Final grant report form

PROJECT/STUDY TITLE:	Delphi Project – Expert consensus on animal welfare priority issues in the UK
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GRANT AWARDED:	November, 2018

Lay summary of project outcomes, achievements and potential impact on animal welfare:

A modified Delphi method was used to generate expert consensus on the priority welfare issues (PWIs, as determined by their impact on the welfare of the individual animal or the group) of managed animals in the UK. The study involved 144 experts, divided between 10 species groups. Experts were recruited from a range of disciplines, including practicing veterinarians, academics, charity sector employees, industry representatives, and policy officials. Half of the groups generated their own species-specific PWI lists via an online discussion board, and half of the groups were provided with a list. Two rounds of surveys were conducted online using the Online Surveys (formerly BOS) tool, and the final round was an in-person workshop with a subset of experts. The experts agreed that welfare issues should be ranked considering three categories: i) severity, ii) duration, and iii) prevalence. Considering these categories would account for welfare at both an individual (severity and duration) and population (prevalence) level. In the first online survey the experts scored each welfare issue using the three categories, on a 6-point Likert scale, where 1 = never/none, and 6 = always/high. In round 2, participants were asked whether they agreed or disagreed with the rankings generated from round 1. At the 2-day workshop 21 experts participated in a series of group discussions to finalise the PWI lists for each species. Top ranking PWIs for animals (at individual level) include: inappropriate home environment / behavioural needs not being met, consequences from breeding decisions, lack of socialisation / handling, delayed euthanasia, lack of basic care / neglect, lethal wildlife management, and inappropriate nutrition. The Delphi process resulted in consensus on the most significant welfare challenges faced by managed animal in the UK and can help to guide decisions on future research and education priorities.

Detailed progress against original objectives: List outcomes against original objectives. Discuss what has been achieved, including any statistical analysis completed as part of the project.

Original Objectives

The aim of this study was to use a modified Delphi procedure to create an overall ranking of welfare outcomes for managed animals in the UK. Specifically, we planned to recruit 12-20 experts for 10 species groups and complete 5 discussion boards, 2 rounds of surveys (20 surveys in total), and a 2-day workshop. All of these original objectives were achieved, and a full description is presented below.

Introduction
Animal welfare remains an area of consistent public concern, with acceptance of animal sentience enshrined in the legislation of many countries. Historically, animal welfare concerns were directed primarily at farmed livestock, through significant disquiet at the intensification and confinement of animals in the 1960s (e.g. the publication of 'Animal Machines' by Ruth Harrison in 1964). Animal welfare concerns now cover a diverse range of species and issues and include all classes of animals where human activities have an influence on animal lives. The importance of specific welfare issues can be determined by public concern and political interests, but also by the impact

of the welfare issue on the animal or population of animals as determined by the scientific assessment of the amount of suffering caused by particular welfare issues. In order to determined where limited funding resources should be directed, or to raise awareness of best practice, it is sometimes necessary to prioritise particular welfare issues to identify those needing special consideration.

It is becoming increasingly common to capture data on animal welfare through qualitative research approaches, especially where there are limited objective welfare assessment tools available (Buckland et al., 2013), and/or limited empirical surveillance. For example, monitoring the welfare of some species is very difficult due to ownership numbers or housing conditions (e.g. companion animals, and exotic pets) or because population size (e.g. many wildlife species, and some pet species) are largely unknown.

A popular method for assessing expert opinion on a topic is the Delphi method, which relies on an expert panel who complete multiple rounds of surveys in an attempt to reach consensus on an important issue(s). The main premise of the Delphi method is based on the assumption that group opinion is more valid than individual opinion (Keeney et al., 2011). The classical Delphi method is anonymous, which provides each panel member with the opportunity to present and react to ideas – unbiased and unintimidated by other participants. However, this study also incorporated a 'conference Delphi' method with an online discussion board, and a 'modified Delphi' method with an expert panel workshop. Including a workshop in the procedure has been shown to have a higher probability of reaching agreement than anonymized classical Delphi approaches. The merit of this approach is that generic cross-cutting issues will be more readily identified than may be possible otherwise.

