased focus on, or performance of day-to-day strategies that served to prevent or respond to issues now seen to fall under biosecurity.

"We have for years but definitely a common industry catch phrase these days" Peri-urban producer

Biosecurity behaviours

As shown in the table below, at an overall level producers exhibited a wide range of biosecurity behaviours, with these able to be classified as being either proactive in that they are aimed to prevent incursions of weeds, pests or diseases (and hence aimed at preventing a biosecurity incursion), or reactive in that they relate to management of an incursion.

Biosecurity behaviours practiced by peri-urban producers

Proactive (preventative)	Reactive (management of incursion)
• Registration of livestock • Ensuring disease free status of new livestock. • Quarantining / yarding of new stock. • Unloading feed / livestock in specified area. • Regular drenching / worming of animals. • Buying plants/ feed from certified growers. • Entry signage • Limiting movements of non-farm vehicles and visitors • Routine washing of shoes / vehicles if been to potential exposure site (e.g., abattoirs, shows) • Separation of animal species - with locality of each in accordance with risk profile (on property and at shows)	• Spraying • Netting • Fly fruit trapping and surveillance • Worm counts • Sugar shake testing • Consultation with vets / horticulturists • Reporting of pests / diseases • Emergency management of biosecurity (e.g. fires, floods)

More specifically the level of focus upon, and compliance with, the above biosecurity behaviours and actions was found to vary by producer type.

Livestock producers tended to primarily focus on proactive behaviours aimed at prevention of tracked incursions onto property (via animals, people, and vehicles). Reactive behaviours were seen to be secondary (but nonetheless important) behaviours that only came in to play if there was a

failure in the preventatives strategies that had been deployed.

"They always spend a few weeks in a separate paddock when they get here" Peri-urban producer

"After the floods we lot quite a few despite moving them to higher ground… chemicals and crap got into the table water and then the pasture" Peri-urban producer

"When we show them, we (alpacas) are always put on higher ground, then the cattle so that we don't get theirs coming down hill, but the risk is still there" Peri-urban producer

"I have pair of boots in the truck that put on when at the abattoirs and then take them off when I leave" Peri-urban producer

Horticulture producers tended to primarily focus on reactive behaviours (such as spraying) which are aimed at management of pests and weeds (with airborne incursions seen to be most likely cause of incursions). Preventative behaviours (such as limiting vehicle movements and quarantining new plant matter) to minimise risk of tracked incursions are utilised, however the risk of an incursion via these means is considered to be both relatively low and able to be managed via reactive behaviours

"We do make sure that seedlings and the like are from trusted suppliers" Peri-urban producer

"People worry about the exotic diseases, but biggest problem is what is already here and not much you can do to stop it coming onto the place…flies in or carried by the wind" Peri-urban producer

"We have a pretty strict spraying rotation, and always chat to the guys as to what's new on the market" Peri-urban producer

Beekeepers themselves were not consulted as part of the case study, however the relevant peak body who was consulted stated that they actively encourage wide range of proactive behaviours that beekeepers should follow to prevent AFB (American foulbrood) and Varroa Mites. With this encouragement extending to active support through provision of resources such as purpose-built logbooks, glass slides and mailers on AFB, dissemination of the Honeybee Biosecurity Manual and Sugar Shake kits, etc. They also promote the BOLT course through Plant Health Australia

"It's vast! We actively educate members on surveillance techniques, reporting and identifying" Peri-urban stakeholder

Broader biosecurity concerns and perceived risks for peri-urban communities

When discussing the impact and relevance of biosecurity several challenges were identified that have the potential to impact all producer types, such as:

Lack of collaboration and knowledge sharing across producer types

While peak bodies are a key source of awareness and knowledge, their specific industry focus means that there is limited interaction between different types of peak bodies, and knowledge of emergent diseases in other species is not occurring in a timely manner. This in turn means that the

need for and adoption of relevant surveillance / preventative measures by potentially at-risk industries is delayed.

Both producers and stakeholders identified that this perceived gap could be addressed via NSW Department of Industries facilitating greater cross sharing of information between peak bodies.

Urban sprawl

It is felt that as the Hawkesbury basin has become increasingly urbanised a corresponding decline in commercial peri-urban activity has occurred, with this especially marked in terms of the number of livestock operations. This in turn has meant that the number of horticulturalists / large animal vets in Hawkesbury area has also declined, due to the smaller customer base that needs to be serviced.

Simultaneously it is also felt that the number of NSW Government horticulturalists and vets has declined.

As a result, the remaining peri-urban producers in the area believe that their ability to access such services has been constrained, with the ramifications of this in an emergency situation seen to be dire.

To address this issue and shortfall there is a strong desire for NSW Department of Industries to increase number of NSW Government horticulturalists and large animal vets available to service the Hawkesbury area.

Non receipt of official communications

It was observed by peri-urban producers who operate in a managerial capacity (as opposed to ownership capacity) that Government communications regarding biosecurity matters tend to be sent to the business owner or rates payer. Unfortunately, the owner or rates payer may be absentee and not always pass on or share such information with managers and employees.

To overcome this issue, it was recommended that official communications also carry a request / reminder of the need to share information with employees to ensure broader awareness and compliance with any required on the ground behaviours.

Lack of facilities

Washing of vehicles and equipment was seen to be a key means by which tracked incursions could be prevented, with this risk seen to be greatest in regard to contamination at abattoirs and stock yards. However, producers stated that the ability to comply with this behaviour was compromised due to no facilities to wash vehicles being available to them either on site or at an alternative location. This in turn meant that they were only able to wash vehicles post visiting a potential exposure once they had returned to their own property (meaning that the risk of tracked incursion to the property had only been minimised, not removed).

“But there is nowhere to wash the truck” Peri-urban producer

To address this issue there is a desire for large vehicle washing facilities to be installed either at or near high-risk sites.

Reporting of issues to relevant authorities can be difficult

Several producers reported that they found navigating government services to either obtain advice, or to report an issue, difficult due to staff in centralised call centres not taking responsibility or following through on the issue. Consequently, action was only felt to occur if the producer was able to speak directly to a local authority, but this in turn was felt be problematic due to this requiring prior knowledge of contact details. This problem was felt to be exasperated if a producer was new to either the industry or the area

Consequently, it was felt that many issues went unreported, and for those issues that were reported limited follow up and enforcement action occurred.

This lack of enforcement was seen to unfairly increase risk and affect the livelihood of those producers who are being compliant. In order to address these concerns producers advocated strongly for advice and reporting lines to be serviced locally, with direct contact details for local contact points made clearly available.

