

Exploring stakeholder views towards animal welfare issues using online forums

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Executive Summary

Progress in the field of animal welfare is often hindered by differences in stakeholder beliefs and attitudes. Understanding the reasons behind decisions to favour or disfavour some farming practices over others will provide information to direct outreach or research strategies that better align with the needs of industry, the public and other stakeholders. An important antecedent to beliefs about farming practices is knowledge. Indeed, it is often argued by industry that opposition towards some practices are the result of lack of knowledge. Hence, in order to gain a comprehensive understanding of the reasons underlying decisions to favour particular farming practices, one must also measure knowledge.

The aim of this project is to investigate stakeholder beliefs and knowledge towards specific animal welfare issues using online forums. Since online forums are rarely used as a means of data collection, a secondary aim of the project is to explore the usefulness of web based forums as a means of data collection.

The specific objectives of the project are:

1. Develop a web-based forum for social engagement on key issues relating to animal welfare
2. Explore stakeholder beliefs and knowledge towards two specific animal welfare issues, laying hen welfare and furnished cages (Issue 1), and broiler chicken welfare and intensification (Issue 2)
3. Evaluate the usefulness of online forums as a means of data collection

We accomplished each of these objectives by:

1. Successfully creating an online software system which permitted us to run online forums related to specific animal welfare topics.
2. Uploading pre- and post-forum surveys to this online software system, and running 4 forums about laying hen welfare and furnished cages, and 6 forums about broiler chicken welfare and intensification. A total of 41 participants successfully took part in online forum discussions and completed pre- and post- forum surveys ($n = 20$ for laying hen welfare, and $n = 21$ for meat chicken welfare). Results suggest that both perceived and objective knowledge about the specific topics covered in these discussions increased after participation in the forums. In the case of furnished cages, hen welfare was rated higher after forum participation, but this was not the case for intensification of meat chickens. For both topics, participants who supported these systems typically viewed them as cost-effective production methods, and those who opposed them generally considered them to be inadequate in meeting the animals' welfare needs.
3. Examining the effectiveness of different forum styles for gauging welfare views by participants. Synchronous forums (live chats lasting approximately 1 -2 hours) were the most useful for determining people's attitudes.

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Introduction

Animal welfare is an increasingly important societal consideration across many industrialised nations [1-4]. Central to these concerns are issues surrounding the treatment and care of livestock animals. Most Australians consider livestock animal welfare to be an important consideration. Consistent with this, there is increasing demand for animal products perceived to be 'high welfare', including organic and free-range foods [5, 6].

Despite this growing concern, there remains much difference of opinion among stakeholders [7-10], including disagreements over aspects as fundamental as the definition and means to assess animal welfare [10-13]. The general public, including consumers of animal products, emphasise positive mental states (i.e., pleasure) and aspects associated with 'natural living' when defining livestock animal welfare [4, 10, 13, 14]. Adequate space [15], freedom to roam [10, 15, 16], social contact with other animals [10], and freedom to fulfil natural desires [16] are commonly cited by the public as indicators of good livestock animal welfare.

Industry representatives, on the other hand, typically consider livestock animal welfare in biological terms [12, 13, 16]. Physical health, fertility, and other aspects associated with production are barometers of livestock animal welfare for many industry members [12, 13, 17].

These different conceptions of what constitute animal welfare can lead to certain farming practises and housing systems being favoured over others. Those who consider animal welfare in terms of biological functioning are more likely to prefer the provision of indoor housing, where the environment and animals can be regulated and closely monitored, over other housing conditions [17]. In contrast, those who value natural living are more likely to favour outdoor access and free-range environments [10, 18].

These somewhat opposing philosophies can hinder progress in the field of animal welfare. As with any conflict, the best means of resolution is to identify and understand stakeholder concerns [19]. It is only by identifying areas of common ground and areas of dissent that progress can be made and resolutions found [19].

While there is empirical knowledge regarding stakeholder conceptions of livestock welfare in general [18, 20], little is known about stakeholder opinions toward industry-specific farming practices. Exceptions to this are recent studies exploring stakeholder opinions towards farming practices in the dairy [21-23] and pork [14] industries. However, studies identifying stakeholder opinions towards practices in the laying hen and chicken meat industry are limited. A Belgian study comparing consumers and producers of broiler chickens found that both groups place a high importance on broiler chicken welfare [24]. However, in the same study, consumers disagreed with producers that people would be unwilling to pay more for high welfare products, or that broiler chickens suffer little [24]. A Dutch study found that outdoor access is the most important attribute in consumer perceptions of broiler chicken welfare, followed by stocking density [25]. Further research is required to better understand whether specific practices in layer hen and meat chicken management are perceived to impact on bird welfare. Identifying the beliefs underlying stakeholder decisions to oppose or support particular farming practices will also provide recommendations for information to direct

outreach or research strategies that bring industry, the public and other stakeholder perceptions into further alignment.

It is argued that one major factor underlying stakeholder differences of opinion is differences in levels of knowledge. Specifically, industry members argue that public opposition towards certain farming practices are the result of lack of knowledge [14]. Indeed, knowledge is an important antecedent of beliefs [26], and research indicates that the public have only a vague understanding of animal welfare issues [1, 16, 17]. Studies investigating stakeholder beliefs underpinning levels of support or opposition to specific farming practices must then also measure levels of industry and farming practice knowledge held by the stakeholder groups. This information will be useful to determine whether supporting or opposing specific farming practices is the result of lack of knowledge or misinformation about a particular issue, thus highlighting areas where communication is necessary.

Previous studies have used a variety of methods to gain knowledge of stakeholder opinions, including interviews [4, 15], surveys [3, 8, 27], and face-to-face focus groups [7]. More recently, online discussions have been employed as a successful and low-cost means to explore animal welfare views [14, 21, 28].

This study used discussion forums as virtual focus groups, in conjunction with pre- and post-forum surveys, to engage and explore stakeholder views towards specific animal welfare issues. Focus groups are in-depth group discussions about a topic led by a moderator. The goal of the moderator is to lead the discussion by defining the topic, asking the group questions related to the topic, and ensuring that everyone contributes to the topic. They typically consist of three to ten participants [29-31]. Focus groups are a useful means of gathering information when little empirical data exists on the topic [31]. They enable the researcher to obtain in-depth understanding of beliefs about a particular topic.

Conventional focus groups are face-to-face discussions, and while they are useful in providing a rich understanding of a particular topic, they do have a number of limitations, such as constraints on time and distance. In this way, virtual focus groups are superior to face-to-face focus groups. Participants can either log in at home at a pre-arranged time (**synchronous sessions** that use chatrooms, or online conferencing), or a time convenient to them (**asynchronous sessions** using email, listserv or mailing lists) [32]. An additional advantage of a virtual focus group is that participants' identity can be protected. This can be useful in encouraging honest feedback and stimulating group discussions about topics that may be controversial [33]; 'online discussion provides a safe and productive format for discussions about contentious issues...' [21, p.3831].

The aim of this project was to investigate stakeholder beliefs and knowledge towards specific animal welfare issues using online forums. Since online forums have rarely been used as a means of data collection, a secondary aim of the project was to explore the usefulness of web based forums as a means of data collection.

The specific objectives of the project were to:

1. Develop a web-based forum for social engagement on key issues relating to animal welfare
2. Explore stakeholder beliefs and knowledge towards two specific animal welfare issues, laying hen welfare and furnished cages (Issue 1) and broiler chicken welfare (Issue 2)
3. Evaluate the usefulness of online forums as a means of data collection

Animal welfare issue 1

The first animal welfare issue to be investigated was furnished cages as an alternative housing system for laying hens in Australia. Despite the fact that eggs are frequently consumed in Australia, very little is known about stakeholder beliefs regarding chicken welfare [34]. What is known is that the public rate the welfare of laying hens quite poorly [34]. It is also known that production method is an important consideration when purchasing eggs, with eggs from free-range systems being perceived by the public as a higher welfare option than eggs produced from conventional cage systems [35]. In the European Union, similar public attitudes led to a ban on the sale of conventional cage-laid eggs and the development of a 'welfare friendly' alternative housing system: furnished cages [36-38]. Furnished cages house hens in groups of 5 to 100 birds, with a typical stocking density of 750 cm² per bird. These cages contain a nest, perch and scratching area or mat [39].

Concerns have been raised by animal welfare scientists that furnished cages will not be accepted by the public [40], who possibly consider furnished cages to be like other cage systems, and inferior, in terms of welfare, to free-range systems. Whether or not this is the case is currently unknown, although most European consumers buy cage eggs, implying that price is more important than perceived welfare for many consumers [40]. According to industry and animal welfare representatives, the debate around furnished cages is polarised. Furnished cage systems can deliver good welfare outcomes based on overseas scientific research [38, 41]. However, the RSPCA states that behavioural needs are not adequately met in furnished cages [42].

Animal welfare issue 2

The aim of part 2 of the study was to understand attitudes towards intensively farmed meat chickens. There is 40% more food being produced worldwide than there was 40 years ago, and as global incomes rise, particularly in the developing world, demand for livestock products is increasing [43]. It will be important to try to balance the growing demand for animal-based food and the need to mitigate the effects of climate change, which are expected to negatively impact agricultural productivity [43], for future generations. It is possible that intensively farmed chicken meat, which is a relatively sustainable and inexpensive protein source [44], may provide a solution to this problem. However, concerns about welfare of livestock animals, including chickens, in intensive systems is also growing in the developed world [4].

Animal welfare-friendly systems have been associated with perceived higher product quality [45, 46] for which some consumers are willing to pay a higher product price [47]. However, the impacts of meat production on environmental resources are further complicated by the trade-off between animal welfare and feed-resource use efficiency [48]. Free-range, or lower-

density animal production rearing systems, can also lead to a higher feed requirement to (meat) output ratio, whereby animals expend greater energy in keeping warm and foraging for food, hence reducing feed conversion efficiency [48]. These systems can therefore be environmentally more damaging than intensive rearing systems.

At best, these competing demands highlight the complexity of issues surrounding 'ethical' meat choices. At worst, they illustrate a lack of understanding of the impact of individual food choice on the environment. Indeed, in a sample of 223 randomly selected Australians, only 22% agreed or strongly agreed that eating less meat was beneficial to the environment [49]. There is also low awareness of climate change reduction strategies in terms of consuming animal foods (e.g., meat, dairy products and eggs) [50]. Given this lack of awareness, we expected that animal welfare considerations would be a higher priority for participants in the current study than the effects of meat production in general, and low-density systems in particular, on the environment.

Animal welfare issue 1: Methods and results

Methods

Participants

A total of 20 participants completed all required components of this study, including 17 who identified as members of the general public, and three who identified as an animal advocacy group member. These participants were recruited from various sources including email lists, industry newsletters, and social media advertisements (see Appendix A), and were provided with a Plain Language Statement to explain the purpose of the study (Appendix B). Mean age of respondents was 53 years ($SD=12.61$). Most participants (80%) were female, and over half (55%) lived in Victoria. New South Wales (20%), Tasmania (10%), the Australian Capital Territory (10%), and Western Australia (5%) were also represented.

Materials

Animal Welfare Science Centre Content Management System (AWSC-CMS).

A windows-based content management system was created specifically for this project (<http://awsc1.oxygen-cms.com>). This system can be used on most internet browsers (e.g. Mozilla Firefox, Internet Explorer, Google Chrome and Safari), and on multiple platforms including Windows, Mac and iPhones. With a customisable Home page, the content management system allows the user to create and administer multiple surveys, as well as conduct asynchronous and synchronous forum discussions.

Pre-forum survey

The pre-forum survey took approximately 10 minutes to complete, and consisted of 26 items divided into three sections (Appendix C). Section 1 contained three questions asking participants about their gender and age. Participants also indicated whether they identified primarily as a member of the general public, animal advocacy group member, or laying hen industry member.

Section 2 contained seven questions relating to chicken farming and welfare knowledge. The first two questions were measured on a 5-point Likert scale (1=Very low, 5=Very high). They assessed participants' level of perceived knowledge about the Australian egg industry, and chicken welfare and husbandry. The remaining five questions were multiple choice questions designed to measure participants' level of objective knowledge about industry farming practices in the chicken industry.

Section 3 contained 16 questions relating to beliefs about chicken welfare, farming and housing (adapted from [34]). The first eight items asked participants how important they perceived a number of attributes relevant to chicken welfare to be. These items were measured on a 5-point Likert scale (1=Not important, 5=Very important). The following three items assessed participants' perceived welfare ratings of laying hens in three housing systems: conventional cages, free range systems and furnished cages. Given that many participants may not be aware of furnished cages, a 'Don't know' category was included for this set of questions. Next, participants were asked to indicate whether or not they would support furnished cages as an alternative housing system for laying hens in Australia, and to explain their answer. Last, they were asked to indicate whether or not they accessed any external sources of information while completing the survey.

Post-forum survey

The post-forum survey was similar to the pre-forum survey. It also took approximately 10 minutes to complete and consisted of 26 items divided into three sections. To determine whether any changes occurred in participants' knowledge of and beliefs about laying hen welfare and farming during the online discussions, the questions contained in Sections 2 and 3 of the pre-forum survey were repeated in the post-forum survey. Additional questions probing participants' levels of satisfaction towards participating in the study were included in this section. A copy of the survey can be viewed in Appendix D.

Procedure

Interested participants were instructed to contact the principal researcher. Those who elected to participate in the study were set up with user accounts on the AWSC-CMS website and asked to complete the pre-forum survey.

In order to determine which forum method was the most useful in terms of engaging participants in discussions, four forums were hosted using three different methods:

1. Type 1. Asynchronous-interval (Forums 1 and 2)
 - The forum was open for 14 days
 - Topic 1 (Laying hen welfare in Australia) was introduced on day 1
 - Topic 2 Part 1 (Furnished cages – uninformed) was introduced on day 5
 - Topic 2 Part 2 (Furnished cages – informed) was introduced on day 11
2. Type 2. Synchronous (Forum 3)
 - Instant messaging discussion group held for 1 hour 30 minutes
 - Each topic, including the introduction, was allocated approximately 20 minutes
3. Type 3. Asynchronous (Forum 4)
 - Forum open for 14 days
 - Introduction, Topic 1 and Topic 2 Part 1 introduced on Day 1

- Topic 2 Part 2 introduced on Day 7, after provision of information statement

The only difference between Forums 1 and 2 was that Forum 1 included only members of the general public, while Forum 2 consisted of members of various stakeholder groups (i.e. animal advocacy, general public, and industry).

As a measure of engagement, the number of posts, number of words, and drop-out rates were measured and compared across the four forums. The number of replies to the moderator and the number of responses to fellow participants were also recorded as a proportion of the total number of responses. Discussions were qualitatively analysed for recurring themes.

Participation in all online discussions was anonymous. All discussions were moderated by a researcher and followed a discussion plan, visible in Appendix E, in order to maintain consistency across the discussion groups. This plan included a science-based information statement about furnished cages (see Appendix E), provided to participants during the course of the discussion. This statement was designed to ensure that all participants were fully informed about the nature of furnished cages. Upon conclusion of the forum discussion, participants were asked to complete the post-forum survey.