The identification of priorities in animal welfare follows from the premise that, where animals' capacities to suffer can be assumed, the most pressing issues are determined by the severity and duration of suffering and the number of animals affected (Kirkwood et al 1994; Farm Animal Welfare Council [FAWC] 2006). Several studies currently exist which have used expert consensus techniques to identify and prioritise animal welfare issues for some species: dogs (Buckland et al, 2014; Yates and Main, 2011); sheep (Phythian et al, 2011); horses (Horseman et al); farm animals (Whay et al, 2003); sows (Bracke, 2002); cattle (Capdeville and Veissier, 2011). However, we believe that this is the first study which has set out to cover such a wide range of species (cats, dogs, horses, rabbits, exotic pets (also referred to as Non-Traditional Companion Animals, NTCAs, and includes non-indigenous reptiles, birds, small mammal species, and small primates), managed wildlife (including pheasant, deer, badgers, foxes etc), cattle, pigs, poultry, and small ruminants). Furthermore, this study also attempted to identify cross-cutting broad welfare issues that affected multiple species. As part of this process, the experts also had to decide on the most appropriate way to weight the importance, and rank, welfare issues. For example, some welfare issues may be very severe but only affect a small number of animals, compared to minor or moderate welfare issues which affect many animals.

The aim of this study was to solicit the opinions of animal welfare experts on the priority welfare issues facing these groups of managed animals in the UK. Specific goals of the study were to generate a prioritised rank of welfare issues for each species group, and also (if possible) a prioritised rank of all groups combined. It was also very important that the experts recruited onto the study were reflective of the diversity of opinions which would be found in each sector. The results of this study would then help guide the Animal Welfare Foundation (AWF) on which areas of animal welfare to support.

Materials and Methods
All research generated from this study was approved by the University of Edinburgh's Human Ethics Review Committee (HERC).

Recruitment of Experts
We aimed to recruit between 12 and 20 experts per species group as recommended by standard Delphi methodology, and to recruit a broad range of stakeholders within each species group which would be a combination of practicing veterinarians, academics, charity sector employees, industry representatives, and policy officials. Where possible we tried to have a balanced mix of these categories between each group, although our ability to manage this was limited as the experts have to agree to participate. An expert was defined as someone who had worked in their field of expertise for more than three years and were based in the UK.

Recruitment was done in two phases; phase I included the groups that would also participate in an online discussion to generate the PWI lists (cats, horses, rabbits, exotics, and wildlife), and phase II was completed two months later (cattle, pigs, poultry, small ruminants, and dogs). The final number of experts in each species group at the start of the study was: cats (n=14); horses (n=19); exotics (n=12); rabbits (n=11); wildlife (n=15); pigs (n=15); cows (n=16); poultry (n=12); small ruminants (n=15); dogs (n=15); 144 experts in total. The recruitment process began with building a list of contacts of well-known experts in their field and contacting them via email describing the study, the aims, and the Delphi procedure. We also created a Delphi information page on the Jeanne Marchig International Centre for Animal Welfare Education website (University of Edinburgh) where potential participants could read more about the study. Additionally, we employed a 'snowball-sampling method' whereby these initial contacts were also asked to refer us to other experts in their field who would be a good addition to the study. In many instances contacts were recommended to us from animal welfare related organisations such as Wild Animal Welfare Committee (WAWC), British Veterinary Association (BVA), Rabbit Animal Welfare Fund (RAWF), People's Dispensary for Sick Animals (PDSA), The Royal Society for the Prevention of Cruelty to Animals (RSPCA), Animal Welfare Foundation (AWF), and many more). Potential experts were only contacted twice via email and if no response was received, they were removed from the list. When an expert agreed via email to participate in the study, they were then sent a consent form to sign in accordance with the Human Ethical Review (HERC) panel guidelines. The consent form also contained a more detailed description of the study objectives, protocol, and expected timeline. It was explained to each expert that participation was voluntary, and they were able to exit the process at any time.

Priority Welfare Lists (including discussion board)
For five of the species groups (cats, rabbits, horses, exotics, and wildlife) it was determined that there was insufficient peer-reviewed literature available in order to construct comprehensive lists of PWIs. Therefore, for these species only, a 'Delphi Conference' was used, and we set up a discussion board for each group using the University of Edinburgh Blackboard virtual learning environment. Participants were registered on the discussion board system and could post and respond anonymously. The discussion boards contained an initial list of potential welfare issues for each species (derived from lists generated by the British Veterinary Association), and the experts discussed, amended and added to the list to generate a comprehensive list of welfare issues for each species group. The discussion boards were open for a period of 2 weeks, and experts were sent an email reminder mid-way through, and 2 days before closing. The discussion board host (FL) was able to monitor how many experts had logged into the system, to answer any queries from experts, and to stimulate discussion between them when necessary.

