Analysis of Livestock Predation Survey 2024

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Prepared for the Department of Energy Environment and Climate Action

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A report to the Department of Energy Environment and Climate Action, Victoria

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Cover photo by Roger Wilkinson:
Exclusion fence, Mitta Valley, September 2024

Summary

- This report presents the findings from an internet survey on predation of livestock conducted by Agriculture Victoria, with useable responses from 523 Victorian farmers.
- The survey was aimed at farmers with experience of livestock predation and cannot be used to estimate overall predation levels or costs across Victoria. It can be used to gauge the beliefs and behaviours of those who have experienced predation.
- More than half the respondents (55%) said they had seen or heard wild dogs or dingoes around their property in the last five years.
- Half the respondents (50%) said they had lost livestock to wild dogs or dingoes in the last five years.
- Eastern and North-west Victorian farmers and those bordering public land were more likely to report sightings or losses than those elsewhere.
- Almost half the respondents (43%) reported sheep being maimed or killed by wild dogs or dingoes. Most losses reported were of sheep, but a substantial minority (24%) reported losses of cattle (mostly calves).
- Losses to domestic dogs were smaller and fewer farmers experienced them.
- The most common monitoring method for wild dog or dingo activity was whether or not respondents saw them around the property (used by 65%). Looking for footprints (used by 45%) and the use of camera traps (used by 37%) were also common.
- The most commonly reported lethal control method used for wild dogs or dingoes was shooting, used by almost half the respondents (48%). 1080 using ground baiting methods, and trapping, were used by about 20 percent (21% and 19% respectively). The other methods asked about were used by almost no one.
- All lethal controls were rated as highly effective.
- The most commonly used non-lethal controls for wild dogs or dingoes were keeping the property clean, used by half the respondents (51%), and exclusion fencing using electric offsets, used by one quarter of respondents (26%).
- The various non-lethal control methods for wild dogs or dingoes were mostly seen as ineffective. Only stand-alone electric fencing, installing infrastructure such as lambing sheds and night pens, and guardian dogs such as Maremmas were seen as effective.
- Infrastructure and fencing installation were seen as expensive.
- Spending on non-lethal controls for wild dogs or dingoes was much higher than spending on lethal controls. Spending on monitoring wild dog or dingo activity was similar to spending on lethal controls.
- Lethal controls were more widely used in Eastern Victoria than other areas. Eastern Victorian farmers had smaller sheep flocks than those elsewhere, greater loss to wild dogs or dingoes, and spent more on monitoring and control.
- Sharing a boundary with public land was associated with greater likelihood of undertaking control and monitoring of wild dogs or dingoes, but not with greater spending per sheep or per sheep lost to wild dog or dingo predation.
- Farmers with losses of sheep to wild dog or dingo predation spent about the same amount on monitoring and control, no matter what the level of predation.

- In assessing respondents' beliefs, their greatest concern was worry about the presence or return of wild dogs or dingoes. Empathy with the suffering of predated livestock and practical concern about wild dogs or dingoes and their impact were also felt strongly.
- Acceptance of and empathy with dingoes was the only belief set about which there was ambivalence. This set of beliefs varied little between groups.
- For all other belief sets, experience of wild dog or dingo predation on sheep was associated with stronger levels of concern than not having experienced predation, and higher predation was associated with stronger concern than lower predation.
- Those who had experienced high levels of wild dog or dingo predation on their sheep had the strongest levels of concern of all groups tested, across all crosstabulation variables. For them, worry about wild dog or dingo presence and return, practical concerns about wild dogs or dingoes and their impact, an emotional response to wild dog or dingo attacks and empathy with livestock being killed or mauled by wild dogs or dingoes were particularly strong.
- Many respondents described deleterious effects of wild dog or dingo predation on their mental health (52% of those describing other personal effects of attacks).
- Those who coordinated dingo control with their neighbours had strong levels of concern about wild dogs or dingoes.
- Generalised concern about other predators was not as great as concern about wild dogs or dingoes.
- A small number of respondents described how they had got out of sheep production because of wild dog or dingo predation, or said that they were contemplating doing so (6% of those describing other personal effects of attacks).
- A small number of respondents had a positive view of dingoes (6% of those describing other personal effects of attacks).
- There was high regard for Wild Dog Controllers and their work, and a desire for the Wild Dog Control Program to be maintained.
- Overall, farmers were worried that the potential withdrawal of their right to lethally control dingoes would mean they as a small group would have to bear the cost of a policy change that benefitted all Victorians.

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Introduction and survey methods

The Department of Energy, Environment and Climate Action is currently reviewing the policy and regulatory settings for dingo conservation and livestock predation management in Victoria. As part of this work Agriculture Victoria conducted a survey of dingo and wild dog impacts on Victorian farmers.

The survey was administered using Survey Monkey and was open from 23 July to 6 August 2024. It was publicised by Agriculture Victoria and farmer organisations. A total of 545 responses were received. After removing several responses from interstate and from non-farmers, plus a small number of responses that appeared to be spurious, 523 were analysed. The quantitative analysis was performed using SPSS software and thematic analysis of the qualitative data was done manually.

The survey was designed, administered and managed by Agriculture Victoria. Roger Wilkinson was contracted to provide some advice on questionnaire design, analyse the data and write this report.

Data quality and analytical methods

In a survey sample of this size the Margin of Error is about 4 percentage points. A caveat with statistical significance testing is that it relies on a random sample and the sample for this survey cannot be guaranteed to be random. Respondents to this survey were self-selected. In several places the results of statistical testing of differences between groups of respondents are reported because this is less reliant on random sampling than the estimation of population characteristics from a sample.

There is a second caveat concerning the survey data. There may have been some over-stating of responses, in particular the number of stock killed or maimed and the cost of monitoring and control of dingo and dog activities. There were some quite extreme numbers and while these are feasible they do distort the data. For this reason medians rather than means are usually reported because they do better justice to the data. Non-parametric statistics have been used in preference to parametric statistics in most situations where raw numbers are reported. Where ratios of two different variables are calculated, any distortions tend to cancel each other out and parametric statistics are more appropriate. Belief items measured using 5-point scales are less susceptible to distortion (although their distributions may be skewed) so they are generally reported using parametric statistics.

The standard crosstabulations used were whether or not respondents had sheep, whether their property was in Eastern Victoria, North-west Victoria or the rest of Victoria, whether their property bordered public land, whether their property was in close proximity to or crossed the border into NSW or SA, whether they coordinated their wild dog or dingo control with their neighbours, and the extent of predation by dingoes on their sheep. Generally, when any of these crosstabulations are not reported it is because there were only minor differences.

To examine patterns in spending on monitoring and control of dingoes, sheep flock size and losses to dingoes, and the various crosstabulation variables, a two-step process was used. First the percentage of respondents who used dingo monitoring and control was corsstabulated against the various categories. Then ratios of spending on lethal and non-lethal controls of dingoes and monitoring of dingo activity per sheep and per sheep lost to dingo predation were crosstabulated against the categories. The categories were location within Victoria (Eastern, North-west, the rest), whether

respondents had a boundary with public land, the extent of dingo predation on their sheep (None, Low – less than median loss, High –median loss or more), and whether they coordinated control activities with their neighbours. Because of doubts about the quality of the data non-parametric statistical tests were used, which make fewer assumptions about the data than parametric tests. For the ratios the median test was used rather than the Mann-Whitney and Kruskal-Wallis tests because even though it has lower power than those tests it is less susceptible to distortion from outlier values. Some crosstabulations were conducted for all livestock farmers, but most were conducted for sheep farmers only (because they were scaled by sheep numbers).

The questionnaire included several open questions, which allowed people to respond in their own words. Also, in several places anyone who responded with "other" had an opportunity to detail their response. In reporting the themes that emerged from this set of qualitative data extensive use is made of verbatim quotations. Within the report these verbatim quotations are set in italics. Some light editing has been done for readability.

Respondents

Of the 523 respondents, 413 (79%) had livestock only, 98 had mixed farms and 12 had no livestock. 363 (59%) had farms that bordered public land, while 160 (31%) did not. 374 (72%) were in Eastern Victoria, 17 (3%) in the North-west, and 132 (25%) in the rest of Victoria. A small number of respondents had property in close proximity to or crossing the border into New South Wales or South Australia (of the 370 who responded to this question, 6% said NSW and 2% said SA), but none of them described any challenges presented by their location on the state border. As one said, *wild dogs do not carry maps*.

Results

Livestock

Median and maximum numbers of each livestock class are presented for those respondents who said they had that livestock class (Table 1). Median stock numbers are presented rather than means because the distributions were skewed. Several respondents mentioned having numbers of wild or feral pigs or deer on their property, and it is possible some such animals are included in these reported numbers. Other livestock were reported by a few respondents: these were generally small numbers of guardian animals such as llamas or donkeys, described as guardians by the respondent. Crosstabulating those with sheep or beef cattle, 45 percent had both sheep and beef cattle, 25 percent had beef cattle but not sheep, 21 percent had sheep but not beef cattle, and nine percent had neither.

Table 1. Livestock on farm (n=523)

Animal	Percent with animal	Median number of head	Maximum number of head
Sheep	65	600	20,000
Beef cattle	70	160	6000
Pigs	2	10	200
Goats	4	10	20,000
Deer	2	11	200
Horses	22	4	100
Dairy cattle	3	220	800
Poultry	21	12	4000
Alpacas	11	3	65
No livestock	2		

Impacts

Those with property adjoining public land were much more likely to have reported seeing or hearing a wild dog or dingo in the past 5 years than those not adjoining public land (Pearson Chi-square=44 for table as a whole, $p<0.001$; 3% who said don't know removed; Table 2)

Table 2. Sightings and hearings of wild dogs, dingoes or domestic dogs on or around property

Seen or heard dogs on or around property in last 5 years	Frequency of response (percent)		
	All respondents (n=510)	Join public land (n=353)	Don't join public land (n=157)
No	16	11	27
Wild dogs or dingoes	55	64	35
Domestic dogs	16	12	24
Both wild and domestic dogs	13	13	13

Respondents in Eastern Victoria and the North-west were much more likely to have reported seeing or hearing a wild dog or dingo in the past 5 years and much less likely to have reported seeing or hearing a domestic dog than those in the rest of Victoria (Pearson Chi-square=129 for table as a whole, $p<0.001$; 3% who said don't know removed; Table 3).

Table 3. Sightings and hearings of wild dogs, dingoes or domestic dogs by region

Seen or heard dogs on or around property in last 5 years	Frequency of response (percent)		
	Eastern Victoria (n=367)	North-west (n=17)	Rest of Victoria (n=126)
No	12	6	29
Wild dogs or dingoes	67	70	16
Domestic dogs	8	6	41
Both wild and domestic dogs	13	18	14

Those with property adjoining public land were much more likely to have reported having had livestock killed or maimed by a wild dog or dingo in the past 5 years (Pearson Chi-square=34 for table as a whole, $p<0.001$; 8% who said don't know removed; Table 4).

Table 4. Losses to wild dogs, dingoes or domestic dogs

Lost stock to dogs in last 5 years	Frequency of response (percent)		
	All respondents (n=495)	Join public land (n=341)	Don't join public land (n=154)
No	30	24	45
Wild dogs or dingoes	50	58	31
Domestic dogs	12	10	16
Both wild and domestic dogs	8	8	8

More than half the respondents in Eastern Victoria and the North-west reported having had livestock killed or maimed by a wild dog or dingo in the past 5 years, compared with only 18 percent in the rest of Victoria (Pearson Chi-square=93 for table as a whole, $p<0.001$; 8% who said don't know removed; Table 5)

Table 5. Losses to dogs by region

Lost stock to dogs in last 5 years	Frequency of response (percent)		
	Eastern Victoria (n=351)	North-west (n=17)	Rest of Victoria (n=127)
No	27	18	39
Wild dogs or dingoes	60	70	18
Domestic dogs	6	0	30
Both wild and domestic dogs	7	12	13

This table reports livestock killed or maimed by wild dogs or dingoes over the past five years (all respondents included). Only sheep and beef cattle were lost in substantial numbers and by large numbers of respondents. Several respondents with losses of beef cattle described the lost stock as calves (Table 6).