Analysis

Descriptive frequency data permit observation of trends and patterns in responses. A paired-samples *t*-test was used to measure differences in survey responses before and after participating in the forums. Transcripts of the forums chats were analysed qualitatively for recurring themes. Word clouds of the 75 most commonly used words in the forum transcripts were created using NVivo qualitative analysis software and Tagul online software (www.tagul.com). For the purposes of the word cloud, we excluded words with less than 4 letters (e.g. 'the', 'and', 'a'), and conversational fillers such as 'think', 'believe', 'thanks', and 'would'. Larger words in the word cloud represent words that occurred more frequently in the transcript.

Results

A total of 23 participants from the general public participated in four forum discussions. Forum 1 included five participants, seven participants took part in Forum 2, four participated in Forum 3, and seven participants took part in Forum 4. Three participants did not complete the post-forum survey even after being sent three email reminders to do so. Therefore, we have included data from all Forum 1 ($n = 5$) and Forum 3 ($n = 4$) participants, six of the Forum 2 participants, and five of the Forum 4 participants, for a total of 20 participants.

Pre-forum survey results

Most participants indicated that they had only moderate level of knowledge about the Australian egg industry. They did believe, however, that they had moderate to high levels of knowledge about chicken welfare and husbandry.

As can be seen in Table 1, participants' level of perceived knowledge ranged from low to very high. No participants rated their knowledge as very low for either question, and no one reported that they had a very high level of knowledge about the egg industry. For both items,

the mean rating was near the mid-point of 3.0, suggesting that, as a group, participants perceived a moderate level of knowledge on these topics.

Table 1: Perceived industry, welfare and husbandry knowledge in the pre-forum survey (N = 20), including mean (M) and standard deviation (SD).

	Very low	Low	Moderate	High	Very high	M	SD
Australian egg industry	-	30%	50%	20%	-	2.9	0.7
Chicken husbandry and welfare	-	5%	60%	30%	5%	3.4	0.4

Table 2 contains the questions used to objectively measure knowledge of specific chicken industry practices. Definitions of free-range and beak trimming were answered correctly by 85% and 100% of participants, respectively. Conversely, only about half of the sample correctly identified the definitions of furnished cages or intensive meat chicken farming, or the reasons for antibiotic use. Since each item had four response options, with one option correct, the likelihood that participants would choose the correct response by chance was 25%.

Table 2: Objective knowledge of specific chicken industry practices (N=20)

	Percentage correct
Free range chickens – Chickens that have access to an outdoor area at least during the day as they please	85
Beak-trimming – Involves the removal of the tip of the chicken’s beak to prevent feather pecking and cannibalism	100
Furnished cages – Furnished cages house laying hens in groups and allow them the opportunity to nest, dust bathe and perch	50
Antibiotics – Are administered to chickens to prevent and treat infections and disease	45
Intensive meat chicken farming – Keeping meat chickens indoors at high densities	50

Table 3 presents the distribution of perceived importance of attributes to chicken welfare. Most agreed that all the listed features were important or very important to chicken welfare. The most important attribute was protection from predators. The least important attribute was preventive medicine, with nearly half of participants rating preventive medicine as not important or moderately important to chicken welfare.

Table 3: Perceived importance of attributes to chicken welfare (N=20)

	Not important	Slightly important	Moderately important	Important	Very important	M	SD
Outdoor access	5%	-	25%	20%	50%	4.1	1.1

Protection from extreme weather	-	-	-	10%	90%	4.9	0.3
Social contact with other chickens	-	-	-	10%	90%	4.9	0.3
Ability to engage in natural behaviour	-	-	5%	5%	90%	4.9	0.5
Protection from predators	-	-		5%	95%	5.0	0.2
Preventive medicine	15%	5%	25%	30%	25%	3.5	1.4
Medicine to treat disease	5%	5%	-	25%	65%	4.4	1.0
Protection from aggression from other chickens	-	5%	20%	35%	40%	4.1	0.9

Participants were asked to rate the welfare of chickens in various housing systems (Table 4). Most participants generally rated the welfare of chickens living in free range systems to be moderate to very good. The welfare of chickens living in conventional cages was rated from very poor to moderate. The welfare ratings of laying hens housed in furnished cages varied, possibly due to the fact that only one half of the sample correctly identified furnished cage systems (see Table 2).

Table 4: Perceived welfare of layer hens in different housing systems

	Very poor	Poor	Moderate	Good	Very good	Don't know	M	SD
Free range systems	5%	5%	25%	50%	15%	-	3.7	1.0
Conventional cages	55%	30%	15%	-	-	-	1.6	0.8
Furnished cages	10%	25%	20%	20%	15%	10%	2.8	1.6

Since only half of participants correctly identified furnished cages, ratings for the welfare of various systems, split between participants who did and did not correctly identify this type of system, are presented in Table 5. Participants who correctly identified furnished cages rated the welfare of layer hens in these systems higher than participants who did not correctly identify them, although this difference was not significant ($t = -1.01$, $df = 18$, $p = 0.33$).

Table 5: Perceived welfare of layer hens in different housing systems, split by participants who correctly or incorrectly identified furnished cages

	Very poor	Poor	Moderate	Good	Very good	Don't know	M	SD
Correctly identified ($n = 10$)								
Free range systems	10%	-	40%	50%	-	-	3.3	0.9
Conventional cages	40%	30%	30%	-	-	-	1.9	0.9
Furnished cages	10%	10%	20%	30%	20%	10%	3.1	1.7
Incorrectly identified ($n = 10$)								
Free range systems	-	10%	10%	50%	30%	-	4.0	0.9
Conventional cages	70%	30%	-	-	-	-	1.3	0.5
Furnished cages	10%	40%	20%	10%	10%	10%	2.4	1.4

Support for the introduction of furnished cages

Participants were asked whether or not they would support the introduction of furnished cages into Australia. Opinions were divided, with 55% in support of the introduction and 25% opposed to the introduction; the remaining 20% were undecided ($M = 2.0$, $SD = 0.7$). Among participants who correctly identified furnished cages, 70% supported their introduction, 10% opposed them, and 20% did not know ($M = 2.1$, $SD = 0.6$). Support was lower among participants who did not correctly identify them ($M = 1.8$, $SD = 0.8$), with 40% in support and 40% opposed; the remaining 20% did not know. There was no significant difference between these groups in their level of support for this type of housing system ($t = -0.98$, $df = 18$, $p = 0.34$).

Participant reasons for support

Participants were asked to explain their reasons for supporting or opposing the introduction of furnished cages as an alternative housing system for laying hens in Australia. Participants who expressed support for furnished cages often referred to the ability of furnished cages to allow hens the opportunity to engage in natural or normal behaviours.

“Animals should be free to express normal behaviour, and furnished cages allow some of this normal behaviour.”

“...they allow chickens to exhibit some natural behaviours while protecting them from cannibalism and rapid spread of disease.”

Other participants believed that furnished cages were a good compromise between meeting production needs and animal welfare.

“[Furnished cages are a]...good commercial compromise that meets consumer expectations on welfare and price.”

“[This system] improves bird welfare over conventional cages but enables industry to maintain productivity and efficiency.”

Some participants compared furnished cages to conventional cages and they were believed to be the better option. For these participants, free range systems were the preferred housing system.

“Overall [they are] better for hens than conventional cages.”

“Yes I would support furnished cages in lieu of battery cages as a progressive toward improved hen welfare. Having said that, I do not support this system overall. Regulation of free ranging hen facilities I would support.”

Participant reasons for opposition

Furnished cages were most commonly opposed by participants because they do not allow laying hens the opportunity to access the outdoors, and this limitation was perceived to be detrimental to laying hen welfare. Further to this, many participants were opposed to furnished cages because they believed cages were universally associated with poor welfare.

“Access to outdoors and housing in low numbers is paramount.”

“I don’t believe in any form of caging animals for human consumption.”

“The Australian climate does not need for any animal to be kept confined in cages.”

Some responses for opposition towards furnished cages revealed that participants were not fully informed as to what this housing system offers laying hens.

“Anything that does not enable chickens to roam outdoors, dust bathe, etc., is unacceptable.”

Additional reasons for opposition to furnished cages concerned the introduction of additional negative impacts on welfare and the failure of furnished cage systems to address all limitations of conventional cages.

“Furnished cages still do not adequately address all aspects of animal welfare. They also include increased risks such as being caught in automatic doors and restriction of access to areas of importance; they do not allow adequate choice of nests.”

Access to external sources of information

Only three participants accessed external sources to help them complete the survey. This was mostly an internet search for the term furnished cages. One participant searched on Wikipedia, another participant used Google, and the third asked their veterinary partner.

Analysis of forum discussions

This section compared the number of and types of posts observed across the three different forum types.

Table 6 provides basic details about the number of posts, number of words, and drop-out rates for the three different types of forums: asynchronous interval; synchronous; and asynchronous. It also displayed the percentage of posts directed toward the moderator or other participants.

Table 6: Comparison of posts between different types of forums

		Number of participants*	Drop-out rates	Posts directed towards moderator	Posts directed towards others	Total number of posts	Total number of words
Type 1	Asynchronous (intervals) 1	5	29%	50%	50%	25	3,310
	Asynchronous (intervals) 2	7	14%	45%	45%	46	3,174
Type 2	Synchronous	4	47%	86%	14%	72	2,932
Type 3	Asynchronous	7	14%	86%	14%	32	3,843

*Number of participants does not include the moderator

It is clear from Table 6 that all forums had similar word counts, although Type 3 had more than the others. This forum type, and the synchronous forum, also mainly had posts directed toward the moderator, and fewer directed toward other members of the forum. The synchronous forum had the highest drop-out rate, with nearly half of participants dropping out before the live online chat began. However, the synchronous forum also had the largest number of posts.

Qualitative analysis of forum discussion texts

A word cloud for the topic one forum discussions is shown in Figure 1, which depicts frequency of the 75 most commonly used words in the transcripts. Unsurprisingly, the word 'cages' was the most commonly used word throughout the discussions, but the discussions also focused on animal welfare, species-specific behaviours, such as pecking, and different housing systems (free-range, conventional cages and barns).

linked to the hen's housing system, with some stating that they do not believe an ideal housing system exists.

"I don't think laying hens in general have universally good or bad welfare, and different aspects of welfare will vary from 'better' to 'worse' across different systems. ...I can't really imagine a workable, profitable system that addresses all aspects of welfare perfectly..."

"The RSPCA has developed the concept of Five Freedoms ... I don't know of any production system for layer hens (or other animals for that matter) that consistently meets all these 'freedoms'."

Welfare is multidimensional

Many participants recognised that welfare is multidimensional. When discussing laying hen welfare, health and natural living were frequently noted as indicators of good welfare. Included in the notion of health are low incidence of disease, low rates of predation, climate control and balanced nutrition. Aspects associated with natural living included free roaming, dust bathing and experiencing the outdoors.

There also appears to be element of mistrust towards egg farmers.

"I think furnished cages are simply another way that egg producers use to try and get the public to believe that the eggs they buy come from 'happy hens'."

Furnished cages

Before information statement

Most participants in the forum were not familiar with the housing system. Many participants on the asynchronous forum looked up information on the internet. The most frequent source of information was the RSPCA. When asked whether they would support the introduction of furnished cages as an alternative housing system in Australia, opinions were divided.

Those that opposed furnished cages believe that laying hens should be free to range, and any housing system that does not offer this feature is rejected.

"I didn't really know what 'furnished cages' were, but assumed they would be better than battery cages. Having read the RSCPA description of them, I can see an improvement of sorts, but personally I would still go on buying free range eggs."

"The point is, either we accept cruelty or we don't. If we are to accept cruelty in food production, how much is acceptable? Furnished cages are not recommended for the welfare of the chickens, I don't think they should be acceptable."

Those that supported the introduction of furnished cages in Australia typically believed that they were an improvement on conventional cages.

“Furnished cages are an improvement on conventional cages, allowing birds to scratch, nest, perch and stretch, and are a progression towards meeting the RSPCA’s Five Freedoms”

After information statement

Once the information statement was presented to the participants, this new knowledge sometimes impacted attitudes toward furnished cages.

“The furnished cage system sounds like a reasonable compromise. I think we also need to be cognisant of the fact that not all families have the luxury of being able to choose free-range due to cost constraints, so furnished cages might offer improved welfare outcomes at a more competitive price to free-range?”

“I would support furnished cages over conventional cages, yes”

Others were not satisfied with the amount of information provided in the statement, and needed more detail before making a decision.

“I suppose my answer would depend on the design of those cages, including size.”

“Furnished cages sound fine in theory, but the devil is always in the detail. Do the hens get to see and hear other hens? I’m assuming that they are not housed in groups, but alone. Presumably there would be no need for de-beaking, but again, that’s not stated.”

Some participants already knew enough about furnished cages to make up their minds prior to the introduction of the scientific statement; thus, the statement rarely changed their views. Some participants were satisfied with the amount of information provided in the statement, but this did not change their views.

“Furnished cages are still an intensive production facility. The same ‘standard farming practice’ principles still apply here: which is legalised cruelty.”

“Thank you for the further information about furnished cages, and no, it does not change my opinion of them. Yes, they are marginally better than the current model in that they offer some ability for the hens to engage in natural behaviours, but I still believe that foraging outdoors is the key and most important element missing from this model, as well as the ability to interact with other birds.”

“Thank you for the information. As I admitted earlier I had to look up furnished cages and am glad we are all now on the same page. It is shocking to know that a hen is expected to live out its whole life on a similar page [A4-sized enclosure].”

General Interactions

In the two asynchronous (interval) forum discussions, participants were more likely to direct comments and questions toward other participants, than the synchronous forum discussion. During the synchronous chat, interactions appeared to primarily take the form of a question and answer format between moderator and the participants. However, this was also the case for the asynchronous forum, which saw relatively little interaction between participants, with most participants engaging solely with the moderator.

Sharing information sources

Sharing of information via web-links was seen in the asynchronous forum discussions but not in the synchronous discussions. This is most likely due to the time constraints of the synchronous forum, which would not permit people to do much research during the chat.

*“The RSPCA has investigated [furnished cages] and their report is here:
[http://kb.rspca.org.au/Can-the-behavioural-needs-of-a-layer-hen-be-met-in-a-\(furnished\)-cage_563.html](http://kb.rspca.org.au/Can-the-behavioural-needs-of-a-layer-hen-be-met-in-a-(furnished)-cage_563.html)”*

Use of personal experiences

Many of the participants cited their own personal experiences to inform their opinions of layer hen welfare and housing systems.

“A friend ran a free range system profitably which I have visited. I have experienced conventional cage farms which were a disgrace and have visited barn systems which were ‘pretty average’ (owned by [name removed]) in NSW, but seemed an improvement on conventional cages in many respects.”

“Interestingly, having travelled in Africa in particular, I have to say I thought the hens there had the best life! They were out and about during the day, in at night. Not kept in huge numbers but replaced as necessary. Eggs formed a great source of protein for their owners and so it is their interests to keep the animals as healthy as could be. Their life expectancy probably wasn't as high, but then to me it is about quality of life rather than length. When their time had come the end was (generally) quick and all parts were used. There's a lot to be said for subsistence farming.”

“I recall as a child visiting my grandparents who kept a chicken run in their backyard. My grandfather would sometimes go down and select a chicken for dinner, take her to a chopping block and cut off her head with an axe. I remember seeing a headless chicken running around the yard for a minute or so. It was quite awful really and must have been a horrible death for the chicken.”