For the remaining five groups (cattle, pigs, poultry, small ruminants, and dogs) it was determined that there was already sufficient peer-reviewed and grey literature to create a comprehensive list of welfare issues to begin the Delphi process. PWI lists consisted of several categories including; general health, management and husbandry, housing, painful procedures, stockmanship, breeding decisions, euthanasia, transportation. The number of welfare issues per species group ranged from 34-118. The PWI lists were generated from a range of sources (peer reviewed journals, websites,

and grey literature including lists generated by the British Veterinary Association, the PDSA Annual Report, RSPCA welfare standards, and more) and were also reviewed by non-participating experts (either project team members or non-UK based welfare specialists) to ensure they were comprehensive. At the end of each survey, experts were also given the opportunity to provide any other issues which they felt might be missing from the original list.

Questionnaire Design
Two rounds of surveys were conducted online using the Bristol Online Survey (BOS) tool and were completed anonymously. In both rounds of online studies, demographic data was also collected from the participants. This included: year of birth, gender, profession, highest level of education, and number of years since graduating highest level of education.

The experts who were initially recruited in phase I of the study were asked via email for the criteria they considered important to rank/score welfare issues. Experts differed in their relative importance of the criteria and thus we used 3 factors; i) severity, ii) duration, iii) prevalence to account for the scale of welfare issues at the individual animal level (severity and duration) and at the population level (prevalence). Participants were asked to score each of these elements on a 6-point Likert scale, where 1 = never/none, and 6 = always/high. An even numbered scale was chosen as this prevented the experts for choosing a neutral answer. In order to remain consistent throughout the study, the same ranking system was also utilised for the other five groups.

Workshop
The final stage of the process was the workshop which was held at Edinburgh University in Sept, 2018. Two experts from each species group (3 for small ruminant group) were invited to attend the 2-day workshop, which consisted of a combination of small group and large group exercises and discussions in order to finalise the priority welfare lists for each species group and to rank them.

The final exercise of the workshop was to ask experts to look for similarities between the PWIs that they identified for their own group and see if there were any similarities or common themes running between all 10 species groups. The experts began with small discussions of 4-5 people, which was then opened to the whole group. The experts were able to come up with a final list of overarching general themes of welfare concerns across all species. The only thing that they were not able to do was to rank this final list as that was deemed to be just too difficult to resolve.

During the 2-day workshop, the ease with which each of the ten groups reached their final consensus varied greatly depending on the complexity of the issues that had to be agreed upon. For example, single species experts were able to work much more efficiently than the multispecies groups which were very difficult to review (exotics, and wildlife).

Data Analysis
All comments and discussions from the five discussion boards were collated, and a simple thematic analysis was performed for each discussion. All of the issues mentioned were categorised into themes (e.g. housing, management, nutrition) and duplicate issues were deleted. The aim of this was to generate a comprehensive list of welfare issues raised by the experts, but to eliminate any duplication. These lists were reviewed by two assessors. At this stage the lists were relatively long and unranked, but that ensured, as far as possible, that all potential welfare outcomes and risk factors had been captured for each species group.

The results of the first survey were reviewed and only the welfare issues which scored an average neutral-high response (scores 3-6 on the Likert scale) were carried forward into round 2. The remaining welfare issues were then presented according their rank, with the highest-ranking issues

(score 6) at the top of the list, and the lowest ranked issues (score 3) at the bottom. In round 2, participants were asked whether they agreed or disagreed with the rankings.

Results
Welfare priority lists were divided into two categories: severity/duration, and prevalence, with the aim of identifying the key welfare issues of individuals and the population respectively. The ranked priority welfare issues for cats, dogs, horses and rabbits are presented in Table 2. Exotics and wildlife are presented in Table 3; and cattle, pigs, poultry and small ruminants are presented in Table 4. During the workshop discussions, the small ruminant experts decided that it was more appropriate for the goats, as a dairy species, to be grouped together with dairy cows, and the sheep to be grouped with the beef cattle as the animals faced much similar welfare issues within the UK industries.

Response Rate
The response rate for the first round was: cats (86%), horses (68%), rabbits (82%), exotics (50%), wildlife (80%), cattle (75%), pigs (93%), poultry (75%), small ruminants (93%), and dogs (87%). The response rate of the second round was cats (79%), horses (74%), rabbits (64%), exotics (58%), wildlife (60%), cattle (81%), pigs (93%), poultry (75%), small ruminants (93%), and dogs (93%).

Demographic Information
Table 1 displays the demographic information, averaged over two surveys per group. The mean age of the experts in each group was relatively consistent (42-54 years old) across the groups. It was not possible to balance all of the groups for gender, with seven out of the ten groups having a female bias. Most of the groups had a good variation of experts' professions, however the exotics and small ruminant groups were more than 50% veterinarians, whereas only 8% of the horse experts were veterinarians. In general, experts from the pet trade, industry organizations, government, and trainers were the least represented across all groups.