Hobby farmers seen to be least compliant

Among commercial peri-urban producers there was a widely held belief that hobby farmers tended to have low levels of compliance with best practice biosecurity behaviours thereby posing an inherent risk for disease outbreak and subsequent biosecurity incursions within the area.

A number of reasons for this low level of compliance were put forward, including:

- Lower levels of awareness as to recommended preventative behaviours, and/or lower level of appreciation as to the ramifications of non-compliance.

  "Don't think back yard Johnny realises why he shouldn't give the pet pig the left-over lasagne" Peri-urban producer

- Less likely to be peak body members and/or be registered as a rural landholder - meaning that less likely to receive communications that would make them aware of emergent issues.
- A lower impetus to manage vegetation growth and weeds effectively, as does not impact livelihood.

Additionally, a lack of perceived enforcement of compliance issues is seen to further reduce hobby farmers perceived need to adopt best practice behaviours.

Hawkesbury basin has been impacted by both floods and fires in recent years

Each of these natural disasters is felt to have increased risks of contamination, disease and hence biosecurity outbreaks. While such disasters are accepted as being inevitable, criticism made as to how such risks were responded to and managed, i.e., non logging of livestock at evacuation centres, significant delays in clearing debris from public land, etc

Additionally, that recovery grants were based on postcodes was felt to be problematic for peri-urban producers given that postcodes were used to determine designation of an area as either metropolitan or regional, however in peri-urban area often covers both. This meant that if a peri-urban producer was deemed to be in a metropolitan area their ability to access grants available for primary production was limited.

Biosecurity Resources

Government entities, industry bodies, and professional advisors were also seen to play distinct roles in relation to the provision and dissemination of biosecurity information and resources.

The **NSW Department of Primary Industries** was seen to primarily play a regulatory and/or oversight role, holding responsibility for the development, implementation, and enforcement of legislation (with awareness had among some as to the introduction of biosecurity legislation in 2017) and other regulations. Any training or enforcement activity undertaken by NSW DPI was felt to be largely focussed on compliance with mandatory industry schemes, as opposed to provide up-skilling as to best practice on-the- ground behaviours. No recall of alerts being received from NSW DPI as to emergent risks

Local Land Services was seen to be the local representatives of the NSW government, with the role they played viewed as being highly twofold in nature encompassing both:

- Skill based training (typically covering several industries as opposed to the more industry specific training provided by peak bodies, but framed in terms of local area)
- Surveillance and enforcement of biosecurity mandated behaviours – especially as relates to vegetation and weed control.

"They are the boots on the ground for the government" Peri-urban producer

However, mention was made that the amount of proactive consultation Local Land Services was undertaking with producers in the Hawkesbury basin had declined in recent years (with this apparent even prior to Covid), with this decline viewed unfavourably and assumed to be related to resourcing issues.

Industry or peak body organisations were seen to be a key source of targeted and industry specific information and resources through the provision of:

- Biosecurity fact sheets
- Biosecurity updates in newsletters
- Industry specific resources (e.g., logbooks, testing kits)

With these organisations also seen to actively:

- Issuing alerts of emergent risks
- Organising and facilitating conferences and training sessions to inform and upskill
- Lobbying on behalf of members on biosecurity issues

Vets and Horticulturists were seen to be the trusted advisors that producers turn to for business specific advice as to what preventive strategies that should be put in place to protect livestock and vegetation, as well as the first point of contact when a biosecurity incursion is detected.

Mention was also made by both producers and peak bodies that opportunity also exists for **animal and plant retailers** to play a pivotal role in the dissemination of information specific to their customers.

"We think retailers also have a role in educating beekeepers and the importance of registering" Peri-urban stakeholder

Aquatic case study

A qualitative case study focussing upon aquatic primary production was conducted in September 2021, with the purpose of this case study being to firstly to provide an understanding of biosecurity as it relates to aquatic primary production, and secondly to inform the development of associated lines of questioning for inclusion within the quantitative surveys with primary producers and the general population.

The aquatic case study comprised a total of 13 qualitative in-depth interviews, stratified as per the below:

Industry consultation:

- Seven individual in-depth interviews with commercial aquatic producers in NSW whose primary area of focus was:
- Prawn / squid
- Fishing
- Aquaculture / hatchery (2 interviews)
- Abalone/ Lobster
- Crab
- Oyster

Stakeholder consultation:

Six individual in-depth interviews with representatives of the following peak body organisations.

- Commercial Fishing NSW Advisory Council
- Indigenous Fishing representative
- Professional Fishers Association
- NSW DPI Lobster Industry Working Group
- Fisherman's Co-operatives (2 interviews)

A subsequent quantitative survey was intended to be conducted with n=50 aquatic producers, however this component did not proceed, with the rationale for this non-inclusion discussed within the appendices section.

Qualitative consultation with aquatic primary producers and stakeholders

Biosecurity awareness and attitudes

Awareness and understanding of the term biosecurity were found to vary by type of aquatic producer, with this found to be greater among aquaculture businesses and commercial divers spoken to, while those working in wild catch fishing businesses are less aware of the term biosecurity. Discussion of the topic tended to focus on 'cleanliness' and to a lesser degree contamination, rather than biosecurity specifically.

Those who are more informed about biosecurity defined biosecurity as maintaining a disease-free state within their industry and saw themselves as having a high level of responsibility in both identifying and preventing biosecurity hazards.

Among those who have a more limited understanding of biosecurity, biosecurity is perceived as being about disease coming into the environment from which they make their living, rather than being something have any control over. They are more likely to perceive 'biosecurity' to be the realm of fisheries inspectors, on the wharf, rather than anything they might be responsible for.

"It's stopping bad stuff coming into our waters or into our country."

"Because I'm fishing wild caught product, I don't want something to come in here that could potentially wipe out my livelihood."

"To be honest, it's not something I ever thought about before… saltwater kills everything here, that's the way we look at it, yeah."

Among the aquatic producers spoken to:

Wild catch fishing businesses were found to be the group least likely to be aware of the term biosecurity or have a good understanding of the breadth of issues biosecurity encompasses. This lack of awareness and understanding of the term biosecurity and what it encompasses was apparent not only among smaller estuary fishing businesses and sole operators, but also among the fishing co-ops set up by these fisheries.

While aware their livelihood is dependent on the environment they fish, there is also a sense they lack any direct control, thus encouraging a somewhat fatalistic attitude.