Post-forum survey results

Most participants (70%) indicated that they were satisfied or very satisfied with the forum, and 75% indicated that they would be likely to participate in another similar forum. The self-rated level of knowledge of the Australian egg industry and of chicken husbandry and welfare are reported in Table 7.

Table 7: Perceived industry, welfare and husbandry knowledge in the post-forum survey (N = 20), including mean (M) and standard deviation (SD). Response options ranged from 1 (very low) to 5 (very high).

	Very low	Low	Moderate	High	Very high	M	SD	t-value
Australian egg industry	-	10%	50%	30%	10%	3.4	0.8	-2.4*
Chicken husbandry and welfare	-	-	40%	50%	10%	3.7	0.7	-2.1*

*The difference is significant at $p < 0.05$ (df for both items = 19).

For both of these items, there was a significant difference between pre- and post-forum ratings, with participants rating their knowledge levels higher after participating in the forum. There was no significant difference between the four forum groups in this change for knowledge of the Australian egg industry, $F(3,16) = 1.60$, $p = 0.22$. However, there was a significant interaction effect of time by group for chicken husbandry and welfare, Wilk's $\lambda = 0.55$, $F(3,16) = 4.31$, $p = 0.02$, partial eta squared = 0.45. This interaction is shown in Figure 2, which indicates that knowledge ratings by all asynchronous group participants increased, but it *decreased* for participants in the synchronous group. Based on the individual participant data for participants in the synchronous group, this was caused by two participants who indicated that their knowledge went from 'high' in the pre-forum survey to 'moderate' in the post-forum survey. The other two participants did not change in their ratings.

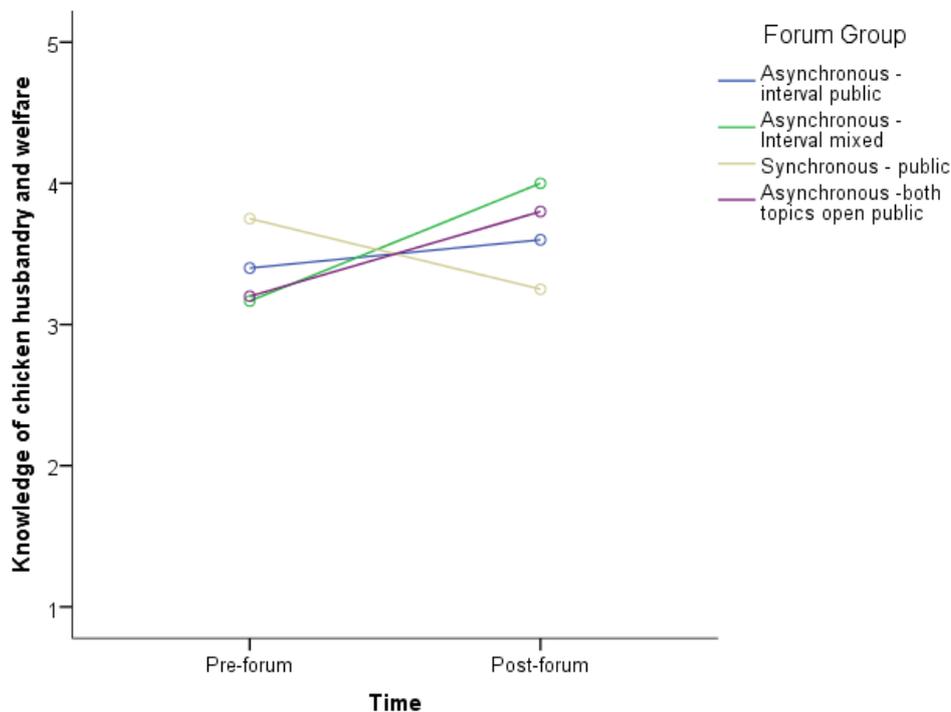


Figure 2: Interaction between time and group type for participants' perceived knowledge of chicken husbandry and welfare

Based on a review of the synchronous chat texts, it appears that, over the course of the chat, participants became more aware of the complexity of the issues around layer hens.

“It is very complex and emotional for many.... All systems have cost restraints.”

Furthermore, the scientific statement did provide them with information about furnished cages that made them consider supporting their introduction, but they would like more information before deciding for sure:

“Furnished cages are certainly a step up from conventional cages - and in that respect I also support them. Perhaps some further research on what design is optimal??”

Table 8 shows the results of the objective knowledge about various chicken industry practices.

Table 8: Objective knowledge of specific chicken industry practices (N=20), based on responses to the post-forum survey

	Percentage correct
Free range chickens – Chickens that have access to an outdoor area at least during the day as they please	95
Beak-trimming – Involves the removal of the tip of the chicken’s beak to prevent feather pecking and cannibalism	100
Furnished cages – Furnished cages house laying hens in groups and allow them the opportunity to nest, dust bathe and perch	75
Antibiotics – Are administered to chickens to prevent and treat infections and disease	60
Intensive meat chicken farming – Keeping meat chickens indoors at high intensities	60

There was a significant difference in the number of participants who correctly identified furnished cages after participating in the forum discussion ($M = 1.5, SD = 0.5$) compared with their pre-forum responses ($M = 1.75, SD = 0.4; t = -2.5, df = 19, p = 0.02$). However, there was no difference observed between groups, $F(3,16) = 0.72, p = 0.56$. Among the four participants in the synchronous forum, who rated that their knowledge had decreased after forum participation, three participants correctly identified furnished cages in the post-forum survey ($M = 1.75, SD = 0.50$). In the pre-forum survey, two of the participants had correctly identified them ($M = 1.50, SD = 0.58$). Therefore, objective knowledge in this group did increase somewhat for this item, although the differences were not significant, $t = -1.00, df = 3, p = 0.39$. None of the other differences were significant, most likely because many participants correctly identified the other items in the pre-forum survey.

Participants were again asked to rate the importance of a variety of welfare considerations for layer hens. Results are visible in Table 9.

Table 9: Perceived importance of attributes to chicken welfare (N=20)

	Not important	Slightly important	Moderately important	Important	Very important	M	SD
Outdoor access	10%	5%	15%	20%	50%	4.0	1.4
Protection from extreme weather	-	-	-	15%	85%	4.9	0.4
Social contact with other chickens	-	-	-	25%	75%	4.8	0.4
Ability to engage in natural behaviour	-	-	5%	15%	80%	4.8	0.6
Protection from predators	-	-	10%	5%	85%	4.8	0.6
Preventive medicine	15%	10%	20%	25%	30%	3.5	1.4
Medicine to treat disease	5%	-	-	30%	65%	4.5	0.9
Protection from aggression from other chickens	5%	-	20%	35%	40%	4.1	1.1

There was some degree of variation between the pre- and post-forum survey results for these ratings; however, none of the differences were significant.

Table 10 reports the results of the post-forum survey, when participants were asked to rate the welfare of layer hens in a variety of different management systems.

Table 10: Perceived welfare of layer hens in different housing systems

	Very poor	Poor	Moderate	Good	Very good	Don't know	M	SD
Free range systems	5%	15%	25%	30%	25%	-	3.5	1.0
Conventional cages	55%	30%	10%	5%	-	-	1.7	0.9
Furnished cages	10%	10%	30%	30%	20%	-	3.4	1.2

In the post-forum survey, participants rated free-range system welfare as slightly poorer than they did in the pre-forum survey, and conventional cage system welfare ratings were slightly higher than in the pre-forum survey. However, these differences were not significant. On the other hand, there was a significant increase in the welfare ratings of furnished cages, $t = -2.6$, $df = 19$, $p = 0.02$. Another notable difference is that none of the participants selected 'don't know' for any of these items, unlike in the pre-forum survey, in which 10% of participants did not know about the welfare of birds in furnished cages. For this item, there were no significant differences between groups, $F(3,16) = 0.79$, $p = 0.52$.

Participants were asked whether their opinion toward the provision of furnished cages had changed since participating in the forum, and 50% reported that it had. When asked why their opinion had or had not changed, the main themes supporting their use were that furnished cages represent a good compromise between productivity and animal welfare (20%), and that they are an improvement over conventional cages (40%). Main reasons for opposition of the

cages were that birds need to have the opportunity to be outdoors (10%) and that the cages are still not able to adequately meet the birds' welfare needs (20%).

When asked whether they had accessed any outside materials to learn more about chicken welfare, 55% indicated that they had. Of those participants, the most common types of materials accessed were Google (27%), academic writings (18%), animal welfare sources such as the RSPCA website (18%), an industry source (5%), or a combination of the above (27%).

Finally, participants were asked if they had any other comments on the forum, and of those who wrote a comment, three participants indicated that they would have preferred more discussion between the participants. Another two reported that they would have liked more information about furnished cages, and one participant wrote that more industry participation, to give insights into industry management, would be useful. Another participant wrote that participants are generally not well-informed about what chickens need; one reported that furnished cages are not adequate, and the final participant wrote that social media may not be an effective tool to influence deeply entrenched beliefs.

Discussion

Forums are useful means of gathering rich and detailed information on animal welfare topics. The usefulness of online asynchronous and synchronous forums were explored in this first stage of the project, and these findings were used to inform the next stage of the project, which explored stakeholder opinions towards intensive farming practices in the chicken meat industry.

Comparisons of the forum methods revealed that asynchronous and synchronous forums can be used to address two different goals. If the goal of the forum is to canvass participant levels of support or opposition towards a particular issue and explore the beliefs underlying these decisions, then synchronous forums are preferred over asynchronous forums. This is based on the observation that participants' posts on the topic are more frequent and spontaneous. If, on the other hand, the goal of the forum is to inform participants on a particular issue, then asynchronous forums are the better option. Because asynchronous forums offer a vehicle with which to discuss and share information, they offer an avenue to change opinions.

Given that one of the objectives of the project was to explore beliefs and knowledge towards a specific animal welfare topic, it was recommended that synchronous forums be used as a means of gathering this information rather than asynchronous forums for the second welfare topic. It is also intriguing that the synchronous group rated a decreased knowledge of chicken husbandry and welfare after participating in the forum compared to before. Although only four participants were included in this group, this result merits further investigation, especially since their *objective* knowledge of chicken management practices actually *increased*. Participant attrition is higher with this method, however, so steps need to be taken to minimise this risk. Multiple reminder emails should be sent to participants of the upcoming forum meeting and, if funds allow, incentives should be offered as a means of retaining participants.

The changes in the responses between the pre- and post-forum surveys indicate that people did learn about the topic of furnished cages. More people correctly identified furnished cages

in the post-forum survey compared to the pre-forum survey, and they were also more likely to rate the welfare of chickens in furnished cages higher after participating in the forum. This result suggests that, while forum participation may not change long-held opinions about animal welfare in general, knowledge about and support for a specific practice may increase as participants become more informed about it.

Animal welfare issue 2: Methods and results

Methods

Participants

All participants were required to be at least 18 years of age, resident in Australia, and able to read and write in English. A total of 21 participants completed all components of the study. Of these, three identified as someone with experience in the meat chicken industry, eight were animal advocacy group members, and eight were general public. The final two participants were in research or veterinary practice, but with no clear affiliation to animal welfare or industry groups. Participants were 67% female, and mean age was 42 years. Most participants lived in Victoria (43%) or NSW (38%). Two participants were based in WA (10%), and one participant each (5%) was based in Queensland or SA.

Materials

As in animal welfare issue 1, there were pre- and post-forum surveys, which were each expected to take approximately 10-15 minutes to complete. These surveys were very similar to the surveys in animal welfare issue 1, except that there was an additional item related to the age at which meat chickens are typically slaughtered. Full pre- and post-forum surveys can be found in Appendices C and D, respectively.

The AWSC-CMS website was used to facilitate all online forums, as in animal welfare issue 1. However, based on the results of the pilot study examining which type of forum would be most effective in gauging people's opinions of animal welfare, we decided to hold only synchronous forums (i.e., live chats) for all groups. For this reason, the last items on the pre-forum survey asked participants to detail their general availability, in order to help the research team schedule the live chats.

Procedure

Recruitment advertisements were sent to research team contacts in the meat chicken industry, animal advocacy organisations, and social media (e.g. Facebook, the University of Melbourne staff newsletter). Interested, eligible participants were asked to contact the research team by email, who registered them on the AWSC-CMS system and gave them access to the pre-forum survey.

After participants had completed the pre-forum survey, the research team organised a series of six different chats across three weeks in late April and early May, 2016. Between five and seven people were invited to each chat. Three of the chats were attended by all of the participants who were invited to that particular chat, including both mixed-group chats with representation from industry, and the chat with only animal advocacy group members. There

were two mixed group chats with no industry representation, and of those, two participants attended one, and three participants attended the other. The sixth chat, which consisted only of members of the general public, had two participants.

Each chat took between 60 and 90 minutes. An outline of the chat, including a scientific statement explaining meat chicken intensification which was provided to the participants during the chat, is available in Appendix E. Two days after the chat, participants were emailed an invitation to complete the post-forum survey.

Analysis

Descriptive frequency statistics permit the observation of trends in the data. Paired samples *t*-tests were used to compare responses to survey items before and after participating in the forum for all participants who completed all three components of the project ($n = 21$). A mixed model ANOVA was used to measure differences between different stakeholder groups across time. We included the following groups: general public ($n = 8$), animal advocacy group members ($n = 8$), and industry-associated participants ($n = 3$). Because two participants did not fit into any of these groups, they were excluded from this analysis, which therefore included a total of 19 participants. Following the qualitative analysis methods used for Topic 1, NVivo analysis software and Tagul online software (www.tagul.com) were used to generate word clouds of the 75 most commonly used words in the chats.

Results

A total of 25 participants took part in six forum discussions. Forum 1 included five participants, all of whom were members of an animal advocacy group. Six participants took part in Forum 2, and seven participated in Forum 3; these were both mixed groups. Just two participants each took part in Forums 4 and 6; Forum 4 comprised members of the general public, and Forum 6 was mixed. Forum 5 comprised three participants and was a mixed group. Although four out of the six forums were mixed, there was only industry representation in Forums 2 and 3.

Four participants did not complete the post-forum survey even after being sent email reminders to do so. Therefore, we have included data from two participants in Forums 1 and 6, and all participants from all other forums, for a total of 21 participants.

Pre-forum survey results

Most participants reported that they had a moderate to high level of knowledge about Australian meat chicken practices and chicken welfare and husbandry. As can be seen in Table 11, participants' level of perceived knowledge ranged from low to very high. For both items, the mean rating was just above the mid-point of 3.0, suggesting that, as a group, participants perceived a moderate level of knowledge on these topics.

Table 11: Perceived industry, welfare and husbandry knowledge in the pre-forum survey ($N = 21$), including mean (M) and standard deviation (SD).

Very low	Low	Moderate	High	Very high	M	SD
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Australian chicken meat industry	-	19%	43%	29%	10%	3.3	0.9
Chicken husbandry and welfare	5%	10%	48%	29%	10%	3.3	1.0

Table 12 contains the questions used to objectively measure of knowledge of specific chicken industry practices. The definition of beak trimming were answered correctly by 95% of participants, but other correct responses ranged from 43% for intensive meat farming definition, so 62% for the use of antibiotics and the age of meat chickens at slaughter. Conversely, only about half of the sample correctly identified the definition of intensive meat chicken farming, or the reasons for antibiotic use.