Table 6. Losses of different animals to wild dogs or dingoes (n=523)

Animal	Percent with losses	Median number of head lost	Maximum number of head lost
Sheep	43	11	400
Beef cattle	24	4	100
Pigs	<1	20	20
Goats	2	8	100
Deer	1	10	10
Horses	<1	1	1
Dairy cattle	1	3	10
Poultry	3	5	30
Alpacas	1	1	1

Those with property adjoining public land had greater losses of livestock to wild dogs and dingoes than those who did not. For example, 46 percent of those bordering public land had lost sheep to wild dogs or dingoes, compared with 37 percent of those not bordering public land. Some individuals had large losses (Table 7). Only losses of sheep and beef cattle are shown, due to small numbers of respondents reporting losses of other classes of livestock.

Table 7. Losses to wild dogs or dingoes by public land boundary

Animal	Those bordering public land (n=364)			Not bordering public land (n=161)		
	Percent with losses	Median number of head lost	Maximum number of head lost	Percent with losses	Median number of head lost	Maximum number of head lost
Sheep	46	15	400	37	10	230
Beef cattle	30	4	100	10	2	15

This table reports livestock killed or maimed by domestic dogs over the past 5 years (Table 8). Only sheep and beef cattle were lost in substantial numbers and by large numbers of respondents. Several respondents with losses of beef cattle described the lost stock as calves.

Table 8. Losses of different animals to domestic dogs (n=523)

Animal	Percent with losses	Median number of head lost	Maximum number of head lost
Sheep	30	8	250
Beef cattle	8	2	100
Pigs	<1	20	20
Goats	1	5	5
Deer	1	10	20
Horses	0	0	0
Dairy cattle	1	2	2
Poultry	3	5	20
Alpacas	<1	1	1

Those with property adjoining public land had greater losses of livestock to domestic dogs than those who did not (Table 9). Some individuals had large losses. Only losses of sheep and beef cattle are shown, due to small numbers of respondents reporting losses of other classes of livestock.

Table 9. Losses to domestic dogs by public land boundary

Animal	Those bordering public land (n=364)			Not bordering public land (n=161)		
	Percent with losses	Median number of head lost	Maximum number of head lost	Percent with losses	Median number of head lost	Maximum number of head lost
Sheep	30	8	250	32	7	80
Beef cattle	8	2	100	4	2	4

Records and reporting

Thirty-one percent of respondents said they kept records of wild dog, dingo or domestic dog activity on their farm. Of these, 21 percent said they kept their own written or electronic records, 13 percent said they photographed killed or maimed stock, one percent (only 7 respondents) said they used a FeralScan app and six percent used some other recording method. Other methods used included photographing dogs they had killed, use of remote cameras and records kept by Wild Dog Controllers.

In response to a hypothetical question about things that would prompt them to report wild dog, dingo or domestic dog activity, respondents were more likely to report seeing or hearing wild dogs or dingoes on their property than domestic dogs, but equally likely to report attacks by wild dogs or dingoes and by domestic dogs (Table 10). Of the 42 respondents who made a comment on this question, seven said that there was no point in reporting wild dogs or dingoes because nothing was ever done about it.

Table 10. Reasons to report wild dog, dingo or domestic dog activity (n=523)

	Frequency of response (percent)	
	Wild dogs or dingoes	Domestic dogs
Heard on property	42	24
Saw on property	61	47
Attacks on humans	45	48
Attacks on own domestic animals	50	52
Attacks on livestock	66	63
Seen or heard on public land	39	Not asked
Other	8	8

Monitoring

The most common monitoring method for wild dog or dingo activity was whether or not respondents saw them around the property (Table 11). Looking for footprints and the use of camera traps were also common. Other methods mentioned included hearing howls, observing stock behaviour, counting dead stock, checking fences, discussions with neighbours, and the absence of other wildlife. Some respondents reported spending large amounts of money on monitoring, although based on the descriptions in the "other" category, some of these could include the cost of exclusion fencing.

Table 11. Use of and spending on monitoring wild dog or dingo activity (n=523)

	Frequency of response (percent)	Median spend (12 months)	Maximum spend (12 months)
Monitor bait sites	12	1000	20,000
Camera traps	37	800	5200
DNA analysis	2	0	0
Hair or scat samples	16	0	5000
Observations	65	500	75,000
Looking for footprints	45	500	20,000
Other	15	1000	100,000
Do not monitor	8		

Total spend on monitoring wild dogs or dingoes in the past 12 months was highly correlated with losses of sheep to wild dogs or dingoes in the past 12 months (Pearson correlation = 0.512, $p<0.001$).

Lethal control

By far the most commonly reported lethal control method used for wild dogs or dingoes was shooting, used by almost half the respondents (Table 12). 1080 using ground baiting methods, and trapping, were used by about 20 percent. The other methods asked about were used by almost no one. Lethal methods reported in the "other" category were almost all use of the local Wild Dog Controller. Reported annual spending on lethal pest control methods was highest for 1080 ground baiting, trapping and shooting.

Table 12. Use of and spending on lethal control of wild dogs or dingoes (n=523)

Lethal control method	Percent using	Median annual spend ($)	Maximum annual spend ($)
1080 ground baiting	21	1000	16,000
1080 with Canid Pest Ejectors	3	500	5000
PAPP ground baiting	1	200	300
PAPP with Canid Pest Ejectors	<1	200	200
Trapping	19	1000	10,000
Shooting	48	1000	25,000
Other	5	680	2000
None	23		

Effectiveness ratings for all lethal methods were similar (Table 13). For every method more than half the respondents who rated its effectiveness said it resulted in some decrease in livestock losses. The high mean score for "other" suggests the Wild Dog Controllers were rated as highly effective.

Table 13. Perceived effectiveness of lethal control methods for wild dogs or dingoes (n=523)

Lethal control method	Mean effectiveness rating
1080 ground baiting	3.9
1080 with Canid Pest Ejectors	3.8
PAPP ground baiting	4.0
PAPP with Canid Pest Ejectors	4.0
Trapping	4.0
Shooting	3.9
Other	4.5

Scale: 1 Large increase in livestock losses, 2 Some increase in livestock losses, 3 No change in livestock losses, 4 Some decrease in livestock losses, 5 Completely stopped the livestock losses

For each lethal control method they had not used, respondents were asked their most important reason for not using it (Table 14). They were not asked the relative importance of each reason. Across all methods, the most commonly mentioned reason for not using it were operator safety or licence requirement (298 mentions) and risk to non-target animals, including domestic animals (282 mentions). The profiles of reasons for not using were similar across all methods, with the following exceptions. No one saw shooting as posing a risk to non-target animals. Shooting and trapping were seen by a higher proportion of respondents as difficult to use than were poisons. Both PAPP and Canid Pest Ejectors were relatively less well-known than ground baiting with 1080.

Table 14. Reasons for not using lethal control methods for wild dogs or dingoes

Most important reason for not using	1080 ground (n=172)	1080 CPE (n=267)	PAPP ground (n=277)	PAPP CPE (n=278)	Trapping (n=179)	Shooting (n=33)
High capital investment	3	5	5	6	3	9
High maintenance cost	6	7	8	6	10	3
Difficult to use	4	8	4	6	18	30
Long time to implement	3	3	4	2	8	6
Landscape not suitable	7	6	5	5	2	9
Operator safety or need for licence	30	28	23	22	21	24
Risk to non-target animals	41	21	21	19	24	0
Don't think it is effective	4	8	9	10	9	12
Did not know about it	4	14	21	24	4	6

Non-lethal control

The most commonly used non-lethal controls for wild dogs or dingoes were farm hygiene (keeping the property clean by doing things such as promptly removing carcasses, which was described by some respondents as normal practice anyway), used by half the respondents, and exclusion fencing using electric offsets, used by one quarter of respondents (Table 15). The main non-lethal controls

described in the "other" category were stand-alone electric fencing (as distinct from offsets), spreading predator faeces or urine (mostly dog) and vigilant patrolling. Some respondents reported spending very large amounts of money on non-lethal control. The biggest expense was fencing (including much of the spending in the "other" category), followed by guardian animals.

Table 15. Use of and spending on non-lethal control of wild dogs or dingoes (n=523)

Non-lethal control method	Percent using	Median annual spend ($)	Maximum annual spend ($)
Keeping property clean (e.g. removing carcasses)	51	1000	300,000
Installing infrastructure (e.g. sheds or pens)	9	2000	200,000
Exclusion fencing – conventional	14	10,000	150,000
Exclusion fencing – electric offsets	26	6500	1,000,000
Guardian animals – donkeys	2	4000	15,000
Guardian animals – alpacas or llamas	11	1000	6000
Guardian animals – dogs (e.g. Maremmas)	5	2000	6000
Visual deterrents – flashing or high beam lights	12	400	4500
Visual deterrents – automated or sensor lights	5	400	2000
Visual deterrents – inflatable tube men	<1	150	150
Noise deterrents	5	475	10,000
Smell deterrents	2	350	550
Other	5	2000	150,000
None	16		

The non-lethal control methods for wild dogs or dingoes were mostly rated as less effective than the lethal methods (Table 16). Those that were rated as being at least as effective as the least effective lethal method were stand-alone electric fencing (mean rating for the 5 respondents who mentioned it 4.0), installing infrastructure such as lambing sheds and night pens, and guardian dogs such as Maremmas (the high rating for inflatable tube men by a single respondent is likely to be spurious). Smell deterrents and electric offset fencing were also rated as fairly effective.

Table 16. Perceived effectiveness of non-lethal control methods for wild dogs or dingoes (n=523)

Non-lethal control method	Mean effectiveness rating
Keeping property clean (e.g. removing carcasses)	3.4
Installing infrastructure (e.g. sheds or pens)	3.8
Exclusion fencing – conventional	3.6
Exclusion fencing – electric offsets	3.7
Guardian animals – donkeys	3.5
Guardian animals – alpacas or llamas	3.5
Guardian animals – dogs (e.g. Maremmas)	3.8
Visual deterrents – flashing or high beam lights	3.4
Visual deterrents – automated or sensor lights	3.3
Visual deterrents – inflatable tube men	5.0
Noise deterrents	3.2
Smell deterrents	3.7
Other	4.0

Scale: 1 Large increase in livestock losses, 2 Some increase in livestock losses, 3 No change in livestock losses, 4 Some decrease in livestock losses, 5 Completely stopped the livestock losses

For each non-lethal control method they had not used, respondents were asked their most important reason for not using it. For infrastructure and both forms of fencing, more than half said they required high capital investment (Table 17, Table 18). For each method, the tables show the percentage of respondents not using that method who nominated each particular reason as their most important reason for not using it. Each of these three methods also had the lowest proportion of non-users saying they did not think it was effective. The two most common reasons given for not using guardian dogs such as Maremmas were ineffectiveness and difficulty in using them. For all other non-lethal control methods, by far the most common reason given for not using them was that people did not think they were effective.

Table 17. Reasons for not using non-lethal control methods for wild dogs or dingoes (part 1)

Most important reason for not using	Property clean (n=119)	Infra-structure (n=336)	Non-elec fencing (n=309)	Offset fencing (n=247)	Donkeys (n=369)	Alpacas (n=322)
High capital investment	8	62	60	56	11	12
High maintenance cost	10	5	8	16	10	12
Difficult to use	11	4	4	4	21	18
Long time to implement	6	2	1	1	1	1
Landscape not suitable	13	7	6	11	10	8
Operator safety or need for licence	5	1	<1	<1	2	1
Risk to non-target animals	4	1	1	1	3	3
Don't think it is effective	33	15	15	8	34	40
Did not know about it	9	4	4	3	7	6

Table 18. Reasons for not using non-lethal control methods for wild dogs or dingoes (part 2)

Most important reason for not using	Maremmas (n=354)	Flashing lights (n=318)	Auto lights (n=356)	Tube men (n=378)	Noise (n=355)	Smell (n=370)
High capital investment	12	14	19	10	9	8
High maintenance cost	13	7	6	5	6	5
Difficult to use	22	6	6	6	7	8
Long time to implement	4	1	1	<1	1	1
Landscape not suitable	11	16	16	11	13	11
Operator safety or need for licence	1	>1	<1	<1	1	1
Risk to non-target animals	4	2	2	1	3	2
Don't think it is effective	27	46	42	49	47	43
Did not know about it	6	9	8	18	15	22

Spending on non-lethal controls for wild dogs or dingoes was much higher than spending on lethal controls (Table 19). Spending on monitoring wild dog and dingo activity was similar to spending on lethal controls.