Although the term biosecurity was itself not necessarily a familiar one, when probed, these fishing businesses did have an awareness of issues that constitute biosecurity hazards in their own environment and do take actions when they are observed (for example removing items such as whitegoods from waterways, reporting fuel or oil leaks). However, they were more likely to identify risks as coming from elsewhere/overseas/other parts of the country (i.e., imported bait, container ship bilge water) rather than anything they do (or don't do) being top of mind.

Commercial divers included in the consultation were found to be highly aware of the risks of biosecurity hazards on the environments in which they operate and saw their role in relation to biosecurity as being focussed on monitoring and reporting any issues (with this based on them seeing themselves as being ideally suited to observe issues and changes in the natural marine environment.

"Local rules and regulations from NSW DPI, we have to report any weird things seen or any threatened species, any interaction like that."

Like wild caught fisheries, commercial divers acknowledge their high level of dependence on the natural environment.

Aquaculture businesses / farmed fisheries, such as businesses involved in fish and oyster farming, are by necessity well informed about biosecurity risks and the management of those risks, especially given the recent QX outbreak.

These businesses reported being subject to high levels of regulation and were well aware of their own responsibility to both control risks associated with their outputs on other parts of the supply chain in addition to risk from incursions onto their properties. They may or may not have a written biosecurity plan but were likely to see the value in one even if they don't.

"Biosecurity is the most important issue for the business, you make plans but then need to reinvent the wheel as issues occur or change."

Biosecurity behaviours

The level of focus upon, and compliance with, best practice biosecurity behaviours and actions was found to vary by aquatic producer type.

Aquaculture businesses and farmed fisheries

Aquaculture and farmed fisheries are aware of and practice a wide range of preventative measures in relation to biosecurity:

- Water quality testing and monitoring
- Visual checking and testing for illness and disease
- Quarantining of new stock
- Testing of water from their water catchment
- Training all staff to ensure protocols are followed
- Ensuring anybody onsite follows protocols to minimise pathogens from entering facility (includes self, customers, people from other similar businesses, inspectors etc)
- Working with neighbouring properties to proactively manage potential impacts of other farming activities (i.e., smokestacks to monitor wind direction when neighbours are spraying)
- Use of other management tools and processes such as keeping dogs to deter birds
- Understanding and managing the impact of seasonal changes and other conditions such as drought
- For oysters – planning and logging movement of all oysters
- Developing innovative ways of working to reduce transmission of contaminants – e.g. clip farm system of oyster farming whereby baskets remain in the water and do not move with oysters from estuary to estuary, also working with other farmers to reduce the movement of stock where possible.

Wild Catch Fisheries / Commercial Divers

Among wild catch fisheries the following were considered to be best practice biosecurity behaviours:

- Use of local bait to minimise the risk of introducing disease
- Cleaning all equipment and fittings before moving areas
- Use of tracking devices on vessels that move between waterways (i.e., Succorfish)
- Following safe food guidelines which cover how to look after and store product safely
- AMSA schedules for vessel maintenance based on risk level

In addition, wild catch fisheries were found to be concerned with the environment from which they make their livelihood and will report any issues they observe such as:

- Impacts of recreational fishing activities on their environment
- Signs of contamination in their local area given they know what is 'normal'

Reporting channels among these producers was often informal, for example a well-known, well-respected fisherman may be the 'go-to' person for those who don't feel confident directly contacting authorities about a potential issue.

Perceptions as to current risks

A number of risks were identified to be current areas of concern among aquatic producers, including:

White Spot Disease (prawns): Producers felt that the presence of this disease in QLD reflects a failure of the Australian government to have regulated sufficiently to protect Australia by allowing imported prawns to be used as bait

AVG (Abalone Viral Ganglioneuritis): While only currently found in Central and Western Victoria and in Tasmania, AVG is seen to be a risk due to abalone from these areas able to enter NSW via ACT. The potential impact of which would devastate the NSW Abalone industry and the ecosystem it maintains.

QX (Queensland Unknown) Oyster Disease: The emergence of this disease in Port Stephens is felt to be significantly affecting 'Highway' oyster farmers.

POMS Disease (Pacific Oyster Mortality Syndrome): the incursion of this disease into the the Georges and Hawkesbury River system has resulted in a raft of restrictions on movement of oysters and crayfish.

> *"We warned the government for a decade it would happen, and they said it was minimal risk - we said no it isn't, you have to manage it, and if you don't it will cost a huge amount of money. And it has. They take a minimum acceptable approach."*

Broader biosecurity concerns and perceived risks for aquatic industry

When discussing the impact and relevance of biosecurity a number of other challenges were identified as impacting on commercial fisheries and the marine environment more broadly.

Water contamination and pollution

Water Contamination was seen to be a major issue for aquaculture businesses that irrigate water into their ponds

- Bushfires are one of the recent factors impacting on river water quality which in turn impacts aquaculture businesses filling their ponds from these rivers.
- Drought can also lead to issues in waterways due to buildup of toxins, though more recently this is less of an issue following floods which have had a positive impact.
- Ballast Water from cargo ships carrying in foreign species, diseased species and aquatic plants (e.g., Codium fragile an invasive species from Japan).
- The Marine Estate Management Authority appears to be currently focusing on addressing the water quality in NSW.

Lack of regulation and lack of knowledge among recreational fishers

While licenses are required for recreational fishing, they can be more short term (e.g., weekend licenses) and do not require a base level of knowledge to obtain, with this creating risks due to

- Recreational fishermen tending to be more mobile and due to their ability to be fishing in different states one weekend to the next may be unknowingly spreading diseases or plants on their equipment.
- They are less informed about invasive species or issues to look out for at popular fishing spots so less likely to be early reporters of an issue.

Purchasing seafood sold as food and using it for bait also occurs, when individuals are not aware the seafood could be carrying diseases

"They think, if it's good enough to eat, it must be good enough to use as bait."

Lack of knowledge among other users of the marine environment:

Lack of awareness and understanding of the marine environment among the public was also seen to lead to the public inadvertently causing harm by introducing non-native livestock into the ecosystem. Cited examples of this included involving monks in Sydney releasing live fish into the water at Bondi to 'free them' and a customer purchasing imported mussels from a co-op and putting them back into the water.