Table 12: Objective knowledge of specific chicken industry practices (N=21)

	Percentage correct
Free range chickens – Chickens that have access to an outdoor area at least during the day as they please	57
Beak-trimming – Involves the removal of the tip of the chicken’s beak to prevent feather pecking and cannibalism	95
Antibiotics – Are administered to chickens to prevent and treat infections and disease	62
Intensive meat chicken farming – Keeping meat chickens indoors at high densities	43
Age of meat chickens at slaughter – 5 to 7 weeks	62

Table 13 presents the distribution of perceived importance of attributes to chicken welfare. Most agreed that all the listed features were important or very important to chicken welfare. The most important attribute was protection from extreme weather, but protection from predators, ability to engage in natural behaviours, and social contact with other chickens also rated very highly. The least important attribute was preventive medicine, with over half of participants rating preventive medicine as not important or moderately important to chicken welfare.

Table 13: Perceived importance of attributes to chicken welfare (N=21)

	Not important	Slightly important	Moderately important	Important	Very important	M	SD
Outdoor access	10%	5%	-	5%	81%	4.4	1.3
Protection from extreme weather	-	-	-	5%	95%	5.0	0.2
Social contact with other chickens	-	-	-	10%	91%	4.9	0.3
Ability to engage in natural behaviour	-	-	5%	5%	91%	4.9	0.5
Protection from predators	-	-	5%	5%	91%	4.9	0.5
Preventive medicine	14%	10%	48%	10%	19%	3.1	1.3
Medicine to treat disease	5%	-	5%	52%	38%	4.2	0.9

Protection from aggression from other chickens	-	5%	29%	14%	52%	4.1	1.0
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Participants were asked to rate the welfare of chickens in free-range versus intensive management systems (Table 14). The mean rating for both systems was below the mid-point of 3.0, but perceptions of intensive systems are worse than those of free-range systems.

Table 14: Perceived welfare of meat chickens in different management systems

	Very poor	Poor	Moderate	Good	Very good	Don't know	M	SD
Free range systems	5%	29%	29%	19%	5%	14%	2.5	1.4
Intensive farming conditions	71%	10%	-	5%	10%	5%	1.6	1.4

Since less than half of participants correctly identified intensive farming, ratings were analysed for the welfare of intensive and free-range systems, split between participants who did and did not correctly identify intensive systems. There was no significant difference between participants who correctly identified intensive systems and those who did not, in welfare ratings for free-range chickens ($t = -0.40$, $df = 19$, $p = 0.70$) or intensively-raised chickens ($t = -0.92$, $df = 19$, $p = 0.37$).

Support for intensive management systems

Participants were asked whether or not they support intensive management systems for meat chickens. A large majority (76%) strongly opposed this system, while 10% strongly supported it, and 5% each reported that they oppose, support, or neither oppose nor support this system ($M = 1.7$, $SD = 1.4$). There was no significant difference in support for this type of housing system between participants who correctly ($M = 2.0$, $SD = 1.6$) or incorrectly ($M = 1.4$, $SD = 1.2$) identified intensive management systems ($t = -0.98$, $df = 19$, $p = 0.34$).

Access to external sources of information

Only two participants accessed external sources to help them complete the survey. One participant searched an industry website, the Australian Chicken Meat Federation, Inc. The other participant referred to their own weblog related to veganism.

Analysis of forums

This section provides information about the number and types of posts in each chat, as well as qualitative analysis of the chat texts, and satisfaction with the chat forums.

Table 15 provides basic details about the number of posts, number of words, and drop-out rates for each chat. It also displayed the percentage of posts directed toward the moderator or other participants.

Table 15: Comparison of posts between different chats

Chat	Group type	Number of participants invited	Number of participants attended*	Drop-out rates	Posts directed towards moderator	Posts directed towards others	Total number of posts	Total number of words
Chat 1	Animal advocacy	5	5	-	78	40	141	3,214
Chat 2	Mixed (with Industry)	6	6	-	62	148	245	5,464
Chat 3	Mixed (with Industry)	7	7	-	53	65	160	3,684
Chat 4	General public	4	2	50%	46	3	92	2,320
Chat 5	Mixed (no Industry)	7	3	40%	68	14	120	2,845
Chat 6	Mixed (no Industry)	7	2	-	26	4	49	2,002

*Number of participants does not include the moderator

Four of the chats experienced no drop-outs at all; that is, everyone who was invited, confirmed that they could attend the chat and subsequently participated. The chats with confirmed participants who did not show up both took place in early evening during the week (beginning at 5:30 or 6:00pm). Chat 6 also took place at that time of the day; seven people were invited to attend that chat, but only two confirmed that they were able to attend, and both subsequently attended the chat. While the chats were organised based on people’s availability, it is possible that this time of day is not suitable for live chats.

It is notable that the trend toward discussions between the participants was highest in chats with the most participants. In particular, the chats with industry members saw a larger number of participant-direct posts than those directed toward the moderator. Part of this was due to disagreements, but there was also much more factual evidence being presented and discussed in these two chats than in the other four.

Qualitative analysis of in-chat texts

A word cloud for the chats related to meat chickens is shown in Figure 3, which represents the relative frequency of the 75 most commonly used words in the chats. Primary considerations in the discussion were welfare, production, growth, and, to a lesser extent, selection. There was also some concern expressed about transparency and enforceable standards in the industry.

was a cost-effective, environmentally-sustainable production system which provides low-cost protein to a growing population.

“Over the last 30 years I have seen a massive improvement in the conditions under which birds have been kept...the modern sheds are all computer controlled, and provide the right temperature and ventilation for the age of the birds.”

“Chicken meat grown indoors is by far the least environmentally damaging of all agriculture meat production.”

“...if chickens were not grown as efficiently as they are, we would have a lot more people struggling to feed their families, and the Australian economy would look pretty sick.”

Reasons for opposition included the large number of birds kept in close proximity to one another, and limited ability to engage in natural behaviours.

“They are not designed to live by the thousands. They naturally have very complex social structures on an intricate, medium-sized scale.”

“Group size is a major social factor, and a lot of the poor welfare (such as cannibalism, not getting enough food, etc.) probably stems from that.”

“Chickens raised in any sort of intensive operation are not able to perform the behaviours that are characteristic of their species, such as dust-bathing and scratching for food. Nor are most chickens able to enjoy fresh air and sunshine.”

Learning opportunities

There was a fair degree of misunderstanding about certain industry practices among members of the general public and animal advocacy groups. For instance, several participants indicated that they disagree with the use of hormones and beak trimming in meat chicken production.

“[Welfare concerns include] de-beaking without anaesthetic, overcrowding, ammonia burns.”

“...They are injected with steroids to make them grow faster, and due to the rate of growth, they can't stand up and endure all sorts of sore spots, ill health, and discomfort.”

In cases where industry-affiliated participants were represented in the chat, this provided an opportunity to clarify that hormones have not been used in decades.

“There is no de-beaking in meat birds practiced.”

“There are no hormones in chicken feed here in Australia, and there has not been for approximately 50 years.”

Common ground between stakeholder groups

While there was plenty of disagreement between how chickens should be managed, there was also a fair amount of agreement between members of different stakeholder groups on two key topics: enforceable standards and transparency within industry.

"I think we are 'sold' a lot of marketing stuff that is not actually reflected in the chicken's welfare."

"CCTV footage live streamed in all CAFOs...might address accountability."

"Transparency of practice and some honest government food research [is needed]."

"I would like to see certain standards implemented in a law and communicated transparently. We all should know what stocking density to deal with, what welfare parameters have to be considered, etc. Currently, there is too much confusion, misleading information, and different accreditation bodies."

"I know farmers where you can adopt a pig as a baby, get updates until they are at the age of killing, and then delivered the entire set of pig products. It's a very personal selling. The prices are very high but the demand crazy. However, being on the farm, it's still not all perfect, and what consumers get sold as welfare is not necessarily a happy animal. Marketing is a huge power tool, and cannot replace communication of simple facts and objective needs."

Relative importance of environmental sustainability and animal welfare

We expected that participant concerns about animal welfare in intensive systems would be more important to them than any potential environmental benefits. The scientific statement introduced during the chat mentioned that intensive meat chicken is a relatively environmentally sustainable way to produce animal protein. Participants did appear concerned about climate change and the effects of livestock farming on the environment. For participants who were not affiliated with the industry, this meant that they doubted the sustainability of producing any type of meat, including chicken meat. Some of these participants suggested that plant-based food sources should be used more often than meat, as humans do not need meat to survive.

"If we would all just calm down and not demand meat with every meal there would be no need for intense farming."

"Yeah I seriously doubt the sustainability of chicken meat farming, at least compared to crops."

"I think that meat should be a luxury good as adequate protein can be obtained from plant sources in a far more environmentally friendly way."

Other participants recognised the low likelihood of most consumers becoming vegetarian or vegan in the near future, and acknowledged the complexity of the issue.

“I think it is a lovely, but unrealistic, dream for people to eat less meat or no meat at all. People don’t care enough.”

“Every change I think of [to improve chicken welfare] negatively affects the environment. Obviously fewer chickens per meter [would be an improvement to welfare], but that means building more sheds, which means clearing more land.”

“It certainly is an intricate puzzle.”

Satisfaction and likelihood of future participation

Participants were asked rate their satisfaction with participating in the forum, and half of participants reported that they were satisfied (25%) or completely satisfied (25%). Another 40% indicated that they were neither satisfied nor unsatisfied, and one participant each indicated that they were unsatisfied (5%) or very unsatisfied (5%). When asked to report whether they would be likely to participate in a future forum, 5% each indicated that they would be unlikely or highly unlikely, while 10% reported that they would be neither likely nor unlikely; the overwhelming majority indicated that they would be likely (50%) or extremely likely (30%) to participate again in the future.

After the chat, one participant emailed a proposed labelling system for chickens and eggs based on quality of life to the research team. This participant was unable to fully express this proposal within the chat itself because, according to them, they were a ‘two-finger typist’ and the conversation moved more quickly than they could manage.

*I advocate a clear and simple **Q.O.L [Quality Of Life]** marking on every chicken product sold in Australia or exported by Australia...It would be a legislated requirement for the marking to conform to a standard clear and simple pattern and colour system using only the approved ratings ... and be of a size of not less than, say, 10% of the advertising/marketing space on the product’s primary face (eg: top of meat tray or egg carton).*

*The **Q.O.L** rating refers to the chickens’ potential for a comfortable and healthy lifestyle under the conditions provided by the producer at the specific facility. [An alphabetical] component rates comfort potential, and [a] numeric component rates health potential. The alphanumeric ranking would be a simple A-E, 1-5 with associated three colour codes ... of green (A-B/1-2), blue (C-D/3-4) and red (E5). The five points on the respective scales relate to excellent, very good, good, fair, and acceptable. The lowest score drives colour award (eg: B3 = blue, E4 = red etc).*

When asked whether there were any comments on the project, a few participants had suggestions for improvements in future forums:

I have just two little improvements to the online forum system. 1. It would be good to know your own number so when people refer to "121" you know they are referring to you. 2. Occasionally I read one of your [the moderator] comments thinking it was just someone in the chat-it might be better to have your comments in another colour to distinguish.

There were only 2 participants (including me) and 1 moderator, which is why I was unsatisfied with the forum, but I am likely to offer to participate in similar events, provided numbers could be higher.

Though I found the live chat forum challenging as a function of the fact that I am a slow typist and there are so many inputs to try and consider in the time available, I would participate in such a study again because it is important for all who have an opinion to make their opinion known.

Less-satisfied participants had complaints about the research study:

...There is nothing more upsetting to have spent many years working extremely actively on many fronts to improve the welfare of a large number of animals to be confronted with comment after comment to which one cannot reply fast enough... I am sure there are much more effective ways of doing research into this.

I feel that many of these questions were asked in a leading way. For example; "how important do you think protection from pecking is", is going to depend significantly on the conditions. If chickens are kept intensively then they require protection of pecking for their welfare, but this protection from welfare need not require de-beaking; it could instead come from a change in conditions. So while I think protection from something like pecking is important, I think that the appropriate protection is more space and not de-beaking, and the questions as asked will conflate these distinctions.

For one question, no answer is correct: broiler chickens are not raised in 'high' stocking densities, they are all raised using chemicals (even food is a chemical), etc. The question with the preventive medicine is biasing and influencing people, since antibiotics was mentioned, but not vaccines.

Other participants appreciated the opportunity to discuss animal welfare with people employed within the industry, and some expressed a desire to learn more about the inner workings of the industry:

The post survey has made me realise I need to read more to gain specific knowledge about the beak trimming and read more about the altering of the labelling laws and exactly what free-range means as a term.

It was really interesting, and thanks to the actual chicken farmer and researcher who joined. It was well-moderated also.

Finally, one participant was wary about how the results of the study might be used:

There were points during this study where I felt wary of the potential for the data to inform marketing/packaging shifts in chicken meat industries, rather than tangible shifts in practices. Much of this hinged around the definition of welfare - I understand that when we speak of 'animal welfare' with respect to meat production, that has a certain definition to do with health, safety, etc. of the animals. Whereas when animal rights advocates (of which there were many in my forum) speak of welfare they mean something akin to wellbeing. As I don't recall these definitions being agreed to at the start of the forum, I am wary of how the ensuing discussion might be interpreted.

Post-forum survey

After participating in the chats, participants rated a higher level of knowledge about Australian meat chicken practices and chicken welfare and husbandry than they had in the pre-forum survey. For both of these items, there was a significant difference between self-reported knowledge ratings before and after the forum (meat chicken industry: $t = -3.2$, $df = 19$, $p = 0.005$; husbandry and welfare: $t = -2.2$, $df = 20$, $p < 0.05$).

As can be seen in Table 16, participants' level of perceived knowledge ranged from low to very high. For both items, the mean rating was well above the mid-point of 3.0, suggesting that, as a group, participants perceived a moderate to high level of knowledge on these topics.

Table 16: Perceived industry, welfare and husbandry knowledge in the pre-forum survey (N = 21), including mean (M) and standard deviation (SD).

	Very low	Low	Moderate	High	Very high	M	SD
Australian chicken meat industry	-	5%	40%	40%	15%	3.7	0.8
Chicken husbandry and welfare	-	5%	43%	38%	14%	3.6	0.8

We analysed whether there were any differences across time between different stakeholder groups. For both of these items, there were within group differences across time, and differences between groups. Figure 4 shows the difference between groups, across time, for perceived knowledge ratings of chicken husbandry and welfare. The item related to knowledge of the chicken meat industry followed a similar pattern. For both items, there was no significant interaction between group and time.