Table 19. Spending on monitoring and control of wild dogs or dingoes (236<n<353)

	Median spend per year
Lethal controls	$1500
Non-lethal controls	$5300
Lethal or non-lethal controls	$6500
Monitoring	$1075
Controls or monitoring	$6000

Total spending on lethal controls for wild dogs or dingoes was highly correlated with spending on monitoring of wild dog or dingo activity (Pearson correlation=0.442, p>0.001). Total spending on non-lethal controls for wild dogs or dingoes was also highly correlated with spending on monitoring (Pearson correlation=0.325, p>0.001). Total spending on lethal controls and total spending on non-lethal controls had a much lower correlation (Pearson correlation=0.134, p=0.065).

Working with others

Seventy-one percent of respondents (371) answered questions about working with others to control predators. Of these, 57 percent said they coordinated control of wild dogs or dingoes with their neighbours and 36 percent said they were part of a community group focused on invasive species control. Combining the two variables, 25 percent said they were coordinated with their neighbours and were part of a community group, 32 percent said they coordinated with their neighbours but were not part of a community group, ten percent said they were part of a community group but did not coordinate with their neighbours, and 33 percent responded neither.

Several reasons were given why respondents did not coordinate control of wild dogs or dingoes with their neighbours. One was that the neighbours were hobby farmers. Another reason was that the neighbours did not run sheep. Some gave both reasons. Some said their neighbours were not interested. Others preferred to keep to themselves. In some cases they just had not got around to it. Some respondents bordered public land and pointedly criticised the state government's land management.

Crosstabulations

This section presents crosstabulations of use and spending on lethal and non-lethal controls and monitoring if wild dogs or dingoes by various categorical variables. The first set of tables is for all livestock farmers. A later, more comprehensive set of tables, is for sheep farmers only. All forms of wild dog or dingo control and monitoring were used more widely in Eastern and North-west Victoria than in the rest of Victoria (Table 20).

Table 20. Use of monitoring and control of wild dogs or dingoes by region – all livestock farmers (n=511)

Percent using	Area of Victoria			Sig. of difference
	Eastern	North-west	Rest	
Lethal controls	51	40	31	***
Non-lethal controls	53	53	35	**
Lethal or non-lethal controls	62	67	42	***
Monitoring	54	60	36	**
Lethal or non-lethal controls or monitoring	66	80	47	***

Significance (Chi-square test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Sharing a property boundary with public land was associated with a much greater likelihood of undertaking control and monitoring activities than not sharing (Table 21).

Table 21. Use of monitoring and control of wild dogs or dingoes by public land boundary – all livestock farmers (n=511)

Percent using	Boundary with public land		Sig. of difference
	No	Yes	
Lethal controls	32	51	***
Non-lethal controls	32	55	***
Lethal or non-lethal controls	42	64	***
Monitoring	37	55	***
Lethal or non-lethal controls or monitoring	46	68	***

Significance (Chi-square test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Coordinating wild dog or dingo control with neighbours was strongly associated with a greater likelihood of undertaking wild dog or dingo monitoring and control (Table 22).

Table 22. Use of monitoring and control of wild dogs or dingoes by coordination with neighbours – all livestock farmers (n=511)

Percent using	Coordinate wild dog or dingo control with neighbours		Sig. of difference
	No	Yes	
Lethal controls	41	76	***
Non-lethal controls	49	81	***
Lethal or non-lethal controls	59	90	***
Monitoring	46	78	***
Lethal or non-lethal controls or monitoring	64	93	***

Significance (Chi-square test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

The rest of the crosstabulations in this section were conducted for farmers with sheep only, because they focus on spending on wild dog or dingo control and monitoring per sheep and per sheep lost to wild dog or dingo predation. As a general observation, lethal and non-lethal controls and monitoring were more widely used by sheep farmers than other livestock farmers.

Lethal controls were more widely used in Eastern Victoria than other areas (Table 23). Farmers in Eastern and North-west Victoria used wild dog or dingo controls and monitoring much more than those in the rest of Victoria.

Table 23. Use of monitoring and control of wild dogs or dingoes by region – sheep farmers (305<n<342)

Percent using	Area of Victoria			Sig. of difference
	Eastern	North-west	Rest	
Lethal controls	57	44	36	***
Non-lethal controls	62	56	38	***
Lethal or non-lethal controls	69	69	47	***
Monitoring	68	56	50	*
Lethal or non-lethal controls or monitoring	76	81	58	**

Significance (Chi-square test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Eastern Victoria had a quite different profile from the North-west and the rest of Victoria, with smaller sheep flocks and proportionally greater sheep losses to wild dogs or dingoes (Table 24). Because of this Eastern Victorian farmers spent much more, relatively, on monitoring and control of wild dogs or dingoes. The North-west and the rest of Victoria had fairly similar profiles.

Table 24. Spending on monitoring and control of wild dogs or dingoes by region – sheep farmers (140<n<342)

Median for those spending on monitoring or control	Area of Victoria			Sig. of difference
	Eastern	North-west	Rest	
Number of sheep	200	1900	2000	***
Total spend on lethal controls per sheep	$4.17	$1.23	$1.14	***
Total spend on non-lethal controls per sheep	$25	$6.25	$5.00	***
Total spend on all controls per sheep	$28	$5.71	$3.08	***
Total spend on monitoring per sheep	$6.50	$1.43	$1.29	**
Total spend on controls and monitoring per sheep	$33	$8.75	$3.01	***
Sheep lost to dingoes per thousand head in flock	53	6.7	10	***
Total spend on lethal controls per sheep lost	$80	$100	$200	*
Total spend on non-lethal controls per sheep lost	$371	$140	$493	ns
Total spend on all controls per sheep lost	$479	$333	$300	ns
Total spend on monitoring per sheep lost	$100	$238	$188	ns
Total spend on controls and monitoring per sheep lost	$674	$325	$400	ns

Significance (Median test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Sharing a property boundary with public land was associated with a much greater likelihood of undertaking control and monitoring activities than not sharing (Table 25).

Table 25. Use of monitoring and control of wild dogs or dingoes by public land boundary – sheep farmers (305<n<342)

Percent using	Boundary with public land		Sig. of difference
	No	Yes	
Lethal controls	39	54	**
Non-lethal controls	39	61	***
Lethal or non-lethal controls	50	68	***
Monitoring	52	67	*
Lethal or non-lethal controls or monitoring	61	75	**

Significance (Chi-square test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Sharing a property boundary with public land appeared to have little relationship with sheep flock size, sheep losses to wild dogs or dingoes, and spending on wild dog or dingo monitoring and control per sheep and per sheep lost to dingoes (Table 26).

Table 26. Spending on monitoring and control of wild dogs or dingoes by public land boundary – sheep farmers (305<n<342)

Median for those spending on monitoring or control	Boundary with public land		Sig. of difference
	No	Yes	
Number of sheep	400	$700	ns
Total spend on lethal controls per sheep	$3.75	$3.33	ns
Total spend on non-lethal controls per sheep	$17	$17	ns
Total spend on all controls per sheep	$19	$17	ns
Total spend on monitoring per sheep	$6.82	$3.75	ns
Total spend on controls and monitoring per sheep	$26	$21	ns
Sheep lost to dingoes per thousand head in flock	38	37	ns
Total spend on lethal controls per sheep lost	$119	$90	ns
Total spend on non-lethal controls per sheep lost	$345	$371	ns
Total spend on all controls per sheep lost	$430	$474	ns
Total spend on monitoring per sheep lost	$120	$125	ns
Total spend on controls and monitoring per sheep lost	$530	$675	ns

Significance (Median test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Use of wild dog or dingo monitoring and controls was strongly associated with the extent of wild dog or dingo predation on sheep (Table 27). In the table, “none” means no predation, “low” means less than the median predation of 10 sheep per year, and “high” means the median predation or more.

Table 27. Use of monitoring and control of wild dogs or dingoes by extent of wild dog or dingo predation – sheep farmers (270<n<342)

Percent using	Extent of wild dog or dingo predation on sheep			Sig. of difference
	None	Low	High	
Lethal controls	28	57	73	***
Non-lethal controls	38	61	75	***
Lethal or non-lethal controls	39	72	87	***
Monitoring	43	69	83	***
Lethal or non-lethal controls or monitoring	53	79	90	***

Significance (Chi-square test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Those with high levels of wild dog or dingo predation on their sheep spent more per sheep on monitoring than those with low or no sheep losses to wild dogs or dingoes, but less per sheep on control (Table 28). In the table, “none” means no predation, “low” means less than the median predation of 11 sheep per year, and “high” means the median predation or more. Per sheep lost to wild dogs or dingoes, those with high losses spent a little less on monitoring and a lot less on control than those with low losses. In other words, farmers with predation losses spent about the same amount on monitoring and control, no matter what the level of predation.

Table 28. Spending on monitoring and control of wild dogs or dingoes by extent of dingo predation – sheep farmers (140<n<342)

Median for those spending on monitoring or control	Extent of wild dog or dingo predation on sheep			Sig. of difference
	None	Low	High	
Number of sheep	1150	145	1000	***
Total spend on lethal controls per sheep	$1.02	$5.00	$2.50	*
Total spend on non-lethal controls per sheep	$17	$24	$13	ns
Total spend on all controls per sheep	$19	$24	$14	ns
Total spend on monitoring per sheep	$2.79	$5.51	$4.64	ns
Total spend on controls and monitoring per sheep	$13	$27	$21	ns
Sheep lost to dingoes per thousand head in flock		40	37	ns
Total spend on lethal controls per sheep lost		$138	$68	ns
Total spend on non-lethal controls per sheep lost		$777	$294	**
Total spend on all controls per sheep lost		$850	$333	***
Total spend on monitoring per sheep lost		$200	$98	ns
Total spend on controls and monitoring per sheep lost		$1167	$463	***

Significance (Median test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Coordinating wild dog or dingo control with neighbours was strongly associated with a greater likelihood of undertaking wild dog or dingo monitoring and control (Table 29).

Table 29. Use of monitoring and control of wild dogs or dingoes by coordination with neighbours – sheep farmers (217<n<251)

Percent using	Coordinate wild dog or dingo control with neighbours		Sig. of difference
	No	Yes	
Lethal controls	48	77	***
Non-lethal controls	56	87	***
Lethal or non-lethal controls	65	94	***
Monitoring	69	90	***
Lethal or non-lethal controls or monitoring	81	99	***

Significance (Chi-square test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Those who coordinated dingo control with their neighbours spent much more on monitoring dingo activity than those who did not coordinate with their neighbours, but only slightly more on control of dingoes (Table 30).

Table 30. Spending on monitoring and control of wild dogs or dingoes by coordination with neighbours – sheep farmers (140<n<251)

Median for those spending on monitoring or control	Coordinate wild dog or dingo control with neighbours		Sig. of difference
	No	Yes	
Number of sheep	600	475	ns
Total spend on lethal controls per sheep	$1.50	$3.42	ns
Total spend on non-lethal controls per sheep	$19	$17	ns
Total spend on all controls per sheep	$17	$19	ns
Total spend on monitoring per sheep	$2.15	$5.01	ns
Total spend on controls and monitoring per sheep	$21	$24	ns
Sheep lost to dingoes per thousand head in flock	22	50	ns
Total spend on lethal controls per sheep lost	$100	$80	ns
Total spend on non-lethal controls per sheep lost	$654	$340	ns
Total spend on all controls per sheep lost	$675	$420	ns
Total spend on monitoring per sheep lost	$125	$120	ns
Total spend on controls and monitoring per sheep lost	$740	$595	ns

Significance (Median test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Attitudes and beliefs

Respondents described high levels of concern about wild dogs or dingoes near their property (Table 31). Seventy percent said they were very concerned or extremely concerned. Those with property bordering public land had significantly higher mean levels of concern (4.1 compared with 3.7; F test, F=8.6, p<0.01, “Unsure” and “Does not apply to me” removed). Farmers with sheep had significantly higher levels of concern than farmers with no sheep (4.2 compared with 3.7; F test, F=13, p<0.001).