Lack of adequate restrictions on importation of bait

Some producers blame the government for the introduction of White Spot which they believe was inevitable due to the failure to place restrictions on use of imported bait

Indigenous engagement

Much of the feedback from indigenous fishing representatives focused on the lack of inclusion into the interests of aboriginal fishing, despite the formal Indigenous Fishing Advisory Council

There is strong identification by Indigenous Australians of the impact and outcomes of environmental damage as opposed to using the language of 'biosecurity hazards' - evidenced by polluted waterways, management of water supply/flow (water rights), sewerage outflows (affects pipis supply), oyster disease, etc

Introduction of alien or hybrid species

Felt to be a high risk of this occurring through the introduction of ranched / farmed abalone in NSW. While this is considered to be reasonable there is concern that more needs to be done to address potential biosecurity impacts on wild abalone

Balancing commercial (trade) expectations with biosecurity risks

Where some states have particular diseases such as AVG, managing movement of product around the country can become challenging

Inability to trace fittings (bins, crates, dividers)

Discussed as an issue in relation to abalone but likely to be similar for other products

"Once it leaves the boat and goes onto a truck it can travel through multiple jurisdictions and have contact with other species of abalone, other ecosystems and other product."

Lack of regulation of the aquarium industry

The aquarium industry overall is self-regulated, or in other words unregulated, and poses a risk through the introduction of species which could make their way into the waterways and carry disease such as goldfish ulcer disease.

Increased importation of ornamental fish particularly during COVID through the direct importation of fish through the internet without any form of regulation.

"You see a shiny fish online, use PayPal, and ship it to Australia, no one checks - but we know for sure they put them in their outside pond which is washed downstream in a flood, or they move and release it in the waterways because that's more 'humane'."

"The Aquarium industry is devoid of any biosecurity rules. Rules are self-managed by importers."

"When issues are raised, NSW says 'it's the feds that do that' but they could step in and do their own inspections, but they don't. NSW DPI has the ability to step in when there is a notifiable virus in NSW"

"It's still legal to buy Koi Carp and put it in your dam or pond and when the dam overflows it can go into the river."

Biosecurity Resources

The NSW Department of Primary Industries was seen to primarily play a regulatory and/or oversight role but there was a feeling it could increase positive engagement and education.

Training and enforcement activity is currently felt to be focussed on non-compliance and calling out infringements rather than providing more positive advice on what people can do.

An example of a positive social media post by NSW DPI was two fish tagged in Tasmania being caught in the same area in NSW in one day – noted as interesting and engaging.

Provision of information about issues so they are not forgotten would be beneficial – for example information about white spot was issued when the problem arose but should be reissued so it isn't forgotten.

Local Land Services were seen as having a role to play in protecting rivers, lakes and other waterways, particularly those that run into the ocean, by ensuring cattle and other livestock and weeds are separated from the marine environment.

Sea Rangers could potentially take on the Local Land Services role expanding it into the water out to the four-meter marine contour where pollutants such as plastics tend to accumulate, and stormwater runoff is an issue.

Industry and peak body associations were found to play an important role, especially in regard to training as there is an appetite for industry led training related to biosecurity issues relevant to a specific industry e.g., Abalone Association of NSW worked with Oceanwatch through a Farm Smart Grant to develop a Cert II training module to improve the abalone industry understanding and knowledge of operating procedures and reporting of issues observed.

Indigenous case study

A qualitative case study focussing upon aquatic primary production was conducted in November 2021, with the purpose of this case study being to explore any emergent differences in response between the indigenous and non-indigenous cohorts in the quantitative survey.

The indigenous case study comprised of 1 focus group and 10 qualitative in-depth interviews, stratified as per the below:

Community consultation:

One focus group with Indigenous residents of NSW.

Stakeholder consultation:

Eight individual in-depth interviews with representatives of the Local Aboriginal Land Councils (LALCs) including:

- Albury District LALC
- Bahtabah LALC
- Anaiwan LALC
- Balranald LALC
- Bunyah LALC
- Coffs Harbour LALC
- Coonamble LALC
- Tamworth LALC

Two individual in-depth interviews with Indigenous farmers.

Qualitative consultation with Indigenous residents and stakeholders

Biosecurity awareness and attitudes

Indigenous **primary producers** who participated in the case study were very familiar with the term biosecurity but also had a view of biosecurity as being about things that they do as a matter of course, but without necessarily calling it biosecurity.

"Control of biological agents within the business – everything from chemicals to pests, etc." Primary producer

"Biosecurity is about a bunch of stuff that we've done all our lives without calling it biosecurity." Primary producer

LALCs understanding of biosecurity varied significantly with some residents and individuals within LALCs having a good working understanding of biosecurity and others being quite unfamiliar with the term. LALCs tended to talk about looking after country rather than biosecurity.

"Doesn't mean an awful lot to me at this stage." LALC CEO

"The security not only of the environment, but the animals and ecology of the place as well from either industry or enterprise or from interest introduction or foreign species or anything to do which in some form or measure degrades or harms the local ecology and, and general balance of, of the environment." LALC CEO

"Not a clue. Not really – I know all about weeds and pests but as a land council we are not involved in that side of things at all." LALC CEO

Indigenous **residents** were similar to regional and metro residents in terms of the types of things they discussed when providing a definition of biosecurity, in that the term evoked descriptions which sat somewhat outside their area of personal influence or responsibility.

"I thought it was just like stopping contaminants getting into the country, in terms of checking produce coming through." Indigenous resident

"It's a government way of handling biology…" Indigenous resident

However, when a definition was provided and used as a prompt to further discussion, the indigenous residents participating in the research actually had a good understanding of the biosecurity issues facing their local area and NSW more broadly, they just did not tend to identify or label these as biosecurity issues.

There was a general consensus among both residents and LALCs that interest in caring for the land and the need to care for the land has increased in recent years. This was attributed to a number of factors including people having more time during COVID to stop and think about these issues and a greater desire to learn about their own culture. Residents however felt strongly that learning about the land is important, but it should be equally important for all Australians, and not their sole responsibility. Care for the land and environment was also seen as a way to bring together all Australians, rather than being something that should be attributed to or the domain of Indigenous people.

"I've grown up being taught by my family that I am responsible for the land, and I accept and want to take on that responsibility, but care of the entire land should not be allocated to First Nations people." Indigenous resident

"Connection to country is part of First Nations but why can't we encourage that with everybody." Indigenous resident

Biosecurity behaviours

Indigenous producers tended to express similar views as non-indigenous primary producers when discussing biosecurity behaviours, with biosecurity behaviours centred around surveillance and management (e.g., of weeds and disease) on their own land. As such, Indigenous primary producers described their area of responsibility as being their own land.