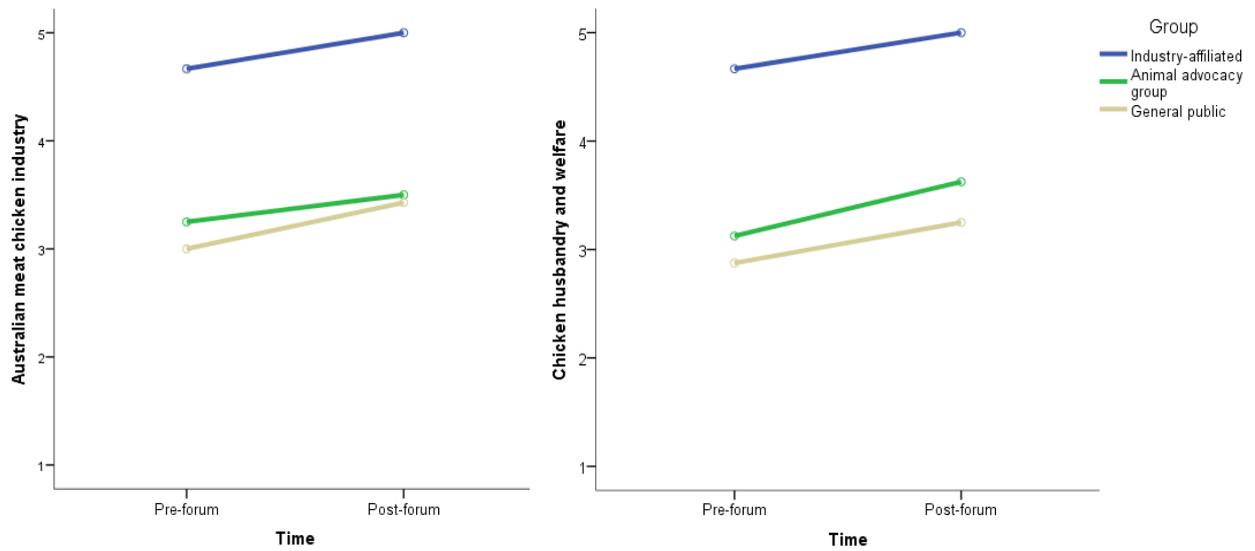


Figure 4: Self-reported ratings of chicken industry, husbandry and welfare knowledge between stakeholder groups across time

For the item related to chicken husbandry and welfare knowledge, there was a significant main effect for time, Wilk's $\lambda = 0.77$, $F(1,16) = 4.69$, $p < 0.05$, partial eta squared = 0.23. There was also a significant difference between groups, $F(1,28) = 9.69$, $p < 0.01$, partial eta squared = 0.55. For the item investigating Australian meat chicken industry knowledge, there was a main effect for time, Wilk's $\lambda = 0.70$, $F(1,15) = 6.58$, $p = 0.02$, partial eta squared = 0.31, and a difference between groups, $F(2,15) = 7.51$, $p < 0.01$, partial eta squared = 0.50. As can be observed in Figure 4, perceptions of both items increased after participating in the forum, and industry-affiliated participants rated a higher level of knowledge than the other stakeholder groups.

Table 17 contains the questions used to objectively measure knowledge of specific chicken industry practices. Among all participants, the only item with a significantly higher rate of correct answers in the post-forum survey compared to the pre-forum survey was intensive meat chicken practices ($t = -2.8$, $df = 20$, $p = 0.01$). The definition of beak trimming, which was answered correctly by 95% of participants in the pre-forum survey, was correctly answered by only 81% of respondents in the post-forum survey, but this difference was not significant. All other items showed some improvement in the number of correct responses.

Table 17: Objective knowledge of specific chicken industry practices (N=21)

	Percentage correct
Free range chickens – Chickens that have access to an outdoor area at least during the day as they please	62
Beak-trimming – Involves the removal of the tip of the chicken's beak to prevent feather pecking and cannibalism	81
Antibiotics – Are administered to chickens to prevent and treat infections and disease	81

Intensive meat chicken farming – Keeping meat chickens indoors at high intensities	71
Age of meat chickens at slaughter – 5 to 7 weeks	76

While there were no significant differences between stakeholder groups in the percentage of correct responses for these items, there was a difference observed across time for the item related to intensive meat chicken farming, Wilk's $\lambda = 0.69$, $F(1,16) = 7.11$, $p = 0.02$, partial eta squared = 0.31. More participants in various stakeholder groups answered correctly after participating in the chats.

Table 18 presents the distribution of perceived importance of attributes to chicken welfare. Most agreed that all the listed features were important or very important to chicken welfare. As with the pre-forum survey, the most important attribute was protection from extreme weather, but ability to engage in natural behaviours, and social contact with other chickens also rated very highly. The least important attribute was preventive medicine. The only rating that was significantly different before and after forum participation was the importance of medicine to treat diseases, which was rated higher after the forum than before ($t = -3.0$, $df = 20$, $p < 0.01$).

Table 18: Perceived importance of attributes to chicken welfare (N=21)

	Not important	Slightly important	Moderately important	Important	Very important	M	SD
Outdoor access	14%	-	-	10%	76%	4.3	1.4
Protection from extreme weather	-	-	5%	5%	91%	4.9	0.5
Social contact with other chickens	-	-	5%	10%	86%	4.8	0.5
Ability to engage in natural behaviour	-	-	5%	10%	86%	4.8	0.5
Protection from predators	-	5%	5%	14%	76%	4.6	0.8
Preventive medicine	5%	14%	24%	29%	29%	3.6	1.2
Medicine to treat disease	-	5%	5%	19%	71%	4.6	0.8
Protection from aggression from other chickens	5%	-	14%	24%	57%	4.3	1.1

Comparisons across time and stakeholder groups showed a number of differences. For instance, there was a significant difference between groups in ratings of important for outdoor access ($F(1,20) = 9.75$, $p < 0.01$, partial eta squared = 0.55) and social contact ($F(2,16) = 7.56$, $p < 0.01$, partial eta squared = 0.49), although there was no main effect for time observed for these items. For both of these items, industry-affiliated participants rated their importance much lower than the other groups. Only one item, the importance of medicine to treat disease, showed a main effect for time, Wilk's $\lambda = 0.72$, $F(1,16) = 6.12$, $p = 0.03$, partial eta squared = 0.28. For this item, the importance ratings increased for all three stakeholder groups, after participating in the forum.

Participants were asked to rate the welfare of chickens in free-range versus intensive management systems (Table 14), and responses did not change considerably from the pre-forum survey. The mean rating for both systems was below the mid-point of 3.0, but perceptions of intensive systems are worse than those of free-range systems. There was no significant difference between participant ratings before or after forum participation.

Table 19: Perceived welfare of meat chickens in different management systems

	Very poor	Poor	Moderate	Good	Very good	Don't know	M	SD
Free range systems	-	43%	29%	10%	10%	10%	2.6	1.3
Intensive systems	71%	5%	-	5%	14%	5%	1.7	1.6

There was no difference between stakeholder groups across time in their ratings of free-range system welfare, but there was a difference between groups in welfare ratings for chickens in intensive systems ($F(2,16) = 9.44, p < 0.01$, partial eta squared = 0.54). As shown in Figure 5, industry members rated the welfare of these systems much higher than animal advocacy group members or the general public.

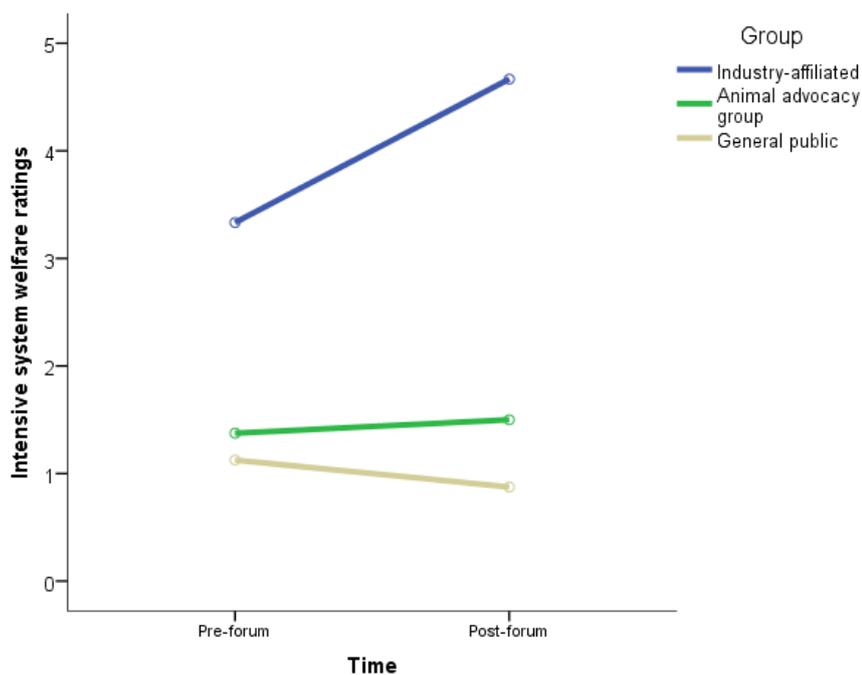


Figure 5: Welfare ratings of meat chickens in intensive systems, across time and between groups

Support for intensive management systems

Participants were asked whether or not they support intensive management systems for meat chickens. A large majority (72%) strongly opposed this system and 10% opposed it, while 14% strongly supported it. The remaining 5% did not know ($M = 1.9, SD = 1.7$). There was no significant difference in support for this type of housing system between all participants after participating in the forum when compared to before participation. However, when comparing different stakeholder groups across time, there was a difference between groups in support

for intensive systems, ($F(2,16) = 6.77, p < 0.01$, partial eta squared = 0.46). Support was much higher among industry-affiliated participants than any other group.

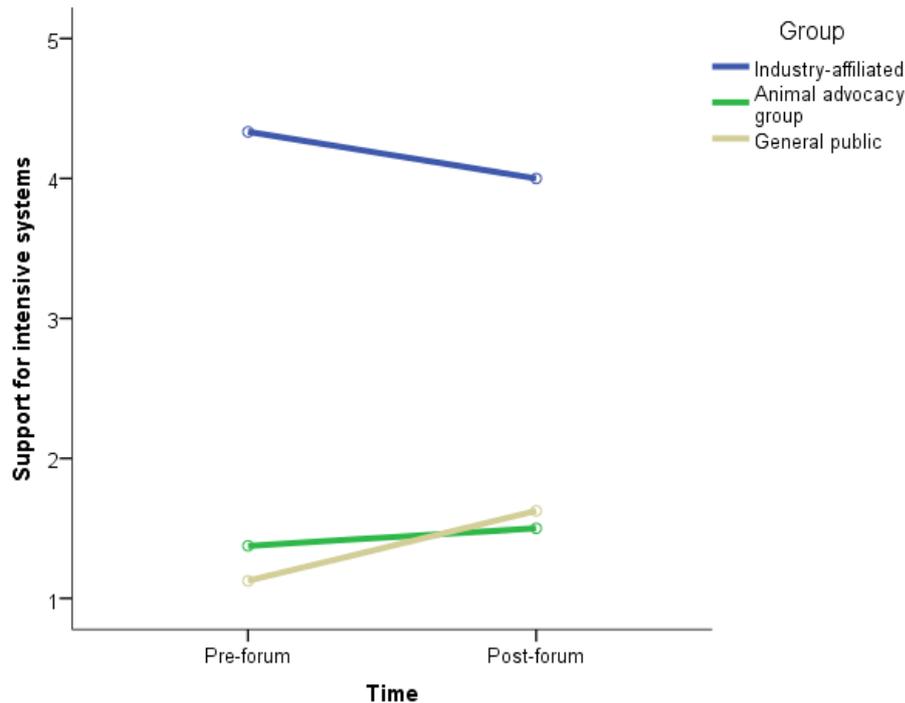


Figure 6: Support for intensive systems, across time and between groups

Participant reasons for support

Participants were asked to explain their reasons for supporting or opposing intensive meat production in Australia, based on their experiences in the forum. Participants who expressed support for intensification described it as an efficient way to feed protein to a growing population.

“People need protein and chickens are efficient producers of it.”

“As a farmer of 30 years’ experience I have seen huge advancement of shed technology which allows the industry to be a very efficient producer of protein, while providing a high level of animal welfare to the chickens in our care.”

Another participant highlighted the relative infrequency of disease and food safety risks in intensive systems.

“This is the safest way to grow chickens and minimise disease and food safety risks, and at the end of the day we are growing the birds to provide food.”

Participant reasons for opposition

Most participants did not support intensification of meat chickens, overwhelmingly due to concerns for animal welfare. Some participants expressed concerns that the chickens were unable to exhibit natural behaviours.

"I do not believe that the chicken's welfare is as it should be when raised in these environments. I believe that their natural behaviour is largely restricted and that their short lives are not pleasant."

"Intensification practices are cruel. They cause pain and suffering. Even if the conditions were improved the fact they are killed at 5-7 weeks is absolutely abhorrent and heartbreaking."

"This practice does not allow chickens to perform natural behaviours and interact socially and naturally with other chickens."

Some individuals also disapprove of current practices in meat chicken management.

"...it involves abnormal growth patterns and unnecessary death among chickens which is cruel and wrong."

"Through selective breeding, chickens in intensive situations also grow abnormally large, becoming top heavy, and causing damage to their legs. They are also killed while they are effectively babies."

Some participants also indicated that a lack of transparency about what goes on the industry is concerning.

"In my opinion there is not enough transparency in this industry which allows for abuse of the chickens as well as room for rumour."

"It is very difficult to allocate a degree of support for intensification practices when you have insufficient information to judge. My perception is that this is the challenge for many Australians. We lack a clear and simple set of standards that are immediately transparent to the ordinary consumer in the market. Many citizens would like to know what effects intensification has on the comfort and health of the chickens during their short lives. Having such information immediately available would enable an informed decision of conscience."

Finally, several participants who opposed intensification viewed that management system as a triumph of greed over ethics.

"If cheap chicken meat cannot be produced in a way compatible with at least a minimally decent life for those chickens, then chicken meat should not be produced cheaply. People can gain more than adequate protein from other sources."

"[Intensification is] uncompromising exploitation and commodification of animals for food & profit..."

"Sometimes there needs to be a balance between the welfare of lives and profit, and in meat chicken rearing systems the focus is only on profit."

“This practice is a result of increased demand for chicken meat in Australia... It's a progression like anything else mass produced and is entirely profit driven.”

Access to external sources of information

Seven participants accessed external sources to help them during the course of the project, including four who accessed information before the chat, six of whom accessed info during the chat, and one who accessed it while filling out the post-forum survey. Of these, Animals Australia and RSPCA were common sources of information. One participant also reported looking up the Animal Welfare Science Centre's associations and funding bodies.

Discussion

Based on the results of topic 1, which suggested that synchronous chats would be a more accurate barometer of attitudes and knowledge about specific welfare topics than asynchronous forums, only chats were used for topic 2. However, topic 2 was able to incorporate a more diverse range of stakeholders, with industry-affiliated participants interacting with members of the general public and animal advocacy groups. In chats with representation from industry, there were a greater number of posts, and greater interaction between the participants themselves. This could be a function of the larger number of participants in these chats, but it is also likely due in part to the lack of agreement on some issues, and a desire by participants outside the industry to learn more about industry practices.

As a rule, participants rated the welfare of meat chickens in intensive systems quite low, but industry-affiliated participants rated it much higher than participants in the general public or animal advocacy groups. This welfare rating did not change over time, unlike in the topic on furnished cages, which did see an increase in the welfare rating after participating in the forums. In hindsight, we should have specified 'intensive indoor systems' rather than 'intensive farming conditions', since some free-range systems could be considered intensive. However, for the public, 'intensive' is probably perceived as 'indoor housing'.