Farmers with beef cattle had the same level of concern as farmers with no beef cattle (4.0). Farmers in Eastern and North-west Victoria had slightly higher levels of concern than those in the rest of Victoria (4.1 for both Eastern and North-west versus 3.9 for the rest). Neither of these differences were significant.

Table 31. Concern about wild dogs or dingoes near property (n=523)

Level of concern	Frequency of response (percent)
Not at all concerned	7
Slightly concerned	6
Moderately concerned	12
Very concerned	22
Extremely concerned	48
Unsure	1
Does not apply to me	4

Farmers with property in close proximity to or crossing the border into NSW had significantly lower levels of concern than those with without property in close proximity to or crossing the border into NSW (3.2 compared with 4.2, Fisher's LSD, $p<0.001$). Those with property in close proximity to or crossing the border into SA also had lower levels of concern (3.8) than those with without property in close proximity to or crossing the border into SA, though this difference was not significant (likely due to there being only 8 respondents with SA border issues).

Those who were concerned about wild dogs or dingoes on or near their property were then asked about their specific concerns by being presented with a series of statements and asked to respond using the same five-point scale as the overall concern question (Not at all concerned, Slightly concerned, Moderately concerned, Very concerned, Extremely concerned. Respondents were then presented with a series of statements describing various thoughts and feeling they might have following wild dog or dingo attacks, and asked the extent to which they identified with each statement. This series of statements used a similar five-point scale (Not at all, Somewhat, Moderately, Quite a bit, Extremely).

Although the two sets of scale labels were not identical, they were quite similar, and the labelling of the options is generally not important. The two sets of items were therefore combined, and the statements were grouped into a number of belief sets. This was done using a combination of factor analysis, reliability analysis and manual examination of the variables. The belief sets were calculated by taking the mean of their constituent statements. Where a respondent did not provide data for one or more of the constituent statements in a set, the mean of those statements they did respond to was used. All of this is standard social research practice.

The belief sets and their Cronbach's alpha coefficients were: practical concern about wild dogs or dingoes and their impact (alpha=0.94), concern about the need for better infrastructure to keep out wild dogs or dingoes (alpha=0.96), a generalized worry about wild dogs or dingoes being present or returning (alpha=0.93), worry about wild dogs or dingoes causing harm to people or pets (alpha=0.87), an emotional response to wild dog or dingo attacks, empathy with livestock being killed

or mauled by wild dogs or dingoes (alpha=0.82), and empathy with and acceptance of dingoes (alpha=0.54).

Cronbach's coefficient alpha is the most widely used single measure of the interrelatedness or internal consistency of the items in the set of belief statements. It is expressed as a number between 0 and 1. Alphas should ideally be at least 0.7; alphas of 0.8 or more are considered high. Although one of the sets in this research does not meet the 0.7 benchmark, the three statements in that set do appear to relate to each other more strongly than they relate to other statements, so they have been kept together.

Responses to all of the statements are tabulated below, grouped into belief sets (Table 32). Concern statements all begin with the words "concern about". Across all the statements the most extreme response was for concern about prolonged suffering of stock that have been attacked, with 74 percent saying they identified with it "extremely". Other statements with a high proportion of respondents identifying with them "extremely" were the two worries about wild dog or dingo presence and return (both 67%) and two of the practical concerns about wild dogs or dingoes, being concern about predation on livestock and worry about lambing or calving percentage being reduced (both 64%).

Across the statements, the "extremely" response was the most common for all but the three "acceptance of dingoes" statements. For these three statements "not at all" or "somewhat" were the most common response. For ten of the 23 statements, the "extremely" response was selected by more than half the respondents. The only statements for which there was an appreciable spread of responses were the three "acceptance of dingoes" statements and the statement about personal safety, "I fear for the safety of myself, my family, or my workers".

Table 32. Beliefs about wild dogs or dingoes in detail (365<n<418)

	Frequency of response (percent)					
	Not at all (1)	Slightly / Some-what (2)	Moder-ately (3)	Very / Quite a bit (4)	Extr-emely (5)	Mean
Practical concern about wild dogs or dingoes	7	5	7	17	64	4.3
Concern about predation on livestock						
Concern about reduced lambing or calving percentage	8	5	8	20	59	4.2
Concern about mismothering of lambs or calves	6	7	8	20	59	4.2
I am worried about the viability of my farming business due to wild dog or dingo attacks on my livestock	14	12	12	17	45	3.7
I am worried that my lambing or calving percentage will be reduced	8	8	9	11	64	4.2
I am concerned about the increased workload associated with managing predation	9	10	9	15	57	4.0

	Frequency of response (percent)					
	Not at all (1)	Slightly / Some-what (2)	Moder-ately (3)	Very / Quite a bit (4)	Extr-emely (5)	Mean
Infrastructure concern						
Concern about upgrading infrastructure such as fencing	12	12	16	21	39	3.7
Concern about installing new infrastructure such as fencing	11	12	15	24	38	3.7
Worry about wild dog or dingo presence and return	8	6	7	12	67	4.2
I am worried about increased presence of wild dogs or dingoes in my area						
I am worried about wild dogs or dingoes returning to my area	6	7	7	13	67	4.3
Worry about effects on people and pets						
Concern about increased incidence of human and animal disease	11	19	18	17	35	3.5
Concern about attacks on humans	16	23	13	11	37	3.3
Concern about attacks on domestic animals	10	17	9	19	45	3.7
I fear for the safety of myself, my family or my workers	24	21	15	12	28	3.0
Emotional response to attacks						
The attacks have left me distressed or anxious	9	12	11	19	49	3.9
The attacks have left me angry	6	9	8	16	61	4.2
I feel watchful or on-guard	8	11	11	24	46	3.9
Empathy with livestock						
Seeing stock mauled or killed has affected me, my family or my workers	6	9	8	18	59	4.1
I feel helpless in my ability to protect my livestock	10	12	13	22	43	3.7
I am concerned about prolonged suffering of stock that have been attacked	4	5	6	11	74	4.5
Acceptance of dingoes						
Predation is just one of many causes of livestock losses	13	30	21	18	18	3.0
In the context of everything else that could reduce my income, predation does not cause a big loss	28	20	15	14	23	2.8
I accept that dingoes are a part of Australian landscape but I am interested in ways to reduce livestock losses without losing dingoes from the landscape	33	21	12	15	19	2.7

Among the belief sets, the highest level of concern or identification was worry about the presence or return of wild dogs or dingoes (Table 33). Empathy with the suffering of predated livestock and practical concern about wild dogs or dingoes and their impact were also identified with strongly. Acceptance of and empathy with dingoes was the only belief set about which there was ambivalence. Fears about wild dogs or dingoes causing harm to people and pets were not as great as other concerns.

Table 33. Beliefs about wild dogs or dingoes in summary (365<n<418)

Belief set	Mean
Practical concern about wild dogs or dingoes and their impact	4.0
Concern about the need for better infrastructure to keep out wild dogs or dingoes	3.7
Worry about wild dog or dingo presence and return	4.2
Fears about wild dogs or dingoes causing harm to people and pets	3.3
Emotional response to wild dog or dingo attacks	3.9
Empathy with livestock being killed or mauled by wild dogs or dingoes	4.1
Acceptance of and empathy with dingoes	2.8

The following set of tables shows the mean response for each belief set, crosstabulated against the grouping variables. The only belief set whose strength did not vary much between groups was acceptance of dingoes. Beliefs were quite variable, but not significantly different, across the different regions of Victoria. There were no significant differences in beliefs by region (Table 34).

Table 34. Beliefs about wild dogs or dingoes by region (365<n<418)

Mean value of belief set	Area of Victoria			Sig. of difference
	Eastern	North-west	Rest	
Practical concern about wild dogs or dingoes	4.0	4.2	4.1	ns
Infrastructure concern	3.6	4.0	3.7	ns
Worry about wild dog or dingo presence and return	4.3	4.1	4.0	ns
Fears for people and pets	3.4	2.9	3.3	ns
Emotional response to attacks	4.0	4.3	3.9	ns
Empathy with livestock	4.0	4.1	4.2	ns
Acceptance of dingoes	2.8	2.7	2.8	ns

Significance (F test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Sharing a boundary with public land was associated with stronger levels of all belief sets except acceptance of dingoes (Table 35).

Table 35. Beliefs about wild dogs or dingoes by public land boundary (365<n<418)

Mean value of belief set	Share boundary with public land		Sig. of difference
	No	Yes	
Practical concern about wild dogs or dingoes	3.8	4.1	*
Infrastructure concern	3.4	3.8	*
Worry about wild dog or dingo presence and return	3.9	4.3	**
Fears for people and pets	3.2	3.4	ns
Emotional response to attacks	3.8	4.0	ns
Empathy with livestock	4.0	4.1	ns
Acceptance of dingoes	2.9	2.8	ns

Significance (F test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Having sheep was also associated with stronger levels of all belief sets except acceptance of dingoes (Table 36). Only four percent of those who responded to the belief question had neither sheep nor beef cattle, so most of those in the "no sheep" column were beef cattle farmers. Splitting the farmers four ways (sheep, sheep-beef, beef, neither), sheep and sheep-beef farmers had similar and not significantly different (Fisher's LSD) scores for each belief set. Also, for all belief sets except acceptance of dingoes, beef farmers had lower scores than sheep and sheep-beef farmers, and those with neither sheep nor beef had lower scores again. Overall, across all livestock classes, having sheep or not was the most discriminating variable.

Table 36. Beliefs about wild dogs or dingoes by farm type (365<n<418)

Mean value of belief set	Have sheep		Sig. of difference
	No	Yes	
Practical concern about wild dogs or dingoes	3.7	4.2	***
Infrastructure concern	3.3	3.8	**
Worry about wild dog or dingo presence and return	4.0	4.3	*
Fears for people and pets	3.2	3.4	ns
Emotional response to attacks	3.6	4.1	***
Empathy with livestock	3.8	4.2	***
Acceptance of dingoes	2.9	2.8	ns

Significance (F test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

For all belief sets except acceptance of dingoes, experience of wild dog or dingo predation on sheep was associated with stronger levels of belief than not having experienced predation, and higher predation was associated with stronger levels of belief than lower predation (Table 37). In the table, "none" means no predation, "low" means less than the median predation of 11 sheep per year, and "high" means the median predation or more. Those who had experienced high levels of wild dog or dingo predation on their sheep had the strongest beliefs of all groups tested, across all crosstabulation variables. For them, worry about wild dog or dingo presence and return, practical concerns about wild dogs or dingoes and their impact, an emotional response to wild dog or dingo attacks and empathy with livestock being killed or mauled by wild dogs or dingoes were particularly strong.