For LALCs, care for the land was a significant focus of the activities of the LALCs. Activities and programs undertaken included:

- Ranger programs which are responsible for cultural burns and weed control,
- Training community members in cultural burning practices,
- Working with local farmers to assist with weed control through cultural burns (of increasing interest to farmers since being subjected to restrictions on back burning which are not applied to cultural burns),
- Educating the broader community about Indigenous approaches to looking after Country (keeping things in balance),
- Educating local Indigenous community members as to cultural land management practices,
- Working with other organisations such as National Parks to agree on standard methods of managing particular issues (e.g., regeneration programs, possum boxes and control of introduced species such as hares),
- Outreach programs (e.g., to schools) to pass on knowledge and encourage cultural pride among young people, and
- Identifying and protecting culturally significant sites, and
- Cleaning up and/or reporting dumping of rubbish on land managed by the LALC.

"Local council go around and spray weeds - but they don't educate, and they are not getting out and looking - it's a quick fix and when it rains again, they will grow again." LALC CEO

Indigenous residents tended to be concerned with similar issues to others living in similar areas – for example those living in peri urban and regional growth areas were particularly concerned with tree changers moving from metro areas and lack of knowledge and concern for the environment.

Broader biosecurity concerns and perceived risks

Key challenges identified as having the potential to impact land managed by the LALC and the broader local area include:

- Feral animals and introduced species (e.g., goats, pigs, foxes)
- Weeds (i.e., thistle, rape, other weeds arriving on drought hay bales from Victoria),
- Diseases outbreaks such as swine flu and foot and mouth, and
- Other events such as locust and mouse plagues.

Biosecurity Resources

Among LALCs and Indigenous primary producers, NSW DPI, through Local Land Services, local councils and to a lesser degree the SES were seen as key players in relation to the dissemination of biosecurity information and resources. The Federal government is seen as responsible for protecting international borders from incursions.

LALCs would also like to see more local signage advising of local issues - with QR codes for those wanting more information (lessening the impact on the environment compared to printed brochures).

"I think it's really important that we could get the word out to our mob – our mob are getting land these days and it's appropriate to be talking to them - passing on to LLC would be helpful." LALC CEO

"I have a close association with our northern tablelands Local Land Services – and any of that sort of stuff, I am happy to learn and get more information as an individual." LALC CEO

"There's a couple of weeds that I need to get identified I haven't seen before. I generally take a photo of them and take it to the weed officer at Local Land Services." LALC CEO

Among Indigenous primary producers, agronomists, rural producers' co-ops, and rural supply stores, were also considered resources for on-property and local area specific advice. However, there is a sense that there is room for better communication between residents and local councils.

"Nobody comes and talks about it so you wouldn't know what was out there. If you don't know they don't want to tell you. Unless we go somewhere where there is a seminar on it – we don't. It would be the shire if anyone who should be doing this sort of stuff – but you never hear about it – they should be telling the ratepayers – they are just not worried – instead they are ad hoc fixing."

Among Indigenous residents, schools are considered the key to increasing awareness and knowledge of biosecurity issues and care for the environment. There was also an agreement among participants that schools have come a long way and are playing an important role in recent years – compared to previous generations. Public events such as Clean up Australia Day are also considered opportunities that could be further leveraged to raise the profile and importance of caring for the environment.

Metro case study

A qualitative case study focussing upon metro residents and stakeholders was conducted in November 2021, with the purpose of this case study being to allow for more detailed exploration to be made as to the drivers of any emergent changes since the 2017 research.

The metro case study comprised of 1 focus group and 18 qualitative in-depth interviews, stratified as per the below:

Community consultation:

One focus group with metropolitan based residents of NSW.

Businesses, community groups and stakeholder consultation:

Eighteen individual in-depth interviews with stakeholders including:

- Integrity Systems Company - Australian Meat and Livestock Association
- Green Life Industry Australia
- NSW Chamber of Fresh Produce (Freshmark)
- Stock Feed Manufacturers Council of Australia
- Caravan and Camping Industry Association NSW
- Royal Agricultural Society (Sydney Royal Easter Show)
- WIRES
- World Wide Fund for Nature Australia
- Taronga Conservation Society Australia
- Veterinary Practitioners Board
- University of Sydney
- Grains Research and Development Corporation
- Woolworths
- Transgrid
- Bankstown Garden Club
- Ku Ring Gai Orchid Society Inc
- Bidwill Community Garden
- Blacktown City Garden Club

Qualitative consultation with metro residents and stakeholders

Given the broad variety of metro stakeholders surveyed the metro case study will be presented as a number of smaller case studies as follows:

- Metro residents
- Primary producer industry associations and R&D organisations
- Animal welfare organisations
- Other stakeholders

Metro residents

Biosecurity awareness and attitudes

NSW metro residents participating in this case study had a wide and varied level of understanding of biosecurity ranging from those mostly drawing on information from border security / customs reality TV programs, something we also saw in 2017, to those very informed about specific areas of interest such as bee keeping. Whether more informed or having limited understanding, residents tended to at least recognise the term biosecurity and have some understanding of what it encompasses. This represents a contrast to 2017, when residents had more limited understanding of the term biosecurity and commonly confused biosecurity with other terms such as biodiversity and /or biohazards. The term biosecurity has established itself in the vernacular of NSW residents, both metro and as described below regional. Overall, there is a sense among residents that:

- Penalties for biosecurity breeches are not sufficiently steep to deter people from doing the wrong thing,
- Australia's international customs are underfunded / under resourced,
- State border restrictions appear to have been relaxed or lapsed over recent years (e.g. taking fruit across border from QLD to NSW), and
- The greatest risks are from overseas (e.g., ballast water in/biofouling on cargo ships, insects caught up in packaging of goods ordered online).

The perception that the greatest biosecurity risks are from overseas is consistent with findings in 2017 and consistent with residents' knowledge of biosecurity coming from customs and border security reality television programs.

Biosecurity behaviours

While Customs is considered to have the greatest responsibility for biosecurity, there is a sense that 'everybody' is responsible for doing the right thing. Specific behaviours mentioned include:

- correctly declaring items being bought into the country at customs,
- not bringing fruit into NSW,
- not taking fruit into grape growing areas,
- not flushing goldfish or allowing non-native reptiles to go free,
- keeping pets such as rabbits, cats and dogs contained,
- staying out of areas in public places (such as national parks, marine areas) that have been blocked off, and
- not abandoning a beehive.

Current risks

There is a sense that while COVID has to some degree made people more conscious of hygiene, it has not really had the effect of bringing the issue of biosecurity to the fore because it is seen as an outlier and therefore separate to biosecurity. Nevertheless, in 2017, residents did express a fear that a major public health outbreak could come about as a result of a biosecurity breach, although at the time this was seen as unlikely.