Workshop
The tables below are final priority lists that were generated during the workshop. The severity and duration of welfare issues were considered together (considering the welfare of individual animals), and prevalence of a welfare issue was considered alone (considering the welfare of a population of animals).

Table 22. Ranked welfare priority issues of companion animals determined using a Delphi method. Issues in same box are equal ranking.

SPECIES	Ranking	PRIORITY WELFARE ISSUES	
		SEVERITY x DURATION	**PREVALENCE**
CATS	1	Social behaviour issues relating to inappropriate home environment	Neglect / hoarding
	2	Diseases of old age	Delayed euthanasia
	3	Obesity	Inherited diseases and conformation issues
	4	Not seeking veterinary care when required	Social and environmental restriction leading to inappropriate behaviours
	5	Poor pain management	Poor pain management
	6	Shelter issues (including long stays, chronic stress, etc)	Diseases of old age

	7	Unowned cat population	Not seeking veterinary care when required
	8	Delayed euthanasia	Obesity
	9	Neglect / hoarding	Shelter issues (including long stays, chronic stress, etc)
	10	Inherited diseases and conformation issues	Inadequate stray cat management (inc. overpopulation)
DOGS	1	Genetic and breeding issues	Abnormal / unwanted behaviours
	2	Lack of socialisation / handling	Common canine health issues
	3	Obesity	Obesity
	4	Lack of knowledge of dog welfare needs by owner / carer	Lack of canine behavioural knowledge by owners and breeders
	5	Not meeting behavioural requirements	Lack of socialisation / habituation
	6	Inappropriate training methods	Lack of knowledge of dog welfare needs by owner / carer
	7	Not seeking or delayed veterinary care	Behavioural restriction
	8	Irresponsible ownership	Lack of routine vet care
	9	Lack of regulation of establishments or service providers	Long distance travel
	10	Physical trauma	Lack of regulation of establishments or service providers
	11		Physical trauma
RABBITS	1	Lack of socialisation /handling	Inadequacy of housing/environment
	2	Failure to vaccinate	Lack of socialisation / handling
	3	Reduced life expectancy	Inadequacy of diet (can lead to dental issues and obesity)
	4	Lack of owner/vet knowledge on basic rabbit behaviour and health (and recognition of diseases/pain)	Lack of pre-purchase research by new owners
	5	Rabbits regarded as cheap /replaceable pets	Reduced life expectancy
	6	Inadequacy of diet (can lead to dental issues and obesity)	Failure to vaccinate
	7	Inadequacy of housing/environment	Rabbits regarded as cheap /replaceable pets
	8	Lack of research/knowledge on rabbit health/welfare by owners/caretakers	Lack of recognition of pain behaviour
HORSES	1	Delayed euthanasia decisions	Lack of biosecurity and disease surveillance
	2	Lack of recognition of pain behaviour	Delayed euthanasia decisions
	3	Large worm burdens	Lack of understanding of horse welfare needs by owner/carer
	4	Obesity	Fear/stress/frustration from use in work, sport, or entertainment

	5	Unsuitable diets for equine feeding behaviour	Obesity
	6	Hunger	Indiscriminate/inappropriate breeding
	7	Inability to perform normal social interactions	Poorly fitting and restrictive tack
	8	Negative affective states	Unstable social groups
	9	Overworking	Unsuitable diets for equine feeding behaviour
	10	Overweight riders	Poor weaning methods

Table 23. Ranked welfare priority issues of exotic animals and wildlife determined using the Delphi method. Issues in same box are equal ranking.

*prevalence was not completed for general exotics, birds, and fish as the experts felt unable to answer accurately due to lack of empirical evidence

SPECIES	Ranking	PRIORITY WELFARE ISSUES	
		SEVERITY x DURATION	PREVALENCE*
EXOTICS (general)	1	Lack of general care from owners /caretakers	
	2	Lack of recognition /treatment for poor health	
	3	Species being sold that are not suited to life as a pet	
	4	Inadequacy of housing /environment	
	5	Inadequate social groups	
	6	Lack of breeder regulation /breeding decisions	
	7	Lack of knowledge by vets / underserved in practices	
	8	Misinformation given to owners	
	9	Lack of research / knowledge on what is good husbandry /needs / welfare indicators	
Birds	1	Hand rearing birds to make them tame / bond to owner	
	2	Inadequacy of diet	
	3	Abnormal / problem behaviours	
	4	Clipping wings	
Primates	1	Early removal of primate offspring from parents	Lack of socialisation / correct social grouping
	2	Metabolic bone disease and fractures	Early removal of offspring from parents
	3	Inadequacy of diet	Inadequacy of diet
	4	Abnormal / problem behaviours	Abnormal / problem behaviours
Fish (as pets)	1	Fish regarded as cheap/replaceable pets	
	2	Wild caught fish for pet trade	
Wildlife	1	Methods of lethal wildlife management	Long-term captivity
	2	Hunting for fun /food	Lethal wildlife management