Participants who supported intensification cited the cost-effective nature of this production method, as well as the relative environmental sustainability of intensive chicken systems compared to other livestock farming methods. Participants who opposed intensification typically believed that chickens had inadequate opportunities to express normal behaviours, and that there were far too many chickens in close proximity to one another. In response to the statement that intensification is environmentally friendlier than other systems, many participants suggested that meat should just be eaten less than it is, although other participants recognised that this profound cultural shift is unlikely in the short to medium term.

As with topic 1, perceived knowledge of the Australian meat chicken industry, and of meat chicken husbandry and welfare, increased after participating in the chats. Likewise, objective knowledge about meat chicken intensification also increased.

General discussion

The aim of this project was to investigate stakeholder beliefs and knowledge towards specific animal welfare issues using online forums, and to determine whether this method is a useful tool for collecting information about people's perspectives on animal welfare. First, we developed a web-based forum for individuals to engage socially on animal welfare issues. This was accomplished through development of the Animal Welfare Science Centre Content Management System (AWSC-CMS).

Second, we used this online software to explore people's beliefs and knowledge about layer hen welfare and furnished cages (Topic 1), and meat chicken welfare and intensification (Topic 2). To accomplish this, we ran four forums, including asynchronous and synchronous forums, to gauge participants' perceptions of layer hen welfare. We also ran six synchronous chats to investigate attitudes and beliefs about broiler chicken welfare. Finally, we explored whether online forums are a useful tool for measuring attitudes and knowledge about specific animal welfare topics. Synchronous forums saw the largest number of total posts in the first topic, and were therefore selected for exclusive use in the second topic.

In Topic 1, self-rated knowledge of the Australian egg industry, and chicken husbandry and welfare, improved after participating in the forum. The notable exception to this was for participants in the synchronous forum, who showed a decrease in perceived knowledge. However, this was not reflected in objective knowledge outcomes, which showed an increase in knowledge about furnished cages. Furthermore, furnished cage welfare ratings were significantly higher after forum participation than before. Most of the reasons for supporting the introduction of furnished cages in Australia related to a perceived improvement over conventional cages; they were also viewed by some as a good compromise between industry productivity needs and animal welfare. Participants who opposed their introduction generally agreed that chickens need the opportunity to spend time outdoors, and that furnished cages would not meet all of their welfare needs.

For Topic 2, comparisons between different stakeholder groups (industry-affiliated, animal welfare advocacy group members, and the general public) were possible. Industry participants rated higher on support for meat chicken intensification than the other groups. Supporters cited the cost-effectiveness and relative sustainability of intensive systems, while participants who opposed intensification cited the large group sizes and lack of ability to perform natural behaviours. Like Topic 1, objective knowledge about the relevant topic (i.e. intensification) increased after participating in the chats, as did perceived knowledge. However, unlike Topic 1, there was no significant increase in welfare ratings of chickens in intensive farming conditions after chat participation compared to before. Industry welfare ratings were higher than the other stakeholder groups.

In Australia, the public generally hold positive attitudes towards livestock animal welfare. On a measure of attitudes towards livestock animal welfare, 60% of Australians scored above the neutral point of three [1]. This attitude measure consisted of belief statements such as 'livestock have the same rights as domestic pets' and 'people should do whatever is necessary (legal or illegal) to stop animals being used in livestock production systems'. In the same study, the Australian public believed livestock animals experience relatively good welfare. Dairy cows

and sheep produced for wool were perceived to have the best standards of welfare, while laying hens were believed to have poorest standard of welfare [1].

The reasons why laying hens are believed to have poor welfare in comparison to other livestock animals is not clearly understood. One of the reasons for the poor welfare ratings may be due to media campaigns by NGOs against battery cages in Australia [51, 52]. Indeed, in the current study, welfare ratings for hens in conventional cage systems were well below the mid-point of 3.0, with a mean of 1.6 before the forum, and 1.7 after the forum. Conversely, for free-range hens, the pre-forum survey mean was 3.7, and the post-forum mean was 3.5.

The beliefs underlying the public's approval or disapproval of practices was not the focus of the report, but it is likely that approval of practices are related to the importance that people place certain attributes to the wellbeing of livestock animals. In one study, most people rated husbandry attributes, such as good ventilation and nutrition, as more important than natural living attributes, such as freedom to roam outdoors and contact with offspring [34]. However, natural living attributes correlated more strongly with community behaviour and meat consumption than husbandry attributes [34]. Natural living attributes negatively correlated with approval of livestock practices; the more important people rated natural living attributes, the less likely they were to approve of livestock practices.

The extent to which the negative relationship between natural living attributes and livestock practice approval specifically relates to the laying hen and meat chicken industry should be explored. It is possible that the increase in welfare ratings for furnished cage systems was due to the perception that this system provides hens with more opportunities to engage in species-typical behaviours, information which was provided in the scientific statement. It would also explain why free-range hens had consistently higher welfare ratings than conventional systems.

For meat chickens, intensification was perceived by many participants as forcing animals to live in an unnatural way, with little opportunity to engage in natural behaviours, and in groups far larger than they should experience. The scientific statement did not dispel any of these concerns, instead focusing on the relative environmental sustainability and improved productivity to feed a growing population. This could explain why the welfare ratings for chickens in intensive systems did not change after participating in the chat. If intensive systems somehow improved the chicken's ability to engage in natural behaviours, and if this had been reflected in the information provided to the participants, perhaps welfare ratings would have improved. Future research should examine whether objective information about improvements to natural living attributes for specific livestock management practices results in perceptions of higher welfare for those animals.

A key practical implication of this work is the role that consumers play in determining industry practices. Generally, the public believe animal welfare is important. This sentiment is consistent across most industrialised nations. In the UK 88.5% of survey respondents believed it is important that the meat they buy has been produced with good animal welfare standards [50]. Over half try to buy meat reared in the UK, believe UK standards are very high, buy free-range meat where possible, and agree that they are fussy about where their meat comes from.

Animal welfare knowledge is generally gained passively from word of mouth, documentaries or news media [16]. Of the public that do actively seek information, it is rarely sought from primary sources like agricultural industry websites. The most common sources of information are animal protection agencies such as the RSPCA and HSUS [1, 3]. However, it is not currently known what levels of knowledge individual animal protectionists have towards specific animal welfare issues. One recent study found that opinion leaders, who are more likely to be members of animal advocacy groups, have the same levels of actual knowledge as the general public, but their perceived level of knowledge is higher [1].

Interestingly, this was not the case for the current study, in which perceived knowledge was higher for members of the industry than for the general public or animal advocacy group members. However, there was no significant difference between stakeholder groups on objective knowledge. This may be due to ceiling effects, whereby most participants in all stakeholder groups identified the correct response, making it difficult to establish whether there were any differences between groups.

Not only is it important to understand beliefs towards specific animal welfare issues, but it also important to explore how and why opinions change in response to the provision of information. When U.S. and Canadian participants were presented with information about housing systems for pregnant pigs, support for gestation stalls decreased from 30.4% to 17.8% [14]. This shows that the provision of information is successful in modifying the opinions of some members of the public. However, because there were multiple sources of information, and access to the information was voluntary, it is not clear which aspects of the information presented were responsible for the opinion change. For the purpose of making recommendations for a targeted education campaign, future studies should ensure all participants are exposed to the same information.

In the current study, all participants were exposed to the same information, by way of the scientific statement. It was impossible to control whether people accessed information from other sources, however. Welfare ratings for furnished cages did increase after being exposed to objective information about the cages. However, support for intensification did not increase after objective information was provided. This is likely because the perceived benefits of intensification for environmental sustainability did not outweigh the perceived negative welfare impacts to the animals. Therefore, it is possible that support for certain practices will increase when people are clearly informed about them, but education may not be enough to increase support levels for *all* practices.

Some limitations to this study should be noted. For instance, responses to the survey items related to perceived importance of different factors which could impact chicken welfare were biased toward high importance ratings. Future research should aim to develop survey items that do not encourage this type of bias, as ceiling effects may have negatively impacted the ability to draw comparisons between different participants. Likewise, a comparison between meat chickens in free-range systems and intensive farming conditions is a somewhat false comparison, as it could be argued that some chickens in free-range systems are also intensive. It is likely that most people consider intensive systems to be indoors, but future research should clearly differentiate these types of systems.

This project included a small, convenience sample of participants. It uncovered a broad range of beliefs underlying decisions to approve or disapprove of livestock practices. However, the findings contained in this report are not statistically representative and results cannot be generalised to the public, industry or animal welfare groups in Australia. In particular, for topic 2, animal advocacy group members were over-represented in their relation to their proportion in the wider community. Therefore, the dynamic of the conversations may be considerably different if future research uses a representative sample of participants. Additionally, participants completed the post-forum survey within a few days of participating in the forum discussions. It is possible that opinions or knowledge levels were changed on the short-term, but whether this has medium- or long-term impacts is unclear based on the current study. We recommend that future research of this kind should incorporate a larger number of participants over a longer time span.

Conclusion

To conclude, it is possible to use online forums as a way to probe opinions about specific livestock management practices. Synchronous chats are a useful way to gauge perceptions, and encourage a larger number of posts than asynchronous chats. After participation in the forums, in which participants were presented with a scientific statement objectively describing furnished cages or intensification, welfare ratings for furnished cages increased, but remained the same for intensification. Future research should aim to use larger samples over a larger time frame, and to determine whether perceptions of natural living attributes impact on welfare ratings of, and support for, specific industry practices.

References

1. Coleman, G.C., et al., *Public attitudes relevant to livestock animal welfare policy*. Farm Policy Journal 2015. **9**(2): p. 45-57.
2. Eurobarometer, S., *Attitudes of EU citizens towards Animal Welfare*. 2007, European Commission Brussels, Belgium.
3. McKendree, M.G.S., C.C. Croney, and N.J.O. Widmar, *Effects of demographic factors and information sources on United States consumer perceptions of animal welfare*. Journal of Animal Science 2014. **92**: p. 3161-3173.
4. Spooner, J., C. Schuppli, and D. Fraser, *Attitudes of Canadian citizens toward farm animal welfare: a qualitative study*. Livestock Science, 2014. **163**: p. 150-158.
5. Blokhuis, H., et al., *The Welfare Quality vision, in Improving farm animal welfare*, I.V.B.J. H. Blokhuis, Editor. 2013, Wageningen Academic Publishers: The Netherlands. p. 71-85.
6. Southwell, A., A. Bessey, and B. Barker, *Attitudes towards animal welfare*. 2006, Department of Agriculture, Fisheries and Forestry.: Manuka, ACT.
7. Ventura, B.A., M.A.G. von Keyserlingk, and D.M. Weary, *Animal welfare concerns and values of stakeholders within the dairy industry*. Journal of Agricultural and Environmental Ethics 2015. **28**(1): p. 109-126.
8. Phillips, C.J.C., et al., *Perceptions of the importance of different welfare issues in livestock production*. Animal Welfare, 2009. **3**(8): p. 1152-1166.
9. Mazur, N.A., et al., *Australian Animal Welfare Strategy Stakeholder Analysis Phases 1-4*. 2006, Australian Government. Bureau of Rural Sciences Canberra.
10. Miele, M., et al., *Animal welfare: establishing a dialogue between science and society*. Animal Welfare, 2011. **20**(1): p. 103.
11. Vanhonacker, F., et al., *The concept of farm animal welfare: citizen perceptions and stakeholder opinion in flanders, Belgium*. Journal of Agricultural and Environmental Ethics, 2012. **25**(1): p. 79-101.
12. Benard, M., T. Schuitmaker, and T. Cock Buning, *Scientists and Dutch Pig Farmers in Dialogue About Tail Biting: Unravelling the Mechanism of Multi-stakeholder Learning*. Journal of Agricultural & Environmental Ethics, 2014. **27**(3): p. 431-452.
13. Duijvesteijn, N., et al., *Same Pig, Different Conclusions: Stakeholders Differ in Qualitative Behaviour Assessment*. Journal of Agricultural and Environmental Ethics, 2014. **27**(6): p. 1019-1047.
14. Ryan, E.B., D. Fraser, and D.M. Weary, *Public attitudes to housing systems for pregnant pigs*. PLoS ONE, 2015. **10**(11): p. e0141878.
15. Ellis, K.A., et al., *Public opinion on UK milk marketing and dairy cow welfare*. Animal Welfare, 2009. **18**(3): p. 267-282.
16. Te Velde, H., N. Aarts, and C. Van Woerkum, *Dealing with Ambivalence: Farmers' and Consumers' Perceptions of Animal Welfare in Livestock Breeding*. Journal of Agricultural & Environmental Ethics, 2002. **15**(2): p. 203-219.
17. Spooner, J., C. Schuppli, and D. Fraser, *Attitudes of Canadian Pig Producers Toward Animal Welfare*. Journal of Agricultural & Environmental Ethics, 2014. **27**(4): p. 569-589.
18. Vanhonacker, F., et al., *Do citizens and farmers interpret the concept of farm animal welfare differently?* Livestock science, 2008. **116**(1): p. 126-136.
19. Dana, D., *Conflict Resolution: Mediation Tools for Everyday Worklife*. McGraw-Hill's AccessEngineering. 2001: Chicago, Ill. : McGraw-Hill Education LLC., c2001.
20. Verbeke, W., *Stakeholder, citizen and consumer interests in farm animal welfare*. Animal Welfare, 2009. **18**(4): p. 325-333.