A current risk relating to the pandemic was identified as the record number of parcels coming into the country via Australia Post as posing an increased biosecurity risk through the increase in opportunity for pests or disease to be contained within the packaging, however the resident mentioning this did not think it was something many other /people would see as a risk.

Other current risks identified include:

- Containers falling off container ships, and
- Increased chance of contamination due to higher numbers of parcels coming into the country.

The enduring assumption that the greatest risk to biosecurity comes from outside Australia's borders means that even though some residents are aware of a range of protective behaviours, similar to 2017, there is no strong impetus to take greater responsibility for biosecurity. In 2017, residents were describes as overall being in a state of pre-contemplation, that is generally lacking awareness of both the issue of biosecurity and the behaviours to be performed. In 2021, we would describe residents as moving towards a state of contemplation where understanding of the term biosecurity is greater, although there remains work to be done to increase perceived relevance to residents in their daily lives.

Biosecurity Resources

Residents tended to identify customs as the key body responsible for communicating biosecurity risks to Australia from overseas and felt the following actions should be taken to reduce risks:

- Targeting travellers into Australia and ensuring all are clear on the rules (important to provide materials in other languages),
- Alerting people to the risk of disease or pests being in packages delivered from overseas, and
- Developing materials to introduce biosecurity concepts to children.

For local risks, such as a pest coming through a local area, local council was felt to be best placed and responsible for communicating the risk and how to mitigate it.

In line with nudge theory, residents felt strongly that it is not enough to simply communicate the risks or rules to people, but people must be given the tools to do the right thing. For example, it is considered appropriate to put up signs at state border crossings or entrances to wine regions, advising fruit cannot be bought into the area, but just putting up signs is not good enough and not helpful when somebody comes across the sign unexpectedly and has fruit in their vehicle. There also needs to be a bin to place fruit into.

Interestingly, a couple of residents described shared responsibility for biosecurity as dobbing somebody in if you see them doing the wrong thing and felt it was important for the punishment to be significant enough that it acts as a deterrent. The majority of others however highlighted the importance of education and stressed accessibility of information as being key. For these people effective channels include:

- Facebook groups run by organisations such as RSPCA or the Dept of Agriculture, where people can easily access reliable information about a potential biosecurity risk and ask questions if they are unsure, and
- Local council run events such as free lectures and morning tea sessions to come along and learn about local issues
- Newsletters and free local papers – particularly for information relevant to the immediate local area – for example a respondent's local council started sending out a local newsletter through which she found out the council were treating the local lagoon for Ross River mosquitos,
- Information within rates notices, and
- Signs (which include visuals such as photos) to help people identify pests (animals or plants) in a particular area and contact details to make it easy to report.

What these metro residents had in common was a strong desire for a trickle up, rather than a top-down approach whereby action starts at a local level and momentum builds.

"It doesn't have to be tiring or exhausting or expensive, if these things are integrated into the components of our life, then it's more likely to stick." NSW metro resident

Primary producer industry associations and R&D organisations

Biosecurity awareness and attitudes

Among organisations formed to solely to support primary producers and primary industry, biosecurity is a critical issue and one that drives much of these organisations' activities as they strive to be at the forefront of initiatives to reduce biosecurity risks and protect their members and industries. These organisations not only champion advances in biosecurity best practice, but also educate their members as to the value – at an organisation and industry level, of investing in biosecurity systems and processes.

"There is a lot of variance in my membership (about what they believe about biosecurity) - we have some who think it's a government run and led system - and others believe they have a role to play. I think they are starting to understand that bridges the gap as well." Primary producer industry association

"Biosecurity is a shared responsibility that everybody needs to be accountable for - we can educate them to understand their obligations and ensure there is a connection with fresh produce." Primary producer industry association

Biosecurity behaviours

Significant investment in biosecurity is made by Primary producer industry associations. Key areas of current investment in both meat and livestock and fresh produce include the development and expansion of testing and tracking systems to ensure food safety and security through the growing, manufacturing, supply and distribution chain. Primary producer industry associations work closely with their members to educate them as to both the importance of biosecurity and how to comply with relevant industry standards, and laws. For example, the Australian Meat and Livestock Association have been very focussed on increasing awareness of legislative changes introduced in 2017 which introduced biosecurity and animal welfare to food safety and the requirement to have a formal biosecurity program.

Current risks

Current biosecurity issues identified in fresh produce include:

- Panama Disease (affecting bananas from Asia),
- Water contamination from cyclones,
- Pests (such as fruit fly) that impact crops,
- Cane toads, which are prolific in Queensland and also present in NSW,
- Moths impacting flowers, fruit and vegetables, and herbs,
- Transportation sector not understanding the importance of storing produce at the correct temperature, and
- Lack of traceability.

"Sydney Markets Limited don't know what comes into the market." Primary producer industry association

Current known biosecurity issues identified in meat and livestock include:

- African Swine Fever,
- Russian Aphid,
- Lumpy Skin Disease,
- Fall Army Worm, and
- Opportunities for improvement in traceability of livestock and products of.

"We're always at risk but we don't know what the next risk will be. Some sectors have never experienced a major event so it's harder for them to understand the possibilities." Primary producer industry association

Broader biosecurity concerns and perceived risks

As a major exporter of meat and livestock, Australia's clean and green image is an important part of our offer, and biosecurity is vital to maintaining that image and protecting those export markets.

"Industry, government, and citizens all have a role to play – it can be any one group's responsibility... it's about protecting livelihoods and being as clean and green as possible." Primary producer industry association

Biosecurity Resources

Tools to support primary producers in the meat and livestock industry include:

- A questionnaire for producers to complete every three years to be re-accredited, and
- A self-assessment process to support producers to demonstrate the biosecurity compliance activities that they are doing on-farm (yet to be introduced).

Tools to support primary producers in fresh produce include:

- A mapping program that shows where crops are netted.

To increase understanding among the general population:

- Communications programs like NSW DPI's 'Bio Security Warrior" aimed at university and secondary school students.

There is a view that NSW DPI are heavily weighted towards meat as a higher value product, and that NSW DPI could do more to represent growers by communicating more about what they do and how they represent the growing industry.