	3	Long term captivity	Behavioural management
	4	Translocation / exclusion	Translocation /exclusion
	5	Fishing	Birds / bats collisions
	6	Cat predation	Feeding
	7	Birds/bats colliding with turbines, pylons, windows, flypaper, etc	Environmental pollution, contamination, plastic, entanglement
	8	Environmental pollution, contamination, plastic, entanglement	Hunting for recreation / food
	9	Live capture	Fishing
	10	Non-target poisoning	Cat predation
	11	Behavioural management	Live capture
	12	Handling	Handling
	13		Non-target poisoning

Table 24. Ranked welfare priority issues of farmed animals determined using the Delphi method. Issues in same box are equal ranking.

SPECIES	Ranking	PRIORITY WELFARE ISSUES	
		SEVERITY x DURATION	**PREVALENCE**
PIGS	1	Behavioural needs not met	Pain from management procedures
	2	Tail-biting	Tail biting
	3	Inadequate stockperson skills	Behavioural needs not met
	4	Delayed euthanasia	Poor housing design (floor, ventilation, maintenance, layout)
	5	Lameness	Poor general health status
	6	Poor general health status	Inadequate stockperson skills
	7	Breeding for large litters	Lameness
	8	Inadequate / unsuitable feed	Gastric ulcers and inadequate feeding
	9	Aggression	Aggression
	10	Riding behaviour	
	11	Lack of use of analgesics	
POULTRY	1	Consequences from breeding decisions	Consequences from breeding decisions
	2	Inappropriate housing conditions/environment Inappropriate social grouping	Inappropriate housing conditions/environment Inability to express natural behaviours (abnormal behaviours)
	3	Inability to express natural behaviours (abnormal behaviours)	Transportation and handling issues
	4	Neglect	Painful / uncomfortable conditions due to management / housing
	5	Lack of knowledge of poultry behaviour	Lack of knowledge by caretaker of poultry behaviour
	6	Transport related issues	Painful procedures

	7	Unpreparedness for emergency	Delayed euthanasia
	8	Euthanasia methods	Physical injury from aggression
SHEEP + BEEF COWS	1	Neglect	Lack of perception of painful conditions and pain management. Lack of recognition of underlying poor health status (i.e. not just thin animal).
	2	Lameness	
	3	Sheep scab / Mastitis	Lack of local veterinary care / Lack of staff to quickly deal with health issue
	4	Dystocia	High neonatal morbidity and mortality
	5	Inappropriate nutrition	Lameness
	6	Overstocking/stocking density in housed animals	Chronic GI parasites
	7		Sheep scab
	8		Predation / worrying (wildlife and dog attacks)
	9		Poor dental health
	10		Lack of appropriately trained staff/contractors (e.g. shearers, transporters)
DAIRY COWS + DAIRY GOATS	1	Inappropriate nutrition	Neonatal morbidity and mortality
	2	Neonatal morbidity and mortality	Poor pain management
	3	Poor stockmanship skills	Inappropriate nutrition
	4	Social behaviour issues (e.g. mixing animals, aggression, etc)	Production diseases e.g. lameness
	5	Poor pain management	Poor stockmanship skills
	6	Infectious diseases	Social behaviour issues (e.g. mixing animals, aggression, etc)
	7	Euthanasia techniques – specifically for killing goat kids	Infectious diseases
	8		Lack of opportunity to display species specific behaviours (goats e.g. browsing/climbing)
	9		Euthanasia techniques – specifically for killing goat kids

Overarching General Themes of Concern Across Species *(not ranked)*

Eleven broad themes were identified by the experts as being general areas of concern across all of the species, these are listed below, unranked.

- Delayed euthanasia
- Lack of knowledge
- Social behaviour issues
- Breeding decisions
- Lack of health / vet care
- Problem behaviour issues
- Inappropriate diet
- Chronic / endemic health issues
- Lack of appropriate environment
- Recognition and treatment of pain
- Neonatal morbidity /mortality (farm animals only)

Discussion

The aim of this study was to gather a range of expert opinions on the welfare of managed species in the UK and rank the priority welfare issues, both within and between species. This was an ambitious undertaking; however, the experts were successfully able to reach consensus. There are many published studies which report on the welfare issues of a single species (e.g. Phythian et al, 2011; Buckland et al, 2014; Horseman et al, 2016) or in some cases a sub-category of species e.g. farm animal species (Whay et al, 2013). However, to our knowledge, this is the first study that has included such a broad range of species.