Table 37. Beliefs about wild dogs or dingoes by extent of wild dog or dingo predation (365<n<418)

Mean value of belief set	Extent of wild dog or dingo predation on sheep			Sig. of difference
	None	Low	High	
Practical concern about wild dogs or dingoes	3.5	4.1	4.7	***
Infrastructure concern	3.2	3.7	4.3	***
Worry about wild dog or dingo presence and return	3.5	4.4	4.8	***
Fears for people and pets	3.1	3.2	3.6	*
Emotional response to attacks	3.4	4.0	4.6	***
Empathy with livestock	3.7	4.2	4.6	***
Acceptance of dingoes	2.9	2.6	2.9	ns

Significance (F test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Those who coordinated wild dog or dingo control with their neighbours had strong levels of belief (Table 38)

Table 38. Beliefs about wild dogs or dingoes by coordination of control (365<n<418)

Mean value of belief set	Coordinate wild dog or dingo control with neighbours		Sig. of difference
	No	Yes	
Practical concern about wild dogs or dingoes	3.6	4.4	***
Infrastructure concern	3.2	4.1	***
Worry about wild dog or dingo presence and return	3.8	4.7	***
Fears for people and pets	3.0	3.7	***
Emotional response to attacks	3.6	4.2	***
Empathy with livestock	3.8	4.3	***
Acceptance of dingoes	2.9	2.8	ns

Significance (F test): ns not significant, * p<0.05, ** p<0.01, ***p<0.001

Respondents were also able to explain any **other concerns** they had about the impacts of wild dogs or dingoes on or near their property. Most of the descriptions of other concerns were expansions of the

concerns already listed in the closed questions. Some described the fear of finding predated livestock: *I don't see why we should tolerate any animal being torn apart while it is alive.* And c*onstant fear of finding dead, mauled and distressed livestock*. Others described more prosaic impacts: *In a tight season as this year our lambing percentage has dropped from near 130% to 70% with lambs missing heads or basically just mutilated, due to less feed in the bush/crown land*.

Some respondents started explaining what they had been doing to reduce the impacts: *Have already put in anti-dog peripheral fencing*. And further, why it did not always work: s33: personal

Other respondents offered a bigger view of the impacts: *The big expense is the loss of value in the farm when you can't calve heifers in areas or run sheep*. Also: *If we can't control the wild dogs, then we will have to give up livestock farming.* Another respondent blamed the government for the problem: *Wild dogs breed freely on public land, why are they now my responsibility? The Government does little and now threatens to protect them*.

Respondents were asked whether wild dog or dingo attacks had any **other personal effects** on them. Forty-five percent of respondents wrote something in answer to this question, and the responses were classified (Table 39). More than half (52%) mentioned mental health impacts. Eighteen percent mentioned effects on their livestock, ten percent mentioned concern for people or pets, and nine percent mentioned the cost or time or work needed to deal with the attacks.

Table 39. Other personal effects of wild dog or dingo attacks (n=235, 275 multiple responses)

Category of comment	Frequency of response (percent)
Mental health effects such as anxiety, worry, sleeplessness	52
Concern for livestock	18
Concern for people or pets	10
Cost / time / work	9
Need to change farm enterprises	6
Acceptance of dingoes	6
Anger or frustration	4
Support for Wild Dog Controllers	3
Anti-government comment	3
Other	7

Responses were mostly heartfelt. Mental health impacts were mentioned by many, many respondents (52% of those commenting). Words and phrases like these abounded: *A feeling of anger and helplessness*, *Anxiety*, *Hyper-vigilant*, *Constant wariness*, *Depression & fatigue*, *Frustration*, *I'm burnt out*, *Mental and physical exhaustion*, *Mental anguish*, *Mentally draining*, *Sleepless nights*, *Trauma to see livestock in pain*, *unsettled*, *Trepidation*, *Wariness, Worry*. One respondent mentioned an effect via social media: *abuse, trolling on line.*

There were many detailed descriptions of mental health impacts, covering a broad range of mental health effects. Here are some examples:

- Relentlessness: *Certain times of the year I don't want to get out of bed because I know what's going to confront me – I hate it so much and try my best but they keep coming*
- Feeling of responsibility to livestock: *It's my responsibility to defend livestock that cannot defend themselves and after an attack I feel that I have failed in my duty to the stock.*
- Feeling of isolation: *Makes us irritable, hard to live with. Worried all the time, anxious about what we may find. Complete sense of helplessness. Not wanting to socialise, feel like you're isolated, can't leave the farm.*
- Sleeplessness: *Many hours of sleep loss, I'm out all night with spotlight and checking stock camps. Loss of time with family and friends*
- Mental and physical health of farmers, their family and their staff: *Mental health and also physical health of me, my family and my workers.*
- Clinical depression: *I have been diagnosed with Depression, I am a strong-willed person but this has affected my life and it's very sad and concerning. Sometimes I feel helpless.*
- Heightened stress akin to being in combat: *Enormous emotional damage, constant stress …. AWI have conducted research that concluded that farmers with flocks under wild dog attacks suffer stress levels akin to those in a combat zone: please find the research.*
- Fear of the next attack: *The fear of the next never goes away. Every time crows take off I worry what's happened and hope it hasn't happened again.*
- The elusiveness of the dingo: *Chasing dingoes is like chasing a ghost. You can go out night after night and maybe you might see one but cannot get a shot. Mostly you don't find them, only hear them and find the result of their attacks … In the end you give up because the effort you put in to destroy them destroys you.*

The passion many respondents put into their answers is exemplified by this response: *I have been left so devastated to both see the mutilation, care for the injured, burn the carcasses that I can no longer go away even for a short stay leaving stock unattended. The psychological effect of seeing this and my sense of responsibility to the animals in my care has been catastrophic. There can be no words for seeing the throat ripped out of a sheep, the hind quarters torn and then infested with maggots as trying to save them and finally dragging these poor animals to a fire pile and burning them at such a temperature – all day – so hopefully there is no more for the dogs to return to.*

Some respondents described compound effects of mental health impacts:

- *sleeplessness, anxiety, depression, poor relationship with my partner as it is only the two of us supporting each other through this*
- *Causes anxiety in other family members that creates further stress for us.*
- *Reluctance to take holidays due to fear of dog attacks. The time it takes to manage wild dog threats and the subsequent mental health issues of having to work too much with little time off.*
- *Mental health impact – loss of income, difficulty paying bills etc. Why do I keep farming when I cannot control pests?*

Mental health impacts can last a long time, as some respondents explained: *I will never forget the devastation that they caused to my sheep back in 2009 to 2012*. And: *YES MAJORLY. MENTAL HEALTH IMPACT – flashbacks for 35 yrs re killings and maulings. Anxiety anticipating next attack.*

Worry over financial loss and how best to prevent next attack. Constant hypervigilance and prevalence of "dog" thought inducing emotional fatigue. One described *PTSD type symptoms*.

Concern for the effects of wild dog or dingo predation on livestock were described by 18 percent of commenters. These effects included both the physical and mental health of livestock: *The sheep are a lot harder to handle. They will fight the working dog, are not relaxed when working them in the yards. Taking more time and more dangerous to work the sheep, they ae more flighty.* Wild dog attacks were described as undoing years of breeding and education of stock: *Yes, they not only cause direct livestock losses, but cause anxiety and distress in the livestock for many months (or more) after an attack.*

Ten percent of commenters worried about attacks on people and pets increasing. Some of these worries were about feeling unsafe in bushland:

- *I don't feel safe entering forest land without a rifle.*
- *I can no longer walk through the bush on the edge of our property because I do not feel safe.*
- *My youngest son was also bailed up on a camping trip but was able to shoot it thank Christ.*

Other respondents worried about feeling unsafe on their own property:

- *I'm nervous about being alone near the bush boundary to fix a fence and never let my worker or family go alone in that area*
- *Becoming wary of them as they have followed us while we are on our side-by-side vehicles and when we stop they stop and crouch, this is predatory behaviour we have not seen before!*
- *More dogs than ever before at the moment. Packs of 6 in broad daylight hunting stock. A pack stalking my daughter and I while we were fencing.*
- *Cannot leave our dog outside in garden in case of other dogs hearing her and coming closer to our property.*
- *Farm dogs mauled*

The work of Wild Dog Controllers was appreciated by seven percent of commenters. *Without the dog trappers we would feel a complete sense of helplessness. Once a killer wild dog has breached your fence it can take days to catch, shoot remove it and each day you go out and wonder what you will be faced with. The dog trappers offer support when you need it most and skills to get the situation under control. They are experts at this and without them we would be fighting this battle alone which is isolating fearful and slow if not impossible. As a farmer you are often busy dealing with the animals that have been attacked which leaves little time in the day to move onto stopping the next attack. Again we need to keep the dog trappers and their skills.*

This person experienced a mix of high and low emotions around the Wild Dog Controller's visit: *A dogger visited my property during the last killing spree after much effort at control on my part and many phone calls to find such a person. On that day he spotted the dog and shot it. The feeling of relief was instant. I didn't know whether to hug the dogger or burst into tears at the feeling of relief. This feeling was quickly replaced with a worry that there may be more than one dog. Luckily there wasn't. For the record I did not hug the dogger or burst into tears.*

Six percent of commenters described how wild dogs or dingoes had forced them to change enterprises:

- *Their presence has changed the purpose of the property – it is no longer suitable to run sheep.*
- *Wild Dogs have forced us to completely destock sheep and transfer to a beef breeding operation. Lifting the unprotection order would force us to destock breeding cattle which would likely force us off the farm*

Some commenters (6%) expressed a positive comment about dingoes: *They are just doing what an apex predator does. I accept that farming livestock on land adjacent to the National Park has a predator risk*. And: *No, they are predators and unfortunately the sheep and chickens are prey*.

Three percent of commenters directed anger at the state government: *Angry the government doesn't seem to care about farmers and their battles to remain viable*. And: *Wild dog attacks make me sick as a producer who strives to provide high grade animal welfare to our stock and as the Government has removed the unprotection order, they should be charged with being directly responsible for attacks on our animals and animal cruelty by their livestock*

Sheep flock intentions

Half the respondents with sheep intended to maintain the size of their flock (Table 40). Respondents' intentions to increase, maintain or decrease the size of their sheep flock were not strongly associated with flock size.

Table 40. Sheep flock intentions (n=271)

Sheep numbers intentions	Frequency of response (percent)	Median flock size (head)	Median change (head)	Mean percentage in 12 months
Increase	29	700	200	142
Same	50	800		100
Decrease	20	600	200	65
Exit	1			0

Those intending to reduce their sheep flock or exit from sheep completely were similar to those who intended to maintain or increase their sheep flock in the size of their flock and their spending on wild dog or dingo monitoring and on lethal control of wild dogs and dingoes, but had much larger sheep losses due to killing or maiming by wild dogs or dingoes (Table 41). None of these differences were significant (Median test).

Table 41. Sheep loss and wild dog or dingo control by sheep flock intentions (127<n<212)

Median value of:	Sheep numbers intention	
	Same or increase	Decrease or exit
Number of head of sheep in flock	800	600
Number of sheep lost to wild dogs or dingoes	5	16
Total spend on monitoring wild dogs or dingoes	$1500	$1500
Total spend on lethal control of wild dogs or dingoes	$1700	$1500
Total spend on lethal controls per sheep in flock	36c	67c
Total spend on lethal controls per sheep lost to wild dogs or dingoes	$0	$14
Total spend on non-lethal control of wild dogs or dingoes	$5300	$11,750
Total spend on non-lethal controls per sheep in flock	$1.58	$8.53
Total spend on non-lethal controls per sheep lost to wild dogs or dingoes	0	$54

The intention of the survey was to ask those who were not currently running sheep but intended to start or resume running sheep next season why they intended to do so. In the final version, all respondents were asked this question. Some complained about it being irrelevant, but many took the opportunity to explain why they ran sheep. In many cases it was because that was what they had always done. *They are a major component of our business model and income. We have historically had them on our property and as part our business for several generations*. And: *We successfully farm sheep and cattle and have done so for over 50 years*

Some explained that their land was best suited to sheep. *The property is best suited to sheep. Too rocky to crop. No cattle infrastructure. Yards, water, fences*. And: *We run a sheep enterprise – our property is best suited to sheep. The only reason I would stop running sheep is if we were prevented from shooting and baiting wild dogs.*

Others said they liked sheep. *I am interested in wool production and do not intend for predators to prevent this interest*. And: *Sheep are my passion and I believe we're good at it and our boys would like to take over one day.*

Some respondents took the opportunity to explain that they would have to cut sheep numbers or get out of sheep altogether if wild dogs or dingoes became more prevalent or their right to kill wild dogs or dingoes was withdrawn:

- *We have to reduce sheep numbers due to the increased numbers of wild dogs on our property this year. The future is not looking ideal for sheep on our property*
- *We love what we do. We look after our animals. It is part of our business structure. We need flexibility with our income. If predation becomes too great we may need a rethink.*

- *With 6 paddocks bordering public land, we are discussing removing all stock from these paddocks and moving them further away from the boundaries. Effectively reducing our capability to maintain stocking rates and levels.*
- *This decision is pending on government outcome whether dingos will be protected or not. If dingos are protected then l will reduce my numbers over time.*
- *We will move states if no kill introduced*
- *This is what I have done all of my life and is extremely difficult to stop working at a successful career. Especially when the reasons to stop come from outside my management sphere of influence.*

Some said they wanted to increase sheep numbers but could not: *They are essential for eating out firebreaks around houses, haysheds and machinery sheds. I wish I could run more but it's impossible with the wild dogs and dingos*. And: *We will continue with the sheep numbers that we have at the moment as we can keep that number reasonable safe from dogs. We are unable to increase numbers and run them all over our property as we are unable to keep them safe from dogs.*

Concern about other animals

Sixty-four percent of respondents said they had experienced livestock losses from predators other than wild dogs or dingoes (e.g., foxes, eagles, etc.) in the last five years. However, 29 percent did not answer the question and the 64 percent figure is the percentage of those who did answer the question. Also, the wording of the question excluded wild dogs or dingoes but not domestic dogs. This compares with 58 percent who said they had lost stock to wild dogs or dingoes and 20 percent who said they had lost stock to domestic dogs ("don't know" responses removed).