Animal welfare organisations

Biosecurity awareness and attitudes

Animal welfare organisations tended to have a good understanding of biosecurity issues, clear positions on where responsibility for prevention, surveillance, management, and education lies and what their own role is. In terms of prevention / international threats coming into the country, the federal government (AQIS) is seen as responsible, while the state government (NSW DPI) is considered responsible for management of threats once here. There is also a view that management should come from a joint state and commonwealth response and mostly the commonwealth, but a coordinated approach because it's an Australia wide problem i.e. you can't manage foxes in NSW and SA separately as states. Primary producers and landowners are also seen as responsible management of biosecurity risks. And it is considered that landowners and farmers could do more to assist if better reporting systems were set up.

Education is considered to be the responsibility of AQIS for people coming into the country, and NSW DPI for the industry, professionals, and the NSW public.

There was a suggestion that the industries that are being impacted by animal diseases, and weeds and pests have the means and self-interest to take responsibility for these issues and at least part fund prevention activities. In contrast, the issue of feral animals destroying other wildlife and thereby their habitats have a more broad-brush and generic flow on to the welfare of the Australian landscape therefore increasing government's responsibility.

While the concept of shared responsibility, on the face of it makes sense, there is also a degree of cynicism that it is language which has or can be used almost as way to devolve responsibility from some groups to others even if said with good intentions behind it.

"I think if it's to be used - then its everyone. I suppose that's the problem if everyone's responsible then no one is…"

"When someone is talking to us its mostly around the obligations of vets and their position in it -and that is mainly around notifiable diseases and I suppose a request for information from DPI in relation to bio security issues/news/emails."

Biosecurity behaviours

Animal welfare organisations undertake a range of behaviours in relation to biosecurity including:

- Education from the perspective of being a disseminator or information to industry,
- Reporting cares of invasive species being kept as pets to the RSPCA,
- Ensuring invasive species rescued by well-meaning residents are taken to a vet and euthanised,
- Surveillance and reporting of notifiable diseases, although there is a sense that this is something that vets could play a greater role in.

"I don't know that the industry sees itself as being particularly responsible. Thinking back to my time - I didn't see it too much as a role - in private practice. There are government veterinarians as well - and it's a big part of their role. Thinking about it now - I would say we are equally as responsible."

Current risks

Risks highlighted as being currently high profile and/or having serious consequences include:

- Hendra virus,
- Invasive species such as corn snakes, slider turtles,
- Deer, and
- The multi millions of feral foxes and cats across Australia.

Broader biosecurity concerns and perceived risks

There is a need to identify where the greatest opportunity for restoration is, in particular in areas that have had biosecurity management whether that be by government or private owners. But to do this requires information sharing and it would seem that this collaboration is not at a mature stage. Frustratingly, there is no perceived change in the last five years – other than a growing understanding of the role data can and should be playing (if better managed). The strongest issue seems to be one of lack of collaboration. An example given is foxes and deer which appear to be issues that nobody wants to take responsibility for.

"I think DPI should be sharing with landscape managers - people working in bush management to what exactly their role is - and why they have the certain roles they do. There are certain roles that they shouldn't be doing but they are - why are they managing wildlife registrations. I feel like they have been set up so long ago - and no one has really done a proper stakeholder mapping."

"I think CSIRO and DPI should be working hand in hand on some of these long-term gene drive technology and DPI should be funding CSIRO along with all other state government land management agencies - and people should know about it - we should know the work is happening - shouldn't be secret little projects going on."

Biosecurity Resources

There is seen to be a gap in education resources, particularly for particular segments of the population including:

- People new to Australia who may be less informed about which species are native to Australia,
- People new to Australia who may require resources to be translated in their native language,
- People new to regional areas, from metro areas, and
- Older people who may not be as informed about issues with non-native species being allowed to infiltrate the environment.

Other metro stakeholders

Biosecurity awareness and attitudes

In the main, awareness of the term biosecurity and issues was high among the remaining metro stakeholders consulted for this case study, this is in line with the many of these participants being employed in roles with the potential to by significantly impacted by biosecurity issues. Others, such as a hobbyist community gardener, were very unfamiliar with the term biosecurity and unwilling to hazard a guess as to a definition. However, upon probing, was in fact extremely strict in terms of following rules or protocols to protect the community garden with which she was associated, to keep the garden free of invasive seeds and weeds.

Among metro stakeholders for whom biosecurity is a deeply entrenched and ever-present issue, there is an awareness that they are unique or unusual among their metro counterparts for whom, biosecurity generally conjures images of border control programs. There is also a sense that metro people are concerned about biosecurity issues – when they are aware of them, but the information of risks needs to be more visible in the community.

"There have been articles in the Sydney Morning Herald - but only if you are interested in those sections - about bio security and Badgery's Creek - always in the agricultural section - I think all the LGA'S in that area are very interested in it now - I think the airport has been a catalyst - about bringing so much stuff into the country." Metro stakeholder.

"I don't know who the Minister is - they need to be more visible - I have to say in doing that - the people in NSW - 70% of them live on the east coast - but their hearts do go out to the farmers in bad weather - there needs to be more spokespeople about what it would mean to farmers and Australia generally - need more communication." Metro stakeholder.

"It's similar to the Road safety communications - I remember when seat belts were introduced, I remember when drink driving was introduced- but now a societal norm." Metro stakeholder

Regional case study

A qualitative case study was conducted in November 2021, with the purpose of this case study being to allow for more detailed exploration to be made as to the drivers of any emergent changes in regional areas since the 2017 research. The regional case study was conducted with residents, primary producers and a small number of other stakeholders in Tamworth. Tamworth was selected to be consistent with the 2017 research.

The regional case study comprised a total of 2 focus groups and 3 qualitative in-depth interviews, stratified as per the below:

Regional stakeholders, primary producers, and resident consultation:

One focus group with residents of Tamworth, one focus group with primary producers in Tamworth.

Three individual in-depth interviews with agri-businesses and local community group representatives / stakeholders in Tamworth:

- Plant Society
- Garden Club
- Stock and Station Agent

Biosecurity awareness and attitudes

Compared to their metro counterparts, whose first thoughts when biosecurity was mentioned tended to go to incursions at the point of our international borders, Tamworth residents, while aware of these risks, also had a greater awareness of the biosecurity risks within NSW and their local area, particularly as these pertain to primary production and therefore the livelihood of people in their community and protection of native species. A key concern for all audiences in Tamworth is anything that risks their poultry industry, Biaida Poultry being a significant local employer and customer of thousands of local poultry farms.

Tamworth residents definitely saw biosecurity as a shared responsibility and some even advocated for very active involvement in the control of invasive species, for example a bounty on Cane Toads to encourage locals to find and remove them from the local environment or a 'Carp muster' to reduce numbers in local waterways. There is a sense that responsibility starts at home and everybody, from individuals, to organisations, government, and multinationals needs to do their bit.