Response Rate

Throughout the study, we were able to achieve very high response rates, which were considerably higher that other animal welfare priority Delphi studies (Bennett et al, 2004 60%; Souza et al, 68.7%; Whay et al, 2003, 22%). There are no specific guidelines stating the level of response rate that is required to ensure the accuracy of the Delphi. However, some authors (Sumison, 1998; Walker & Selfe, 1996) suggest that a general rate of (70%) should help to maintain rigor. The average response rate for the ten groups, over two rounds, in the present study was 78%. This high response rate provides us with a high degree of confidence that we have covered a broad spectrum of expert opinion, and that the results of the present study are reliable. The lowest response rates that were observed during this study were for the exotics group and the wildlife group. The principal reason for this might be due to each group covering a multitude of species, resulting in longer surveys, and possibly leading to participant fatigue.

Discussion of Results

The results from the first round of online surveys highlighted the most important (highly ranked) welfare issues. There were several similarities that could be seen across companion animal species. For example, social behaviour issues, negative affective states, behavioural restrictions, consequences of long stays in shelters, and consequences from breeding decisions (genetic issues and breeding for exaggerated conformation) featured highly in both the cat and dog lists. Issues relating to inadequate diets were very high in the rabbit and horse lists, and obesity featured highly on all four companion animal lists. Another very highly ranked issue across all four of the groups

was centered around lack of knowledge. Specifically, owners or caretakers not being aware of the welfare needs of these species and a lack of species-specific behavioural knowledge (e.g. behaviours often wrongly interpreted). For some species, particularly farmed species, there may also be a lack of veterinary knowledge, as there is not as much time spent learning about these animals in the undergraduate curriculum compared to companion animals. Finally, for NTCAs, in some instances there may not be sufficient knowledge available about the species with regards to their optimal husbandry or welfare needs. The issue of lack of knowledge, as a broad term, also features across prevalence, severity, and duration.

When considering the priority welfare lists of the farmed species it is interesting, but not unexpected, that many of the high-ranking issues were health related. For example, common production diseases, lameness, lack of routine health care, painful procedures etc. Less emphasis appears to have be put onto behavioural restrictions and negative affective states of production animals – with the exception of poultry, where the inability to express natural behaviours did feature highly on the priority lists (it was in the top seven across prevalence, severity, and duration). Recurring issues across all of the farmed species was delayed euthanasia, and also delayed veterinary care. There are several reasons why delayed euthanasia decisions might occur including; 'giving them a chance' by extending an animal's time for recovery from an illness or injury, inexperience of the stockperson in either assessing an animal's prognosis or carrying out the procedure or euthanasia or waiting for the animal to complete a stage of production before finally being euthanised. Delayed access to veterinary care may be due to economic concerns (farmers maintaining that veterinary care of individual animals is too expensive), an inability to provide individualised care to extensively kept species, or incorrect diagnosis and inappropriate therapies from farmers. Delays in both veterinary care and euthanasia cause unnecessary suffering and poor welfare. These are complex issues but may be partially addressed through improved staff training programmes and better on-farm protocols.

The general results, and species-specific results, from the first exotics survey was also highly focussed on issues relating to lack of knowledge. The lack of knowledge was referring to many areas including owners, vets, breeders, and pet shops, and had consequences on the animals' housing, diet, general husbandry, positive welfare indicators, etc. One of the main difficulties of understanding the welfare of 'exotic species' or 'NTCAs' is the large number of different species that are now kept as pets. Each species might have very specialised requirements, all of which can be poorly understood. Vets also report that the ownership of exotic pets has grown dramatically in recent years, and continues to grow, however the exact numbers of exotics pets in the UK is unknown as many are never seen by a vet. In the current Delphi study, some exotic species were not covered adequately enough either due to lack of expert recruitment or unclear instructions given to the experts It is also pertinent to point out that we did not attempt to cover zoo animals, or farmed fish, and thus our coverage of all managed animal species in the UK was not complete.

The wildlife group welfare priorities were possibly the most diverse of all of the other groups, which probably was also a reflection of the diversity of experts who participated in that group, and the number of species involved. In many instances the experts came up with ethical issues that might not necessarily be welfare issues (such as lethal wildlife management). They also generated issues in the online discussion board that were outside the scope of this study (managed species only). Perhaps, uncovering the priority welfare issues of UK (managed) wildlife was too difficult a task under the confines of this study, and we did not tackle these groups adequately. Therefore, these results might not be as reliable as the other nine groups.