Respondents were asked how concerned they were about livestock losses from predators other than wild dogs and dingoes (Table 42). The question about wild dog or dingo concern was worded more generally than this one: "If you are concerned about about wild dogs or dingoes on or near your property, how would you describe your concern?" Concern about other predators was not correlated with concern about wild dogs or dingoes. The mean concern about other predators (3.7) was significantly less than the mean concern about wild dogs or dingoes (4.1; paired samples t-test, $t=3.9$, $p<0.001$).

Table 42. Concern about other predators (n-289)

Level of concern	Frequency of response (percent)
Not at all concerned	4
Slightly concerned	19
Moderately concerned	20
Very concerned	19
Extremely concerned	37
Unsure	1
Does not apply to me	<1

Other comments

The final question asked if there was anything else respondents wanted to say about the management of control of wild dogs or dingoes on their farm. Forty-five percent of respondents wrote something in answer to this question, and the responses were classified (Table 43). The most common comments were those favourable to existing arrangements. Twenty eight percent of commenters said the current arrangements were working well or requested they be kept, 17 percent made a favourable comment about their local Wild Dog Controller or the controllers generally, and 10 percent commented favourably on the lethal controls currently available in most of Victoria (either baiting, trapping or shooting). Taken together (and removing any double counting) half of those who made a comment (50%) made one or more of those comments. Other comments were made by small numbers of respondents (3% represents somewhere between 6 and 8 comments).

Table 43. Other comments (n=235, 293 multiple responses)

Category of comment	Frequency of response (percent)
Keep current arrangements (Wild Dog Program, unprotection order), they are working well	28
Wild Dog Controllers – favourable	17
Wild Dog Controllers – unfavourable or insufficient resources	3
(Keep current arrangements or WDC – favourable)	(41)
Lethal controls (baiting, trapping, shooting) – favourable	10
Lethal controls – unfavourable	1
(Keep current arrangements or WDC – favourable or lethal controls – favourable)	(50)
Non-lethal controls (fencing, guardian animals) – favourable	3
Non-lethal controls – unfavourable	3
Wild dog or dingo numbers are increasing	6
Mental health effects	5
They're government's dogs / government should fix it	5
Need to change farm enterprises in response to attacks	4
Concern for people or pets	3
Other pests are worse	3
Concern for livestock	3
They're not dingoes or not pure	3
Government should pay us compensation for stock losses or provide financial support for non-lethal controls	3
Don't want any dingoes introduced anywhere	3
Acceptance of dingoes	3
A few farmers should not have to bear the burden for a public good	2
Effects on native species	2
Other	17

Twenty-eight percent of commenters took the opportunity to request the current Wild Dog Management Program and regulatory arrangements be continued, most of them saying the arrangements were working well so why change them. Several more specific points were made:

- It was working as well as it has ever worked: *The current program is working very well to reduce livestock attacks on our properties. This has not always been the case. We've had horrific losses in the past when the wild dog program was poorly managed and operated.*
- It was effective, particularly as part of a coordinated effort: *Excellent support from DEECA staff and working with neighbours when wild dogs are reported has been very effective in reducing impacts of wild and domestic dogs on our livestock.*
- The program's effectiveness was also seen by some as a form of reassurance: *The wild dog program in its present state is a very effective program, this gives us a lot of comfort on a daily basis*.
- Some people were worried their farm would be unviable without it: *If it was not for the constant trapping on our crown land boundaries by government trappers, wild dogs would make our farm unviable.*
- Some people described the unreliability of non-lethal control, adding that their own attempts at lethal control were ineffective and only the local Wild Dog Controller had the skill to achieve lethal control: *We have done everything possible to keep the wild dogs out. We spend an enormous amount of time building, maintaining exclusion fencing with neighbours including the government. Despite our work we depend heavily on our government funded wild dog trapper. Keeping fallen trees off our fences along the bush line and finding new wombat holes under the fences is a constant battle. When the dog numbers build and some are so cunning only the trapper can ease the pressure by removing the offenders. Please keep these important workers. We need them frequently.*

Seventeen percent of commenters described the work of the Wild Dog Controllers glowingly. Some comments were as simple as *the wild dog man is our saviour.* Other respondents were more effusive. Several specific points about the benefits of the Wild Dog Controllers were made:

- They were responsive: *Our dog man has been exceptional. I call or message whenever I hear wild dogs and he is there ASAP and we feel well supported and work together*
- They helped all kinds of farmers: *As a young female farmer having the wild dog co-ordinator and control officers is an invaluable resource for advice, information and assistance.*
- They were effective: *The skill of the dogger who shot the last dog to prey on my lambs was the reason the killing spree ended. Doggers are an integral part of dog control. Although this was more than 5 years ago it is still a strong memory.*
- They provided not only material support but also emotional support: *We work closely with our local Wild Dog Controller who is an integral part of reducing attacks on our livestock. They have been a great resource and support in distressing circumstances. They have always responded promptly to reports and invested time to maximise control methods which in turn has given us the confidence to continue farming.*
- They possessed local knowledge: *The Wild Dog Control Officer has been an incredibly professional and valuable resource in helping manage the wild dogs. His knowledge of the area and the packs of dogs that operate in this area is priceless and integral to a targeted management program.*
- They were, however, seen by some as a limited resource (this comment immediately followed the preceding comment): *But of course, he cannot be everywhere across his territory all at once,*

which is why producers also need to be able to manage wild dogs with lethal force if the situation calls for it. (i.e. dogs are attacking livestock and producer is witness to the attack). This commenter also makes the point that leaving lethal control to the local Wild Dog Controller may not be enough in some circumstances.

- One respondents suggested that only Wild Dog Controllers should be able to use lethal control: *Happy for the government to implement a ban on landowners managing wild dogs with lethal control, as we prefer this continues to be managed by DEECA's Wild Dog Control Program.*

Not all comments on the current Wild Dog Control Program were positive: *Despite contacting the department when my neighbours and I have had stock losses, we have given up on ever receiving any helpful assistance. The only solution that has been offered was cameras in a nearby state forest to monitor dog movements. This has had absolutely no positive impact on our stock losses.*

Two broad comments convey the close inter-relationships between predation impacts. This comment covers the categories of having to change enterprises and concern for people and pets: s33: personal [redacted] *... Baiting on farm is difficult when you have working dogs so we can only bait our boundary to public land. More needs to be done by DEECA to control numbers in the bush. I watched 6 dogs on a sick deer in the middle of the day and I thought that if you were injured in the bush you wouldn't stand a chance. They are bolder than ever at the moment.*

This comment combines ineffectiveness of non-lethal controls with concern for people, pets and livestock and both the cost and mental health impacts of attacks: *You cannot totally protect your boundary when you border the bush. There are creeks and massive gullies and smart dogs find a way. We have companion animals but you can't really tell if they are effective unless you are out at night when a dog attack occurs. This is impossible to do! We can no longer go walking in the bush along the fire track because of fear of encountering a pack of dogs. This has happened previously on two occasions and it is incredibly scary. The dogs will breed up and become a huge problem if we cannot control them with dog men. Financially it is disastrous when you lose sheep. Mentally it is exhausting and stressful. You have to go and put down sheep and lambs that are left maimed and dying and you are never sure how long they have been suffering.*

Some respondents made comments that were generally favourable toward dingoes, saying they belonged in the landscape as an apex predator and helped keep native animal populations in balance:

- *Dingos belong in the landscape, we can learn to live with them.*
- s33: personal *, value Dingoes as a apex predator, kangaroos, wallaby populations are in better balance with dingoes in pack unaffected by human control.*
- *Please stop baiting dingos. Recognise that 'wild dog' is a pejorative term used to justify killing these native apex predators and they need to be protected. We need to change the conversation and better adapt our farming practices to coexist with dingoes.*
- *I believe that wild dogs/ dingoes are an important part of the Australian ecosystem. Interfering with their populations just makes the problem of pigs, deer and kangaroos much worse. Australia is DECADES behind other countries in embracing its native predators.*

Against this, some argued that either the animals were not actually dingoes but wild dogs (*All of the wild dogs in our area are a black brindle color with a thick long coat and short tail - they do not resemble a dingo at all and are suggestive of a mix of domestic dogs.*) or that dingoes were not a

native species anyway (*dingos are just introduced dogs and should not be protected, they kill the true native wildlife*).

There was also a theme concerning farmers' relationship with government. This combined the three categories of government's responsibility to manage its dogs, request for compensation for stock losses or financial support for fencing, and request for the costs of managing a public good being shared more widely. These three quotes cover those categories:

- *I heard dogs tonight howling in the hills … Come spring they will be after my calves. I produce your food. Redirect your funding and resources and help your producers, we pay taxes and live* s33: personal *and live with the consequences of the animals that breed in the bush. If my animals were impacting the State Forest I would be held accountable. Why aren't you?*
- *Compensation for losses without the bullshit. The state owns the dingoes dogs and what goes with that ownership is responsibility to control and Compensate the landowners for their losses just like if my dog did damage I would have pay Compensation, restoration for their loss. So man up and sort this out.*
- *Conserving the Dingo is for the common good of all Victorians and I'm having a hard time grappling with why such a small number of people have to shoulder the entire burden.*

Summary of key findings

- Losses of sheep to predation by wild dogs or dingoes were substantially greater than losses of cattle. Losses to wild dogs or dingoes were substantially greater than losses to domestic dogs.
- Wild dogs or dingoes were a bigger problem than domestic dogs in Eastern Victoria and the North-west, while in the rest of Victoria domestic dogs were the bigger problem. In other words, where there are wild dogs or dingoes they are a bigger problem for farm livestock than domestic dogs, and where there are few or no wild dogs or dingoes domestic dogs are the bigger problem.
- Approximately half of the respondents shot wild dogs or dingoes and maintained their property hygiene. A substantial minority (20% or more) used ground baiting with 1080, trapping or exclusion fencing.
- Non-lethal controls were seen as either expensive or ineffective.
- The amounts spent on monitoring wild dog or dingo activity was similar to the amount spent on lethal controls, and both were much less than the amount spent on non-lethal controls.
- Farmers with losses of sheep to wild dog or dingo predation spent about the same amount on monitoring and control, no matter what the level of predation.
- Concern about wild dogs or dingoes, as expressed by the various beliefs, was high – higher than usual for measured beliefs.
- Concerns were highest among those who had sheep and who had experienced attacks on their sheep by wild dogs or dingoes.
- Location, whether region of Victoria or connection to public land, made much less difference to concerns about wild dogs or dingoes than experience of attacks.
- There was high regard for Wild Dog Controllers and their work, and a desire for the Wild Dog Control Program to be maintained.
- Overall, farmers were worried that the potential withdrawal of their right to lethally control dingoes would mean they as a small group would have to bear the cost of a policy change that benefitted all Victorians.