21. Weary, D., C. Schuppli, and M. von Keyserlingk, *Tail docking dairy cattle: Responses from an online engagement*. Journal of animal science, 2011. **89**(11): p. 3831-3837.
22. Ventura, B., et al., *Views on contentious practices in dairy farming: The case of early cow-calf separation*. Journal of dairy science, 2013. **96**(9): p. 6105-6116.
23. Schuppli, C., M. von Keyserlingk, and D. Weary, *Access to pasture for dairy cows: Responses from an online engagement*. Journal of animal science, 2014. **92**(11): p. 5185-5192.
24. Vanhonacker, F., F. Tuytens, and W. Verbeke, *Belgian citizens' and broiler producers' perceptions of broiler chicken welfare in Belgium versus Brazil*. Poultry Science, 2016: p. pew059.
25. de Jonge, J. and H.C. van Trijp, *The impact of broiler production system practices on consumer perceptions of animal welfare*. Poultry Science, 2013. **92**(12): p. 3080-3095.
26. Ajzen, I., *The theory of planned behavior*. Organizational Behavior and Human Decision Processes, 1991. **50**(2): p. 179-211.
27. Heleski, C., A. Mertig, and A. Zanella, *Assessing attitudes toward farm animal welfare: a national survey of animal science faculty members*. Journal of Animal Science, 2004. **82**(9): p. 2806-2814.
28. Robbins, J., et al., *Stakeholder views on treating pain due to dehorning dairy calves*. Animal Welfare, 2015. **24**(4): p. 399-406.
29. Fontana, A. and J. Frey, *The art of science*. The handbook of qualitative research, 1994: p. 361-376.
30. Greenbaum, T.L., *The handbook for focus group research*. 1998: Sage.
31. Schneider, S.J., et al., *Characteristics of the discussion in online and face-to-face focus groups*. Social science computer review, 2002. **20**(1): p. 31-42.
32. Murray, P.J., *Using virtual focus groups in qualitative research*. Qualitative health research, 1997. **7**(4): p. 542-549.
33. Straus, S.G., *Getting a clue The effects of communication media and information distribution on participation and performance in computer-mediated and face-to-face groups*. Small Group Research, 1996. **27**(1): p. 115-142.
34. Coleman, G.C., et al., *Monitoring public attitudes: Development of a monitoring scheme to inform livestock animal welfare policy*. 2014, Melbourne School of Land and Environment. The University of Melbourne.
35. AECL, *Project Equilibrium: Qualitative research to determine consumer perceptions of free-range stocking densities*. 2012: Brand Story.
36. European Commission, *Council Directive laying down minimum standards for the protection of laying hens, in 1999/74/EC*, European Commission, Editor. 1999.
37. Mench, J., D. Sumner, and J. Rosen-Molina, *Sustainability of egg production in the United States—The policy and market context*. Poultry Science, 2011. **90**(1): p. 229-240.
38. Lay, D., et al., *Hen welfare in different housing systems*. Poultry Science, 2011. **90**(1): p. 278-294.
39. Tuytens, F., et al., *Survey of egg producers on the introduction of alternative housing systems for laying hens in Flanders, Belgium*. Poultry science, 2011. **90**(4): p. 941-950.
40. Farm Animal Welfare Council, *Opinion on enriched cages for laying hens*. FAWC: London, UK) Available at <http://www.fawc.org.uk/pdf/enriched-cages.pdf> [Verified 5 April 2012], 2007.
41. Blokhuis, H., et al., *The LayWel project: Welfare implications of changes in production systems for laying hens*. World's Poultry Science Journal, 2007. **63**(01): p. 101-114.

42. RSPCA Australia. *Can the behavioural needs of a layer hen be met in a (furnished) cage?* Knowledge base 2014 [cited 2016 8 June]; Available from: http://kb.rspca.org.au/Can-the-behavioural-needs-of-a-layer-hen-be-met-in-a-%28furnished%29-cage_563.html.
43. Msangi, S. and M. Rosegrant. *World Agriculture in a Dynamically-Changing Environment*. in *FAO Expert Meeting on How to Feed the World in 2050*. 2009.
44. Nijdam, D., T. Rood, and H. Westhoek, *The price of protein: Review of land use and carbon footprints from life cycle assessments of animal food products and their substitutes*. *Food Policy*, 2012. **37**(6): p. 760-770.
45. Napolitano, F., et al., *Effect of information about organic production on beef liking and consumer willingness to pay*. *Food Quality and Preference*, 2010. **21**(2): p. 207-212.
46. Napolitano, F., et al., *Effect of information about animal welfare, expressed in terms of rearing conditions, on lamb acceptability*. *Meat Science*, 2007. **77**(3): p. 431-436.
47. Eurobarometer, S., *Attitudes of consumers towards the welfare of farmed animals*. Special Eurobarometer 229/Wave 63.2-tns Opinion & Social, 2005.
48. Wang, K., et al., *Effect of a free-range raising system on growth performance, carcass yield, and meat quality of slow-growing chicken*. *Poultry Science*, 2009. **88**(10): p. 2219-2223.
49. Lea, E. and A. Worsley, *Australian consumers' food-related environmental beliefs and behaviours*. *Appetite*, 2008. **50**(2): p. 207-214.
50. Clonan, A., et al., *Red and processed meat consumption and purchasing behaviours and attitudes: impacts for human health, animal welfare and environmental sustainability*. *Public Health Nutrition*, 2015. **18**(13): p. 2446-2456.
51. RSPCA Australia. *Help ensure 'free range' actually means better hen welfare!* Campaigns 2016 [cited 2016 15 June]; Available from: <http://nsw.rspca.org.au/campaigns/layer-hens-0>.
52. Voiceless. *Battery Hens*. The Issues n.d. [cited 2015 30 October]; Available from: <http://www.voiceless.org.au/the-issues/battery-hens>.

Appendix A: Recruitment advertisement

Care about animals? Want to have your say? (Animal welfare issue 1)

Participants needed for a study exploring opinions towards specific animal welfare topics using online forums.

What will the project involve?

- Completing a 10 minute online pre-forum and post-forum survey about your knowledge and attitudes towards laying hen welfare and farming
- Participating in a moderated online discussion about housing systems for laying hens.

Eligible participants will be: residing in Australia, an English speaker, over 18 years old, familiar with computers and online forums.

If you are interested in participating or require more information, please contact vanessa.rohlf@unimelb.edu.au

Care about animals? What to have your say? (Animal welfare issue 2)

Participants needed for a study exploring opinions towards specific animal welfare topics using online forums.

What will the project involve?

- Completing a 10 minute online pre-forum and post-forum survey about your knowledge and attitudes towards chicken meat welfare and farming
- Participating in a 1-2 hour moderated online discussion ('chat') about farming systems in the Australian meat chicken industry. Chats will take place throughout April.

Eligible participants will be: residing in Australia, an English speaker, over 18 years old, familiar with computers and online forums.

If you are interested in participating or require more information, please contact Tiffani Howell at tiffani.howell@unimelb.edu.au

Appendix B: Plain Language Statement

PLAIN LANGUAGE STATEMENT (Animal Welfare Issue 1)

Project: Exploring Australian animal welfare views using online forums

You are invited to take part in a research study conducted by Dr Vanessa Rohlf, Dr Jean-Loup Rault and Prof Grahame Coleman from the Animal Welfare Science Centre. The aim of this study is to explore attitudes and knowledge towards specific animal welfare topics using online forums. This study has received clearance by the Human Research Ethics Committee and is funded by the Department of Agriculture.

Should you agree to participate, you will be asked to contribute in three ways:

1. Complete a 5 to 10 minute online pre forum survey about your knowledge and attitudes towards laying hen welfare and farming.
2. Participate in a moderated online discussion about furnished cages as an alternative housing system in Australia. These discussions will take place in groups of up to 12 people over the course of 10 to 14 days. The exact number of days will vary depending on the amount of participation in the group. You can contribute to this forum as often as you like provided you contribute at least once every two days so that discussions remain active. Estimated time for this part of the project is approximately 2 ½ hours.
3. Complete a 5 to 10 post forum survey about your level of satisfaction with participating in the forum and your knowledge and attitudes towards laying hen welfare and farming

We will protect the confidentiality of your responses as best we can within the limits of the law. Your responses to the online forum will be visible to other members of the group and the researchers but you will only be identified by a number and not your name to other participants. Please be aware though that because the forum groups are small there is still a slight chance that you may be identified. Your survey responses will only be viewed by the researchers.

Your name and contact details will be kept in a password protected computer file separate from any data that you supply. They will only be linked to your responses by the researchers to match your survey responses with your forum discussions. Names and contact details will be deleted after all data has been processed. In the final report, you will be referred to by a pseudonym.

A brief summary of the findings will be available to you on application to the researcher. The results may also be presented in conferences and published in academic journals. The data will be kept securely in the Animal Welfare Science Centre for five years from the date of publication, before being destroyed.

Please be advised that your participation in this study is completely voluntary. Should you wish to withdraw at any stage, or to withdraw any unprocessed data you have supplied, you are free to do so.

- To participate in the first stage of the research, please click on the Surveys tab.
- To participate in the second stage of the research, please click on the Forums tab.
- To participate in the last stage of the research, please click on the Surveys tab.

Should you require any further information, or have any concerns, please do not hesitate to contact either Dr Jean-Loup: email: jean-loup.rault@unimelb.edu.au or Dr Vanessa Rohlf: Tel: (03) 9035 7528; email: vanessa.rohlf@unimelb.edu.au. Should you have any concerns about the conduct of the project, which you do not wish to discuss with the researchers, you are welcome to contact the Manager, Human Research Ethics, University of Melbourne, VIC 3010 ph (03) 8344 2073; fax 9347 6739

HEAG: 1545125.1; Date: 26/10/2015; Version 3

PLAIN LANGUAGE STATEMENT (Animal Welfare Issue 2)

Project: Exploring Australian animal welfare views using online forums

You are invited to take part in a research study conducted by Dr Vanessa Rohlf, Dr Tiffani Howell, Dr Jean-Loup Rault and Prof Grahame Coleman from the Animal Welfare Science Centre. The aim of this study is to explore attitudes and knowledge towards specific animal welfare topics using online forums. This study has received clearance by the Human Research Ethics Committee and is funded by the Department of Agriculture.

Should you agree to participate, you will be asked to contribute in three ways:

1. Complete a 5 to 10 minute online pre-forum survey about your knowledge and attitudes towards meat chicken welfare and farming.
2. Participate in a moderated online discussion about intensive farming in the Australian meat chicken industry. Estimated time for this part of the project is approximately 1-2 hours
3. Complete a 5 to 10 minute post-forum survey about your level of satisfaction with participating in the forum and your knowledge and attitudes towards meat chicken welfare and farming

We will protect the confidentiality of your responses as best we can within the limits of the law. Your responses to the online forum will be visible to other members of the group and the researchers, but you will only be identified by a number and not your name to other participants. Please be aware, though, that because the forum groups are small, there is still a slight chance that you may be identified. Your survey responses will only be viewed by the researchers.

Your name and contact details will be kept in a password protected computer file separate from any data that you supply. They will only be linked to your responses by the researchers to match your survey responses with your forum discussions. Names and contact details will be deleted after all data has been processed. In the final report, you will be referred to by a pseudonym.

A brief summary of the findings will be available to you on application to the researcher. The results may also be presented in conferences and published in academic journals. The data will be kept securely in the Animal Welfare Science Centre for five years from the date of publication, before being destroyed.

Please be advised that your participation in this study is completely voluntary. Should you wish to withdraw at any stage, or to withdraw any unprocessed data you have supplied, you are free to do so without being disadvantaged in any way.

- To participate in the first stage of the research, please click on the [Surveys](#) tab.
- To participate in the second stage of the research, please click on the [Forums](#) tab.
- To participate in the last stage of the research, please click on the [Surveys](#) tab.

Should you require any further information, or have any concerns, please do not hesitate to contact either Dr Jean-Loup: email: jean-loup.rault@unimelb.edu.au or Dr Tiffani Howell: tiffani.howell@unimelb.edu.au Tel: (03) 9035 7528. Should you have any concerns about the conduct of the project, which you do not wish to discuss with the researchers, you are welcome to contact the Manager, Human Research Ethics, University of Melbourne, VIC 3010 ph (03) 8344 2073, fax 9347 6739.

HEAG: 1545125.1; Date: 26/10/2015; Version 4

Appendix C: Pre-forum survey

Animal Welfare Issue 1

Thank-you for agreeing to participate in this online discussion forum. Before we allocate you to a group we'd first like to gather a little bit of information about you.

Please answer the following questions.

Section 1: Demographics

1. Are you?
 - Male
 - Female
2. What year were you born? _____ YYYY
3. Please indicate which of the groups listed below you would primarily identify yourself as (tick one only)
 - Animal welfare/animal rights member
If selected please write the animal welfare or animal rights group _____
 - Member of the general public
 - Laying hen industry member
If selected please describe your role _____

Section 2 Knowledge

1. How would you rate your level of knowledge about the following:

	Very low	Low	Moderate	High	Very high
1.1 The Australian egg industry	1	2	3	4	5
1.2 Chicken husbandry and welfare	1	2	3	4	5

2. The following questions ask you about your knowledge of chicken farming practices. Please answer the following questions as best as you can.

What do the following practices involve? For each item, select the option that you believe to be the correct answer.

2.1. Free range chickens.....

- a) Chickens that are free to roam around in a large shed
- b) Chickens that have access to an outdoor area at least during the day as they please (correct)
- c) Chickens that have access to an outdoor area for their entire lives from hatch
- d) Chickens that have access to the outdoors and are bred and reared without the use of chemicals and hormones

2.2. Beak trimming...

- a) Involves the removal of a chicken's beak to prevent disease
- b) Involves the removal of the chicken's beak to prevent feather pecking and cannibalism
- c) Involves the removal of the tip of the chicken's beak to prevent feather pecking and cannibalism (correct)
- d) Involves the removal of the tip of the chicken's beak to prevent disease

2.3. Furnished cages...

- a) Furnished cages house laying hens in groups and do not allow hens the opportunity to nest, dust bathe and perch.
- b) Furnished cages house laying hens in groups and allow them the opportunity to nest, dust bathe and perch (correct)
- c) Furnished cages house laying hens individually and allow them the opportunity to nest, dust bath, perch and access the outdoors.
- d) Furnished cages house laying hens individually and allow them the opportunity to nest, dust bathe and perch.

2.4. Antibiotics ...

- a) Are administered to chickens to prevent and treat infections and disease (correct)
- b) Are administered to individual chickens to treat infections and disease
- c) Are not administered to chickens in Australia
- d) Are administered to increase the rate of growth in chickens

2.5. Intensive meat chicken farming involves

- a) Keeping meat chickens indoors in high densities (correct)
- b) Feeding growth hormones to chickens to increase their rate of growth and size
- c) Housing meat chickens in cages
- d) All of the above

Section 3 Laying hen welfare and housing systems.

1. How important do you think the following factors for chicken welfare?

	Not important	Slightly important	Moderately important	Important	Very important
1.1. Outdoor access	1	2	3	4	5
1.2. Protection from extreme weather	1	2	3	4	5
1.3. Social contact with other chickens	1	2	3	4	5
1.4. Ability to engage in natural behaviour	1	2	3	4	5
1.5. Protection from predators	1	2	3	4	5
1.6. Preventative medicine	1	2	3	4	5
1.7. Medicine to treat disease	1	2	3	4	5

1.8. Protection from aggression from other chickens	1	2	3	4	5
---	---	---	---	---	---

2. How would you rate the welfare of chickens in the following housing systems?

	Very poor	Poor	Moderate	Good	Very good	Don't know
2.1. Free range	1	2	3	4	5	0
2.2. Conventional cages	1	2	3	4	5	0
2.3. Furnished cages	1	2	3	4	5	0

3. Would you support the introduction of furnished cages in Australia?

- Yes
- No
- Don't know

3.1. If yes why...

3.2. If no, why not...

4. Did you access any external sources of animal welfare information to help you complete this survey?

- Yes
- No

4.1. If yes, please list up to three of the sources that you used the most.

Thank-you for your time in completing this questionnaire. We will be in touch with you shortly.

Animal Welfare Issue 2

Thank-you for agreeing to participate in this online discussion forum. Before we allocate you to a group we'd first like to gather a little bit of information about you.

Please answer the following questions.

1. Are you?

- Male
- Female

2. What year were you born? _____ YYYY

3. In which state or territory do you reside?

- Victoria
- New South Wales
- Tasmania
- South Australia
- Western Australia
- Northern territory
- Australian Capital Territory

4. Please indicate which of the groups listed below you would **primarily** identify yourself as.

- Animal welfare/animal rights group member.
If ticked, please write the animal welfare or animal rights group _____
- Member of the general public
- Researcher
If ticked, please describe your field of study (e.g. animal welfare researcher studying meat chicken quality) _____
- Meat chicken industry representative
If ticked, please describe your role _____
- Other _____

5. How would you rate your level of knowledge about the following:

	1	2	3	4	5
	Very low	Low	Moderate	High	Very high
Australian meat chicken practices					
Chicken husbandry and welfare					

6. The following questions ask you about your knowledge of meat chicken farming practices. Please answer the following questions as best as you can. What do the following practices involve? For each item, select the option that you believe to be the correct answer.