Regarding the second online surveys where experts had to state if they agreed with the ranking of issues, most of the groups had quite a lot of variation in their level of agreement. Within the cat group there was strong agreement for the rankings of prevalence of social behaviour issues (78% agreement), negative affective states (75% agreement), lack of knowledge of feline welfare needs

(80% agreement), and the inadequate management of stray cat populations (78% agreement). Considering dogs, the highest level of agreement was found for the ranking of lack of canine behavioural knowledge by owners (86% agreement), common canine health issues (79% agreement) and behavioural restriction (79% agreement) (considering prevalence, severity and duration).

There was a lot of disagreement between the horse experts as to the ranking of the priority welfare issues, especially within the top 5 issues on the lists. However, the rabbit experts were the only group to reach very high levels of agreement on the top issues including 100% agreement that the most prevalent welfare issue with respect to rabbits is a lack of pre-purchase research by new owners. They are agreed that inadequacy of diet and lack of general care was the most severe welfare issue (both scoring 83% agreement), and that inadequacy of diet and lack of socialisation and handling was the welfare issue that had the biggest impact in terms of duration (both scoring 100% agreement).

Again, wildlife and exotics groups did not report high levels of agreement (with exception of welfare issues for primates). However, the highest-ranking issue for prevalence of a welfare issue for wildlife was methods of population control which scored 75% agreement. Four issues that scored highly for duration of a welfare issue for wildlife were: environmental contaminants, release of invasive species, habitat loss/destruction, and pathogens spread from released wildlife.

Cattle scored high levels of agreement for the number one priority welfare issues for prevalence, severity, and duration. These issues were common productions diseases, delayed euthanasia, and poor foot health, respectively. Pigs only had high levels of agreement for severity of welfare issues, with delayed euthanasia and tail biting both achieving 86% agreement. Poultry scored highly for the prevalence of keel bone fractures (number two on the ranked list), the severity of poor foot/leg health (number three on the ranked list), and the duration of artificial lighting regimes and inappropriate housing conditions (numbers four and five on the ranked list, respectively). Small ruminants scored the highest levels of agreement for the position of lameness, lack of suitable analgesics and commons health issue (second, third, and fifth on the list) with respect to severity.

For some welfare issues it was undoubtedly difficult for our experts to rank them simply because there is limited scientific, or empirical, data available on the extent of the welfare issue, for example, the influence of media, mis-information given to owners, etc. For all species, many welfare issues are multifactorial and it can be difficult to untangle them. For example, in a Delphi study assessing the impact of government policy on farm animal welfare, Bennett et al (2004) reported that in the case of caged hen welfare variables, there would be overlap between variables such as 'injury and pain caused by being pecked, turning, wing flapping, perching etc' and 'feather loss (caused by feather pecking, treading and abrasion)'.

Workshop, Ranking, and Overarching Themes
During the workshop, the experts were able to reach consensus on the priority welfare issues for their own species, to rank them, and to work together and identify common welfare issues (broad themes) running between all of the species. In many instances experts in one group were able to speak competently to other species (e.g. companion animals, farm animals) which undoubtedly facilitated the group discussions, and helped to reach consensus. Similar broad themes were generated for companion animals and farm animal species. However, exotics and wildlife species did not follow the same trends, again, likely due to the inherent difficulties of these multi-species groups.

One overarching theme that came up for almost all species was 'lack of knowledge'. This theme was discussed at great length during the workshop as it can have a number of different causes. For example, in some instances, the knowledge is known, by researchers or veterinarians, but is not

widely understood by animal owners or caretakes. Whereas, in some instances, the knowledge is not available, and more research is required. Finally, in some instances, both professionals and caretakers know what the 'gold standard' of care should be, however a range of limitations may prevent caretakers from implementing the advice (e.g. financial, time, access restrictions). These are all important considerations when looking to apply strategies to improve some of these welfare issues.

The only activity that the experts were not able to complete during the workshop was to rank the final overarching welfare issues across all species. However, this was perhaps an unachievable expectation to make of them, and the greater value lies within the ranking of each individual species.