Discussion and conclusion

Losses of sheep to predation by wild dogs or dingoes were substantially greater than losses of cattle. And losses to wild dogs or dingoes were substantially greater than losses to domestic dogs. That is why this report has focused on losses of sheep to wild dogs or dingoes. Wild dogs or dingoes were a bigger problem than domestic dogs in Eastern Victoria and the North-west, while in the rest of Victoria domestic dogs were the bigger problem. In other words, where there are wild dogs or dingoes they are a bigger problem for farm livestock than domestic dogs, and where there are few or no wild dogs or dingoes domestic dogs are the bigger problem.

Approximately half of the respondents shot wild dogs or dingoes and maintained their property hygiene. A substantial minority (20% or more) used ground baiting with 1080, trapping or exclusion fencing. Non-lethal controls were seen as either expensive or ineffective. The amounts spent on monitoring wild dog or dingo activity was similar to the amount spent on lethal controls, and both were much less than the amount spent on non-lethal controls. Farmers with losses of sheep to wild dog or dingo predation spent about the same amount on monitoring and control, no matter what the level of predation.

Concern about wild dogs or dingoes, as measured by the various belief sets, was high. It is uncommon to measure such strongly held beliefs in a survey. Levels of concern were highest among those who had sheep and who had experienced attacks on their sheep by wild dogs or dingoes, much higher than for those who had not experienced attacks. The location of respondents made much less difference to their level of concern about wild dogs or dingoes than having sheep or experiencing predation. This was true whether respondents were split by their region of Victoria or their property's connection to public land.

In providing an overview of the findings it is hard to be more definitive than that, given the nature and quality of the data. The problems with the nature of the data are that the distributions of many variables were skewed, there were outlier data points and the values of many variables were truncated at zero. Parametric statistical analysis requires that data are normally distributed and not skewed. It also requires that distributions of data points within each variable have only one peak. Many variables in this study had a narrow peak at zero and another, wider, peak at a non-zero value. That is why, for the spending crosstabulations a two-step process was used of comparing those incurring zero expense with those incurring some expense, then comparing the expenses of those who had incurred them. It is also why non-parametric statistical tests were generally used.

The problem with data quality is that there were a lot of questions, full of subtleties and making complex demands on the respondents. So there were some logical inconsistencies in some of the responses, and some other responses were sometimes difficult to interpret. For example, some respondents said they had experienced predation by domestic dogs but not wild dogs or dingoes, yet they indicated the same number of affected sheep for both classes of dogs. Some of these inconsistencies were resolved through subtraction and triangulation of responses. Nevertheless, some uncertainty remains.

For most if not all farmers, markets and seasonal conditions have much more effect on livestock losses and farm financial performance than wild dog or dingo attacks. What markets and seasonal conditions don't provoke is the level of visceral anguish felt by those who confront the sight of livestock killed or maimed by wild dogs or dingoes. The psychometric theory of risk perception (Slovic 1987, 2000) replaces the cold calculus of risk assessment based on likelihood and

consequences with a more socially realistic model of risk perception based on the fear of the unknown and uncontrollable and the dread of it happening.

The psychometric model of risk perception applies to predation of livestock by wild dogs or dingoes. Actual losses of livestock and income may not be great, but the mental damage may be greater. Respondents to this survey wrote passionately about how much they cared about their livestock, the effect of dealing with killed or maimed stock on their mental health and their dread of wild dogs or dingoes returning not to eat their stock but to play with them. Similar responses to wild dogs have been observed in farmers in the Upper Hunter Valley of NSW (Fitzgerald and Wilkinson 2009).

Unknown, dread and fear drive not only the worries of those who have experienced wild dogs or dingoes predating their livestock but also those who have not yet experienced predation but know their neighbours or friends have. Several respondents wrote about exclusion fences moving wild dogs or dingoes to the next property, or the next after that. Sometimes the issues farmers are most concerned about are not the ones with the greatest average cost but the ones that place an inordinately large burden on a small number of people, and those where it is not easy to predict who will be affected next (Jarvis and Wilkinson 1998). The combination of inequity and fear about who might be next is powerful.

Respondents expressed overwhelming gratitude for the work of Wild Dog Controllers. When it came to solving problems of livestock predation by wild dogs or dingoes, being allowed to use lethal control methods for wild dogs or dingoes yourself appeared to come second to having access to a local Wild Dog Controller. They were seen as having highly valued knowledge, experience and expertise. The Wild Dog Control Program as a whole was also described favourably by quite a few respondents. Whether any wild dogs or dingoes that were killing or maiming farmers' sheep were to be killed by Wild Dog Controllers or the farmers themselves, quite a few farmers explicitly requested that the current regulatory arrangements permitting such lethal control be allowed to remain. The tone of these statements varied from a polite request to a threat to sell up and move interstate. Several farmers requested the state government to consult more widely with them as the people most affected by wild dog or dingo management policy decisions. Finally, farmers were worried that the potential withdrawal of their right to lethally control wild dogs or dingoes would mean they as a small group would have to bear the cost of a policy change that benefitted all Victorians.

References

Fitzgerald, G and Wilkinson, R (2009) *Assessing the social impact of invasive animals in Australia*. Invasive Animals Cooperative Research Centre, Canberra, 36pp.

Jarvis, P and Wilkinson, R (1998) *Survey of compliance costs of New Zealand farmers: a study of costs and an exploration of issues*. MAF Policy Information Paper 24, Ministry of Agriculture and Forestry, New Zealand, 43pp.

Slovic P (1987) Perception of risk, *Science* 236: 280–285.

Slovic P, ed. (2000) The perception of risk. London, Routledge.

Appendix: questionnaire

Agriculture Victoria is seeking up-to-date data to better understand how wild dogs and dingoes are affecting Victorian livestock farmers.

To do the best job we can, we need good information on how wild dogs and dingoes are affecting Victorian livestock farmers. That is why we are conducting this survey.

The **purpose of this survey** is to collect data from farmers about incidents of livestock predation by wild dogs and dingoes on private land, including:

- levels and frequency of livestock predation experienced;
- range of impacts of livestock predation experienced by you and your local community;
- effectiveness and efficiency of lethal and non-lethal control methods.

Data collected through the survey will help inform a review of the policies and regulations for the management of livestock predation and conservation of dingoes in Victoria.

In partnership with Traditional Owners, Agriculture Victoria will commence formal consultation in the coming weeks, with farmers, ecologists, industry, and other stakeholders being invited to participate and provide feedback.

This survey is being conducted by Agriculture Victoria, which is part of the Department of Energy, Environment and Climate Action. This survey uses the terms 'wild dogs' and 'dingoes' which includes dingo-dog hybrids or crosses, but not domestic dogs.

Participation in the survey is voluntary. The survey should take about 20-30 minutes to complete if you have had few impacts from wild dogs or dingoes. If you have had considerable impacts, it may take longer. Please return the survey before **11:59pm on 06/08/2024:**

- **Scan and email to**: livestockpredation@agriculture.vic.gov.au; or
- **Post to:** Agriculture Victoria Predation Survey, 475-485 Mickleham Road, Attwood, 3049

This survey is confidential and anonymous. It does not ask for your name. No information about individuals will be released. DEECA's privacy policy can be found at: deeca.vic.gov.au/privacy

If you have any queries about the survey please email livestockpredation@agriculture.vic.gov.au

If you would like to verify that this survey is genuine, contact Agriculture Victoria on 136 186.

Further information about wild dog management, dingo conservation and the dingo unprotection order is available on the Agriculture Victoria website at: agriculture.vic.gov.au/biosecurity/pest-animals/managing-wild-dogs-in-victoria.

Section 1. About you and your property

Answering these questions will help us identify trends in wild dog and dingo impacts across farm and business types, as well as regions.

1. What is the postcode of where your property, farm or business is located? Where you have multiple post codes, please provide the post code covering the largest area of your property.

2. What is your nearest town?

3. Which of the following best describes your farm business?

   ☐ Livestock only

   ☐ Mixed (livestock and other enterprises such as cropping or horticulture)

   ☐ No livestock

   ☐ Other (please specify in the space below)

   _____

   Does any part of your property share a boundary with public land?

   ☐ Yes

   ☐ No

Section 2. Livestock on the property

Answering these questions will help us to better understand production systems in areas impacted by wild dogs and dingoes and impacts on primary producers.

4. Do you currently have livestock on your farm?

   ☐ Yes

   ☐ No

   If 'Yes', please go to Q7

5. In the past 5 years, have you had livestock on your farm?

   ☐ Yes

   ☐ No

   If 'No', please answer Q6a

5a. Please specify the reason you are no longer running livestock.

6. For the past 5 years, please estimate average annual livestock numbers on your farm.

Livestock Type	Number
Sheep	
Beef cattle	
Pigs	
Goats	
Deer	
Horses	
Dairy cattle	
Poultry	
Alpacas	
Other (please specify number and type)	

Section 3. Impacts from wild dogs and dingoes

Answering these questions will help us quantify the impacts wild dogs and dingoes have on livestock and livestock producers.

7. Have you **seen or heard** wild dogs, dingoes, or domestic dogs (other than your own) on or around your property in the last 5 years? **Tick all that apply.**

   ☐ Yes, wild dog or dingo

   ☐ Yes, domestic dog

   ☐ None

   ☐ Unsure

8. Have you **experienced** any livestock losses from wild dogs, dingoes, or domestic dogs (other than your own) on or around your property in the last 5 years? **Tick all that apply.**

   ☐ Yes, wild dog or dingo

   ☐ Yes, domestic dog

   ☐ None

   ☐ Unsure

9. Please provide an estimated annual average of the number and type of livestock killed and maimed by **wild dogs or dingoes** over the last 5 years (between 2019 and 2023). **Fill in all the sections that apply.**

Livestock type	Number
Sheep	
Beef cattle	
Pigs	
Goats	
Deer	
Horses	
Dairy cattle	
Poultry	
Alpacas	
Other (please specify number and type)	

9a. Please provide an estimated annual average of the number and type of livestock killed and maimed by **domestic dogs (other than your own)** over the last 5 years (between 2019 and 2023). **Fill in all the sections that apply.**

Livestock type	Number
Sheep	
Beef cattle	
Pigs	
Goats	
Deer	
Horses	
Dairy cattle	
Poultry	
Alpacas	
Other (please specify number and type)	

10. Do you keep records of wild dog or dingo or domestic dog activity on your farm?

☐ Yes

☐ No

If 'No', please go to Q13

11. How do you keep records of wild dog or dingo or domestic dog activity on your farm? **Tick all that apply.**

☐ FeralScan app such as WildDogScan

☐ I keep my own written or electronic records

☐ I photograph killed or maimed stock

☐ Other (please specify in the space below)

_____

12. Which of the following situations on your property would prompt you to report **wild dog or dingo activity** to your local wild dog controller? **Tick all that apply.**

☐ Heard wild dogs or dingoes on your property

☐ Saw wild dogs or dingoes on your property

☐ Wild dog or dingo attacks on human(s)

☐ Wild dog or dingo attacks on your own domestic animal(s)

☐ Wild dog or dingo attacks on your livestock

☐ Wild dog or dingo activity seen or heard on public land

☐ Other (please specify in the space below)

_____

13. Which of the following situations on your property would prompt you to report **domestic dog (other than your own)** activity to your local council? **Tick all that apply.**

☐ Heard domestic dogs on your property

☐ Saw domestic dogs on your property

☐ Domestic dog attacks on human(s)

☐ Wild dog or dingo attacks on your own domestic animal(s)

☐ Domestic dog attacks on your livestock

☐ Other (please specify in the space below)

_____

14. If you are concerned about wild dogs or dingoes on or near your property, how would you describe your concern? **Please tick one option.**

☐ Not at all concerned

☐ Slightly concerned

☐ Moderately concerned

☐ Very concerned

☐ Extremely concerned

☐ Unsure

☐ Does not apply to me

15. If you are concerned about the following impacts of wild dogs or dingoes on or near your property, please describe your concern? **Please tick one response per statement.**
(Possible responses: Not at all concerned, Slightly concerned, Moderately concerned, Very concerned, Extremely concerned, Unsure, Does not apply to me)

- Upgrade of current infrastructure such as fencing to keep out wild dogs or dingoes
- Installation of new infrastructure such as fencing to keep out wild dogs or dingoes
- Predation on livestock
- Increased incidence of disease among people and farm animals
- Reduced lambing or calving percentage
- Mismothered, orphaned, or abandoned lambs or calves
- Attacks on humans
- Attacks on domestic animals
- Other (please specify)

16. Listed below are statements that someone might use to describe their thoughts or feelings following wild dog or dingo attacks. Please indicate **the extent to which you identify** with each statement and **tick one response per statement.**
(Possible responses: Not at all, Somewhat, Moderately, Quite a bit, Extremely, Don't know, Does not apply to me)

- I am worried about the viability of my farming business due to wild dog or dingo attacks on my livestock
- I am worried that my lambing or calving percentage will be reduced
- Predation is just one of many causes of livestock losses
- I fear for the safety of myself, my family, or my workers

- Seeing stock mauled or killed has emotionally affected me, my family, or my workers
- The attacks have left me distressed or anxious
- The attacks have left me angry
- I feel watchful or on-guard
- I am worried about increased presence of wild dogs or dingoes in my area
- I am concerned about the increased workload associated with managing predation
- In the context of everything else that could reduce my income, predation does not cause a big loss.
- I am worried about wild dogs or dingoes returning to my area
- I feel helpless in my ability to protect my livestock
- I am concerned about prolonged suffering of stock that have been attacked
- I accept that Dingoes are part of Australian landscape but and I am interested in ways to reduce livestock losses without losing Dingoes from the landscape.