6.1. Free range chickens are.....

- a) Chickens that are free to roam around in a large shed
- b) Chickens that have the ability to access an outdoor area as they please, at least during the day (correct)
- c) Chickens that have access to an outdoor area for their entire lives, from the day they hatch
- d) Chickens that have access to the outdoors and are bred and reared without the use of chemicals and hormones

6.2. Beak trimming...

- a) Involves the removal of a chicken's **entire** beak to prevent disease
- b) Involves the removal of the chicken's **entire** beak to prevent feather pecking and cannibalism
- c) Involves the removal of **the tip of** the chicken's beak to prevent feather pecking and cannibalism (correct)
- d) Involves the removal of **the tip of** the chicken's beak to prevent disease

6.3. Antibiotics ...

- a) Are administered to chickens to prevent and treat infections and disease (correct)
- b) Are administered to individual chickens showing symptoms of illness, to treat infections and disease
- c) Are not administered to chickens in Australia
- d) Are administered to increase the rate of growth in chickens

6.4. Intensive meat chicken farming involves...

- a) Keeping meat chickens indoors in high densities (correct)
- b) Feeding growth hormones to chickens to increase their rate of growth and size
- c) Housing meat chickens in cages
- d) All of the above

6.5. Intensively raised meat chickens are typically slaughtered at...

- a) Six to 12 months of age
- b) Two years of age
- c) 5 to 7 weeks of age
- d) 12 weeks of age

7. How important do you think the following factors are for chicken welfare?

	1	2	3	4	5
	Not at all important	Slightly important	Moderately Important	Important	Very important
Outdoor access					
Protection from extreme weather					
Social contact with other chickens					
Ability to engage in natural behaviour					
Protection from predators					
Preventive medicine (e.g. antibiotics)					
Medicine to treat disease					
Protection from aggression from other chickens					

8. How would you rate the welfare of meat chickens farmed under the following conditions:

	1	2	3	4	5	
	Very low	Low	Moderate	High	Very high	Don't know
Intensive farming conditions						
Free range farming systems						

9. Please rate your level of support for intensive farming practices in the chicken meat industry.

1	2	3	4	5	
Strongly oppose	Oppose	Neither support nor oppose	Support	Strongly support	Don't know

Please explain your answer

10. Did you access any external sources of animal welfare information to help you complete this survey?

- Yes
 No

If yes, please list up to three of the sources that you used the most.

11. Where did you hear about this project? (Please select all that apply).

- I personally know a member of the research team
 Animal rights/animal welfare group
 Friend or family member
 Meat chicken industry
 The University of Melbourne
 Other (please write) _____

12. Please indicate the days/times that you would likely be available for the 90-minute live chat. Please select all that apply.

Day of the week	Morning (9am-noon)	Afternoon (noon-5pm)	Evening (5pm – 8pm)
Monday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tuesday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wednesday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thursday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Friday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Saturday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sunday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank-you for your time in completing this questionnaire. When your data is processed the researchers will allocate you to a forum group and contact you with log in information and forum discussion dates.

Appendix D: Post-forum survey

Animal welfare issue 1

Thank-you for participating in this forum discussion. We're now going to ask some questions about your knowledge and opinions towards chickens and their welfare as well as some questions about your experiences with participating in this project. Some of the questions you answer in this survey will be the same as those presented pre-forum survey. While questions may seem repetitive but they are important because they help us to determine whether any changes have taken place over the course of the forum discussion.

Section 1 – A bit about you.....

1. In what state or territory do you live?

2. How would you rate your level of satisfaction with participating in this online forum?

1	2	3	4	5
Very unsatisfied	Unsatisfied	Neither satisfied nor unsatisfied	Satisfied	Very satisfied

3. How likely would you be to participate in another online forum like this one?

1	2	3	4	5
Very unlikely	Unlikely	Neither likely nor unlikely	Likely	Very likely

4. How would you rate your level of knowledge about the following:
The Australian egg industry?

1	2	3	4	5
Very low	Low	Moderate	High	Very high

Chicken husbandry and welfare?

1	2	3	4	5
Very low	Low	Moderate	High	Very high

The following questions ask you about your knowledge of chicken farming practices. Please answer the following questions as best as you can. What do the following practices involve? For each item, select the option that you believe to be the correct answer.

5. Free range chickens are.....

- Chicken that are free to roam around in a large shed
- Chickens that have access to an outdoor area at least during the day as they please (correct)
- Chickens that have access to an outdoor area for their entire lives from hatch
- Chickens that have access to the outdoors and are bred and reared without the use of chemicals and hormones

6. Beak trimming...

- Involves the removal of a chicken's beak to prevent disease
- Involves the removal of the chicken's beak to prevent feather pecking and cannibalism
- Involves the removal of the tip of the chicken's beak to prevent feather pecking and cannibalism (correct)

- d) Involves the removal of the tip of the chicken's beak to prevent disease

7. Furnished cages...

- a) house laying hens in groups and do not allow hens the opportunity to nest, dust bathe and perch.
- b) house laying hens in groups and allow them the opportunity to nest, dust bathe and perch (correct)
- c) house laying hens individually and allow them the opportunity to nest, dust bath, perch and access the outdoors.
- d) house laying hens individually and allow them the opportunity to nest, dust bathe and perch.

8. Antibiotics ...

- a) Are administered to chickens to prevent and treat infections and disease (correct)
- b) Are administered to individual chickens to treat infections and disease
- c) Are not administered to chickens in Australia
- d) Are administered to increase the rate of growth in chickens

8. Intensive meat chicken farming involves

- a) Keeping meat chickens indoors in high densities (correct)
- b) Feeding growth hormones to chickens to increase their rate of growth and size
- c) Housing meat chickens in cages
- d) All of the above

9. How important do you think the following factors are for chicken welfare

	1	2	3	4	5
	Not at all important	Of little importance	Somewhat important	Important	Very important
Outdoor access					
Protection from extreme weather					
Social contact with other chickens					
Ability to engage in natural behaviour					
Protection from predators					
Preventative medicine					
Medicine to treat disease					
Protection from aggression from other chickens					

10. How would you rate the welfare of chickens in furnished cages?

1	2	3	4	5	
Very poor	Poor	Moderately	Good	Very good	Don't know

11. How would you rate the welfare of chickens in conventional cages?

1	2	3	4	5	
Very poor	Poor	Moderate	Good	Very good	Don't know

12. How would you rate the welfare of chickens in free range systems?

1	2	3	4	5	
Very poor	Poor	Moderate	Good	Very good	Don't know

13. Would you support the introduction of furnished cages in Australia?

- Yes
- No
- Don't know

13.2. If yes why...

13.3. If no, why not.....

14. During this research project did you access any external sources of animal welfare information?

- Yes
 - No if no please go to question 10
- If yes, when did you access these resources?
- Before the online forum discussion
 - During online forum discussions
 - Filling out the post forum survey

12 If yes, please list the up to three of the sources that you used the most.

Thank-you for your participation if you have any comments you would like to add, please do so here.

Animal welfare issue 2

Thank-you for participating in this forum discussion. We're now going to ask some questions about your knowledge and opinions towards chickens and their welfare as well as some questions about your experiences with participating in this project. Some of the questions you answer in this survey will be the same as those presented pre-forum survey. While

questions may seem repetitive but they are important because they help us to determine whether any changes have taken place over the course of the forum discussion.

1. How would you rate your level of knowledge about the following:

	1	2	3	4	5
	Very low	Low	Moderate	High	Very high
Australian meat chicken practices					
Chicken husbandry and welfare					

2. The following questions ask you about your knowledge of chicken farming practices. Please answer the following questions as best as you can. What do the following practices involve? For each item, select the option that you believe to be the correct answer.

2.1. Free range chickens are.....

- a) Chickens that are free to roam around in a large shed
- b) Chickens that have the ability to access an outdoor area as they please, at least during the day (correct)
- c) Chickens that have access to an outdoor area for their entire lives, from the day they hatch
- d) Chickens that have access to the outdoors and are bred and reared without the use of chemicals and hormones

2.2. Beak trimming...

- a) Involves the removal of a chicken's **entire** beak to prevent disease
- b) Involves the removal of the chicken's **entire** beak to prevent feather pecking and cannibalism
- c) Involves the removal of **the tip of** the chicken's beak to prevent feather pecking and cannibalism (correct)
- d) Involves the removal of **the tip of** the chicken's beak to prevent disease

2.3. Antibiotics ...

- a) Are administered to chickens to prevent and treat infections and disease (correct)
- b) Are administered to individual chickens showing symptoms of illness, to treat infections and disease
- c) Are not administered to chickens in Australia
- d) Are administered to increase the rate of growth in chickens

2.4. Intensive meat chicken farming involves

- a) Keeping meat chickens indoors in high densities (correct)
- b) Feeding growth hormones to chickens to increase their rate of growth and size
- c) Housing meat chickens in cages
- d) All of the above

2.5. Intensively raised meat chickens are typically slaughtered at...

- a) Six to 12 months of age
- b) Two years of age
- c) 5 to 7 weeks of age
- d) 12 weeks of age

3. How important do you think the following factors are for chicken welfare?

	1	2	3	4	5
	Not at all important	Slightly important	Moderately important	Important	Very important
Outdoor access					
Protection from extreme weather					
Social contact with other chickens					
Ability to engage in natural behaviour					
Protection from predators					
Preventive medicine (e.g. antibiotics)					
Medicine to treat disease					
Protection from aggression from other chickens					

4. How would you rate the welfare of meat chickens farmed under the following conditions?

	1	2	3	4	5	
	Very poor	Poor	Moderate	Good	Very good	Don't know
Intensive farming conditions						
Free range systems						

5. Please rate your level of support for intensive farming practices in the chicken meat industry?

1	2	3	4	5	
Strongly oppose	Oppose	Neither support nor oppose	Support	Strongly support	Don't know

Please explain your answer

6. How would you rate your level of satisfaction in participating in this online forum?

1	2	3	4	5
Very unsatisfied	Unsatisfied	Neither satisfied nor unsatisfied	Satisfied	Very satisfied

7. How likely would you be to participate in another online forum like this one?

1	2	3	4	5
---	---	---	---	---

Very unlikely Unlikely Neither likely nor unlikely Likely Very likely

8. During this research project did you access any external sources of animal welfare information?

Yes

No if no please go to question 9

If yes, when did you access these resources?

Before the online forum discussion

During online forum discussions

Filling out this survey

If yes, please list the up to three of the sources that you used the most.

9. Thank-you for your participation. If you have any comments you would like to add, please do so here.

Appendix E: Forum discussion plan

Animal welfare issue 1

Days may vary depending on amount and type of discussion

Day 1 and day 2

Introduction:

“Before we begin, I would like to first inform you about what we are researching. We are researching..... (Restate aim of the project). There are no right or wrong answers to the topics. We’re just interested in your opinions. Also please be mindful of a few rules. (Outline forum guidelines)...

Day 3 and 4

Question 1. What do you think about when we discuss laying hen welfare?

Question 2. Do you think laying hens have good or bad welfare in Australia?

Day 5 to 6

Question 3. Are you familiar with the term furnished cages?

Question 4. Do you think laying hens would have good or bad welfare if they were housed in furnished cages?

Question 4.1. Would you support keeping laying hens in furnished cages? If yes, why. If not why not?

Day 7 to 8

Moderator to reflect on information and then present the information statement below:

“Eggs are produced by laying hens (chickens) that are kept in a variety of housing systems in Australia, with the two most common being conventional cage and free range. These systems vary in terms of what they provide to laying hens. Scientific studies show that cage systems offer the highest standards of health and hygiene. However, conventional cages offer only limited space and laying hens are restricted in terms of displaying some of their natural behaviours such as not being provided a nest to lay their egg, a perch, a dust bath or foraging materials. Conversely, free range systems give hens the opportunity to display these natural behaviours but are at greater risk of disease and predation, feather pecking and cannibalism.

A new alternative housing system, called furnished cages, have been designed. According to scientific studies, furnished cages allow hens the opportunity to lay their eggs in a nest, dust bath and perch while maintaining similar health and hygiene levels to conventional cage systems. Furnished cages show a low incidence of feather pecking and cannibalism (the main cause of mortality in non-cage systems). These systems however do not allow laying hens the opportunity to forage or access the outdoors”

Moderator should then ask in light of the information just presented what is your opinion towards furnished cages. Question 5. Would you support the introduction of furnished cages in Australia? And why?

Day 9 to 10

Question 6 In light of the information we provided how would you rate the welfare of laying hens in furnished cages? Do you think they would have good or bad welfare?

How do you think the welfare of laying hens in furnished cages compared with the welfare of laying hens in conventional cages? For example, do you think they would have better welfare or worse?

How do you think the welfare of laying hens in furnished cages compared with the welfare of laying hens in free range systems? Do you think it would be better or worse?

Day 11 to 12

Summarise and clarify thoughts. Thank all for participation and direct to online short exit survey.

Animal welfare issue 2

All issue 2 forums were synchronous online 'chats', which took approximately 1 to 2 hours.

Post 1: Hi everyone. Welcome to the discussion forum. Thanks again for your time today. Just to remind you all that the aim of this afternoon discussion is to discuss your thoughts on meat chicken welfare and intensification in Australia. The estimated time for this part of the research project is approximately 1-2 hours.

Post 2: I'd like to begin the discussion by asking you all what your general thoughts are on meat chicken welfare in Australia. Generally speaking, do you think meat chickens have good or bad welfare?

(follow chat and ask probing questions as necessary)

One type of farming practice for meat chickens in Australia is intensification. Have you heard of it before? If so, what do you think about it?

(follow chat and ask probing questions as necessary)

Introduce intensification scientific statement

Intensification can be defined as changes towards more confined production systems and the concentration of production on fewer farms, aimed at increasing the efficiency of production. It does not necessarily mean indoor housing, as some systems which provide access to an outdoor area can also be considered intensive. Chicken meat is the cheapest source of animal protein, with the smallest carbon footprint for animal production, making it an environmentally and economically sustainable production system to feed a growing human population. Many of these goals have been achieved through intensification. Intensification of meat chicken production involves improved chicken nutrition and health management for the flock as a whole, larger flocks (30,000+) of meat chickens kept at higher densities, and chickens which are bred to grow bigger and faster through genetic selection. However, some individual chickens have anatomical (for example, lameness) and metabolic (for example, heart disease) problems, mostly resulting from intense genetic selection for rapid growth. Chickens live in large groups with limited choice of living environment or pen mates. Often, chickens have behavioural restrictions, such as limited space to move around at the later stage of the growing period. They also often have less environmental stimulation, such as limited opportunity to forage and explore. Do you oppose or support this method of raising meat chickens?

END

Thanks very much for your input everyone. Is there anything else you would like to add?

I will be in touch within the next couple days about the final part of the study, the post-forum survey. Thank you again for taking the time to participate in the chat.