Feedback regarding the usage, or lack of, the term biosecurity and understanding of the term was similar to that provided by members of similar metro-based organisations.

> *"I think of bio security as looking at all the biological things that are not in the area but may get into the area. So, you are looking at viruses bacteria, soil, weeds all sorts of things. The concern is that once they get in - they take over the area because they don't have their normal controls." Plant society representative.*

> *"They (my committee) wouldn't understand it (the term) - I don't think they know what biosecurity is - they would talk about weeds - they would talk about the particular weed - and the same with the insects. I have never thought of talking to them about it - I guess in a way to talk about it that way is education." Plant society representative.*

Biosecurity behaviours

While a large number of biosecurity risks were mentioned, only one behaviour was explicitly mentioned:

- Washing own vehicle and footwear when moving through different properties (i.e. when hunting) or visiting any rural property.

Current risks

Tamworth residents were aware of a broad range of biosecurity risks both in their local area and beyond.

- Feral cats, as evidenced by sighting of feathers of killed birds around waterholes,
- Brumbies, in particular in Mt Kosciusko,
- Cane toads,
- Mice,
- Snakes,
- Deer (previously farmed but have escaped during flooding),
- Avian flu,
- Bushfires and drought, threat to biodiversity / native species, and
- Weeds.

Broader biosecurity concerns and perceived risks

Tamworth residents raised a number of issues facing Tamworth and other rural communities. They were aware of consideration being given to the use of 1080 poison to combat the recent mouse plague and while they understood the reason for this was due to the seriousness of the plague, were also concerned about impacts on the environment. Water security is another concern of Tamworth residents who are aware of the town coming close to running out of water in recent times. Another issue raised was fracking which was seen as having no place and posing an unacceptable risk to plant and bird life.

The influx of tree changers to Tamworth was also considered a risk as people new to the area, in particular those from metro areas, are less likely to be aware of biosecurity risks relevant to regional areas more generally including Tamworth.

Biosecurity Resources

Tamworth residents would like to see greater education and feel that this ideally starts with the family, but also sees schools as responsible for educating children as to biosecurity issues and risks. Resources currently used include:

- Signs on rural properties advising of then need to clean vehicles, boots and other equipment,
- Signs in the local area showing images of weeds and providing details of how to report to local council,
- Learning through involvement in groups such as Scouting, and
- Reminders through public events such as Clean Up Australia day.

Residents would also like to see:

- Advertising – including TV commercials, radio and print, advising the general public of biosecurity risks, and
- Social media used to inform and provide a forum for discussion of biosecurity issues.

Appendices

Quantitative research with aquatic primary producers

Initially the proposed research design allowed for n=50 quantitative interviews to be undertaken with primary producers involved in fishing and aquaculture. Unfortunately, this component of the design was not completed due to it not being possible to sample this audience group effectively.

A key requirement of undertaking any quantitative survey with business representatives is for a sample frame of potential respondents to be compiled inclusive of associated contact details that can be used to invite potential respondents to participate within the survey. Typical sources for this sample frame include commercial lists and published business details. It is also important that the sample frame be of sufficient size to achieve the required sample size, with the standard ration for this being a minimum of 10 potential contacts for each required interview to allow for incorrect contact details, lack of availability to participate or unwillingness to participate – meaning that to achieve the required sample of n=50 a minimum of 500 contact records is required.

However, when commercial list companies were approached it proved not viable to obtain sample through this method with the details for such businesses found to only appear on such lists in extremely low numbers. Nor was it possible to obtain commercial listings through business directories with such businesses again tending to not be listed in an identifiable fashion.

Based on the qualitative stage, and subsequent conversations with fishing cooperative representatives (see below) this lack of public records for commercial fishers was felt to be due to a large number of company or business names being registered through a Family Trust or a commercial partnership that bears no reference to an operating vessel or an identifiable trading name. Additionally, it was found that websites for individual fishermen or commercial fishing operations are few and far between – with this in turn explained as being due to a lack of need for a marketing presence due to their produce being either rebranded or redistributed to be sold under a retail name, reprocessed, exported, etc.

In the qualitative stage the key means by which aquatic industry participants were recruited was via liaison with a range of fishing co-operatives located across NSW (the numbers for which were easily able to be accessed). This approach was also explored for the quantitative interviews. In speaking with the local cooperative representatives (targeting CEOs and/or General Managers) a high degree of willingness to assist with sourcing suitable participants was demonstrated – however privacy restraints meant that while they could act as a liaison, they could not provide direct contact details for their members without a members' consent.

In total 10 fishing cooperatives agreed to assist in the distribution of the survey details to their member base, however no response to this preliminary approach was received. Interestingly this lack of response was prompted by the CEO of one of the larger cooperatives (representing over 130 individual commercial operators), as while he was very willing and supportive of his members participation, he stated that not even he had email contacts for all of the members, and further cautioned that "our fishers are not very responsive to email requests, with the exception of only a few." Similarly, another representative stated that fishermen are hard to reach by phone due to the hours they keep and the nature of work that they do.

Note that the reason that the recruitment via fishing cooperatives was successful in the qualitative stage was due to the participants in that stage being offered a $100 incentive to participate, however no such incentive for the quantitative stage was offered given both the smaller time commitment being requested (10 to 15 minutes versus one hour) and due to the payment of such

incentives for the required sample size being prohibitive within the available budget.

Additional alternative options to achieve the desired quantitative interviews were also explored including:

- Intercept interviews being conducted via in-situ recruitment of fisherman at co-operatives and markets – however this approach was determined not to be feasible due to associated occupational health and safety considerations, as well as due to the limited time commercial fishers actually spend at such sites.
- Promotion of survey via relevant NSW Department of Primary Industries social media channels – with his including a prize draw to incentivise participation and a link that could be accessed to complete the survey online. However, no response to this approach was received.

Given the above difficulties in sourcing potential participants for the quantitative survey with primary producers involved in aquatic industries, the decision was reluctantly made to exclude this component from the research program.

However, this experience does highlight that if the NSW Department of Primary Industries wishes to effectively engage with aquatic primary producers there is a potential need for a database of commercial fishermen to be developed in order that communications and information can be effectively distributed. Additionally, this experience highlights that while industry groups can play a key liaison role to ensure the relevancy of any communications (and hence associated performance of desired response) there is a need for clear and compelling benefits to be articulated.