17. Have the wild dog or dingo attacks had any other personal effects on you? Please describe**.**

18. Are you currently a sheep producer?

☐ Yes

☐ No

If 'No', please go to Q25

19. Over the next 12 months, on your property do you intend to:
Please tick one response

☐ Increase sheep numbers

☐ Decrease sheep numbers

☐ Keep sheep numbers about the same

☐ Stop farming sheep commercially altogether

☐ I don't know / none of the above

21. **If you intend to 'increase sheep numbers',** by how many head do you intend to increase (number) and explain why?

22. **If you intend to 'decrease sheep numbers'** by how many head do you intend to decrease (number) and why?

23. **If you intend to 'stop farming sheep commercially altogether',** why?

24. Listed below are statements that might influence your decision to reduce sheep numbers or stop farming sheep commercially. Please indicate **the extent to which each statement might influence** your decisions and **tick one response per statement.**
(Possible responses: No influence, Slight influence, Moderate influence, Strong influence, Extremely strong influence, Don't know, Does not apply to me)

- Lower market prices for your livestock
- Increased input costs
- Dry seasonal conditions or drought
- Difficulty getting shearers or other workers
- Reduced ability to cope with the workload
- Need to reduce the stocking rate
- Inadequate infrastructure
- Predation by dingoes or wild dogs
- Not being allowed to use lethal control measures to minimise predation

Only answer to Q25 if you have answered 'No' to Q19 (you are NOT a sheep producer)

25. Do you intend to start or resume running sheep on your property next season? **Please tick one option.**

☐ Yes

☐ No

☐ Don't know

If 'Yes', please answer Q26

26. Please explain why you intend to start or resume running sheep on your property next season? **Please provide your response in the space below.**

27. How many sheep do you intend to introduce to your property next season?

Section 4. Monitoring methods

Monitoring for wild dogs or dingoes is a key component for pest animal management. We want to understand how you monitor for wild dogs or dingoes on your property.

28. What **monitoring methods** do you use on your property for wild dogs or dingoes? **Please tick all that apply.**

☐ Monitoring of bait sites

☐ Camera traps (video, photo)

☐ DNA analysis

☐ Hair or scat samples

☐ Observations (wild dogs or dingoes seen around the property)

☐ Looking for footprints

☐ Other (please specify in the space below)

_____

☐ None, I do not monitor

29. Over the past 5 years, on average, how much money have you been spending on techniques to **monitor** wild dogs or dingoes on your property in a 12-month period?

Method	Amount ($)
Monitoring of bait sites	
Camera traps (video or photo)	
DNA analysis	
Hair or scat samples	
Observations (wild dogs or dingoes seen around the property)	
Footprints	
I have not invested any money on techniques to monitor wild dogs or dingoes	
If you have provided a monitoring method that is not in the list in Q28, please include that in this response.	

Section 5. Lethal control methods

The following questions are related to the lethal control methods used on your property for wild dog/dingo control.

30. Over the past 12 months, if you have used **lethal control methods** to control wild dogs or dingoes on your property, what were they? **Please tick all that apply.**

    If you have answered 'No lethal control methods used', please go to Q32

    ☐ 1080 baiting using ground baiting methods

    ☐ 1080 baiting using Canid Pest Ejectors

    ☐ PAPP baiting using ground baiting methods

    ☐ PAPP baiting using Canid Pest Ejectors

    ☐ Trapping

    ☐ Shooting

    ☐ Other method (please specify in the space below)

    _____

    ☐ No lethal control methods used

31. In the 12 months following use, please rate how **effective** the methods used have been in controlling wild dogs or dingoes on your property.
    Please provide a response only for methods selected in Q30 and tick one response per method.
    (Possible responses: Completely stopped livestock losses, Some decrease in livestock losses, No change in livestock losses, Some increase in livestock losses, Large increase in livestock losses, Don't know, Not applicable)

    - 1080 baiting using ground baiting
    - 1080 baiting using Canid Pest Ejectors
    - PAPP baiting using ground baiting
    - PAPP baiting using Canid Pest Ejectors
    - Trapping
    - Shooting
    - If you have provided a lethal control method that is not in the list in Q30, please include that in this response.

32. For the following **lethal methods** that you have **not** used, what would you say is the **most important** reason for not using it. **Please only provide a response only methods you have not selected in Q30 and tick one response per method.**
(Possible responses: High capital investment, High maintenance cost, Difficult to use, Long time to implement, Landscape not suitable, Operator safety or licence requirement (eg. costly or time consuming to obtain), Risk to non-target animals including domestic animals, Did not know about this lethal method before today)

- 1080 baiting using ground baiting methods
- 1080 baiting using Canid Pest Ejectors
- PAPP baiting using ground baiting methods
- PAPP baiting using Canid Pest Ejectors
- Trapping
- Shooting

33. Over the past 5 years, on average, how much money have you spent on **lethal control** for wild dogs or dingoes on your property in a 12-month period?

Method	Amount ($)
1080 baiting using ground baiting	
1080 baiting using Canid Pest Ejectors	
PAPP baiting using ground baiting	
PAPP baiting using Canid Pest Ejectors	
Trapping	
Shooting	
If you have provided a lethal control method that is not in the list in Q30, please include that in this response.	

Section 6. Non-lethal control methods

The following questions are related to the <u>non-lethal control methods</u> used on your property for wild dog/dingo control.

34. Over the past 12 months, what **non-lethal control methods** have you used to control wild dogs or dingoes on your property? **Tick all that apply.**

If you have answered 'None of the above', please go to question Q36

☐ Keeping the property clean, such as by removing carcasses promptly

☐ Installing infrastructure such as lambing sheds or night pens

☐ Exclusion fencing – non-electric fencing

☐ Exclusion fencing – electric offsets

☐ Guardian animals - donkeys

☐ Guardian animals – alpacas or llamas

☐ Guardian animals – dogs (e.g. Maremmas)

☐ Visual deterrents – flashing lights or high beam lights

☐ Visual deterrents – automated or sensor lights

☐ Visual deterrents – inflatable tube men

☐ Noise deterrents

☐ Smell deterrents

☐ Other (please specify in the space below)

_____

☐ None of the above

35. In the 12 months following use, please rate how **effective** the non-lethal control methods have been in controlling wild dogs and dingoes on your property?
Please only provide a response for methods selected in Q34 and tick one response per method.
(Possible responses: Completely stopped livestock losses, Some decrease in livestock losses, No change in livestock losses, Some increase in livestock losses, Large increase in livestock losses, Don't know, Not applicable)

- Keeping the property clean, such as by removing carcasses promptly
- Installing infrastructure such as lambing sheds or night pens
- Exclusion fencing - non-electric fencing
- Exclusion fencing - electric offsets
- Guardian animals - donkeys
- Guardian animals - alpacas or llamas
- Guardian animals - dogs (e.g., Maremmas)
- Visual deterrents - flashing lights or high beam lights
- Visual deterrents - automated or sensor lights
- Visual deterrents - inflatable tube men
- Noise deterrents
- Smell deterrents
- If you have provided a non-lethal control method that is not in the list in Q34, please include that in this response.

36. For the following **non-lethal methods** that you have **not** used, what would you say is the **most important** reason for not using it.
Please provide a response only for methods you have not selected in Q34 and tick one response per method

(Possible responses: High capital investment, High maintenance cost, Difficult to use, Long time to implement, Landscape not suitable, Operator safety or licence requirement (eg. costly or time consuming to obtain), Risk to non-target animals including domestic animals, Did not know about this non-lethal method before today)

- Keeping the property clean, such as by removing carcasses promptly
- Installing infrastructure such as lambing sheds or night pens
- Exclusion fencing – non-electric fencing
- Exclusion fencing - electric offsets
- Guardian animals - donkeys
- Guardian animals - alpacas or llamas
- Guardian animals - dogs (eg. Maremmas)
- Visual deterrents - flashing lights or high beam lights
- Visual deterrents - automated or sensor lights
- Visual deterrents - inflatable tube men
- Noise deterrents
- Smell deterrents

37. Over the past 5 years, on average, how much money have you spent on **non-lethal control** for wild dogs or dingoes on your property in a 12-month period?

Method	**Cost ($)**
Infrastructure such as lambing sheds or night pens	
Exclusion fencing – whole property	
Exclusion fencing – only some paddocks fenced	
Exclusion fencing – cluster fencing of a group of properties	
Guardian animals – donkeys	
Guardian animals – alpacas or llamas	
Guardian animals – dogs (e.g., Maremma)	
Visual deterrents – flashing lights or high beam lights	
Visual deterrent – automated lights	
Visual Deterrent – inflatable tube men	
Noise deterrents	
Smell deterrents	
If you have provided a non-lethal control method that is not in the list in Q34, please include that in this response.	

Section 7. Additional details

38. In the last five years, have you experienced any livestock losses from predators other than wild dogs and dingoes (e.g., foxes, eagles, etc.)?

☐ Yes

☐ No

If 'Yes', please answer Q39

39. How concerned are you about livestock losses from predators other than wild dogs and dingoes? **Please tick one response.**

☐ Not at all concerned

☐ Slightly concerned

☐ Moderately concerned

☐ Very concerned

☐ Extremely concerned

☐ Unsure

☐ Does not apply to me

40. Do you coordinate control of wild dogs or dingoes with your neighbours?

☐ Yes

☐ No

If 'No', please answer Q41

41. Please provide information regarding why you do not coordinate control of wild dogs or dingoes with your neighbours**.**

42. Are you part of a community group focused on invasive species control?

☐ Yes

☐ No

If 'Yes', please answer Q43

43. Please specify which invasive species control community group or groups you are a part of.

44. Is your property or land that you manage or service in close proximity to, or does it cross the border into South Australia or New South Wales? **Please tick one response.**

☐ No

☐ Yes, New South Wales

☐ Yes, South Australia

☐ Yes, both New South Wales and South Australia

If 'Yes', please answer Q45

45. We want to understand if you face challenges in wild dog or dingo control on the property that you manage, based on your proximity to the border. Please state any challenges you have experienced in relation to your property location.

46. Is there anything else you would like to tell us about management or control of wild dogs or dingoes on your farm?

Thank you for taking the time to complete this survey.

If you wish to provide additional relevant information that was not captured in this survey, please email a submission to livestockpredation@agriculture.vic.gov.au