Limitations of Study
There appeared to be less agreement between experts from the online surveys, than during the in-person workshop. Because the majority of the study was conducted online, there was potential for misunderstanding of the instructions by the experts, and also for personal/professional bias interfering with the interpretation of both the instructions, and the actual welfare issues. For example, veterinarians maybe more likely to view welfare from a 'health status' point of view, due to their medical training. Two of the groups (exotics and small ruminants) had a higher proportion of veterinarians in their group, which likely biased the results. However, the Delphi methodology is limited by the experts that actually agree to participate in the study, despite every effort being made to balance groups. It is also possible that the welfare consequences of some of the PWIs listed were unclear to some of the experts. Feedback received from some experts was that they did not like the wording/terms that had been used to describe some of the welfare issues. It was exactly these kinds of ambiguities that we were able to work through together in the workshop, and as a consequence were able to reach consensus. This is partly why the results from the in-person workshop maybe more reliable that the online surveys (although they incorporate fewer experts so potentially less variation of opinion).

Despite some of the limitations of the method, discussed previously, this study was the best methodology for the task, and it provided a framework for the comparison of welfare issues within and between species. The aims of the study were achieved, and we were able to retain high response rates throughout the entire process. The high calibre of experts from a wide range of professions/background were recruited to participate in the study, which should ensure the reliability of the results.

Conclusion
The Delphi process did result in consensus on the most significant welfare challenges faced by managed species in the UK. Some of the broad, overarching themes, that cut across all species included lack of knowledge of the animal's requirements and behaviour, social behaviour issues, delayed euthanasia, inappropriate breeding decisions, and inappropriate diets and environments. The final priority welfare issues contained a mix of animal-, resource-, and management-based factors, and can help to guide future research, funding, and education priority decisions.

Were there any challenges or barriers/modifications to the project?

The objectives of this study were ambitious. The Delphi method is very time consuming and to repeat each process for 10 individual groups was challenging. Perhaps it would have been more beneficial to reduce the scope, for example focus on companion animals and farm animals? That would have allowed us to go deeper instead of broader in relation to the most important welfare issues facing each species. However, with that said, some of the results we have generated are very novel, and do not yet exist in the literature, therefore it was a valuable exercise to do.

Some other challenges that we experienced were related to the recruitment of experts onto the study, and also the availability of experts to attend the workshop. Despite contacting people several months in advance, many of our 'first choice' experts already had previous commitments and were unable to attend. These are all inherent challenges of the Delphi methodology and will be discussed in the 'limitations of study' when writing and presenting our results in the future.

In terms of the overall scope and delivery of the project, I believe we were able to deliver on all of the original objectives.

Provide details of knowledge transfer activities to date and any future plans/actions.

KT Activities to Date:

BSAS Abstract submitted and accepted, Edinburgh, 9-11th April, 2019

UFAW Abstract submitted, Bruges, 3-4 July, 2019

Vet Record Editorial "Welfare: are we heading to a golden age?" Published May 26, 2018

JMICAWE Social Media Updates

Delphi Study Promotion on JMICAWE website, https://www.ed.ac.uk/vet/jeanne-marchig-centre/activities/delphi, and blog, http://jmicaweactivities.blogspot.com/2018/09/delphi-workshop-in-edinburgh.html

KT Future Activities Planned:

ISAE Abstract submission, Norway, 5-9th August, 2019 (abstract submission closes 15th Feb)

AWF Discussion Forum, 5th June, 2019

BSAS oral presentation (* if accepted as oral)

UFAW oral presentation (*if accepted)

ISAE oral presentation (*if accepted)

Short communication on priority welfare issues of non-traditional companion animals (NTCA).

JMICAWE Social Media Updates (once we can publicise full results with AWF permission)

Provide details of any original peer-reviewed research papers, book chapters and books/monographs that have resulted directly from your work supported by this grant.

A manuscript to be submitted to the Vet Record has been drafted (much of which has been included in this report), however, with the permission of AWF board this will not be submitted until spring/summer of 2019 as we have species specific manuscripts planned for submission before this time, in accordance with the contract extension of Dr Fiona Lang. Other future planned peer-review articles include:

i)   Prioritising rabbit welfare issues using a modified Delphi method – Vet Record
ii)   Prioritising cat welfare issues using a modified Delphi method – Vet Record
iii)   Prioritising farm animal welfare issues using a modified Delphi method – Frontiers in Veterinary Science
iv)   Short communication on priority welfare issues of non-traditional companion animals (NTCA) – Vet Record

Briefly tell us about the staff who received a salary or stipend from this grant (including yourself)

Dr Fiona C. Lang, Research Fellow, Full time.

Fiona worked full time on the Delphi project over the last 12 months. Fiona managed the project remotely but visited the JMICAWE team in Edinburgh twice during this period. Once in November 2017 to plan the project with the project co-investigators, and again in September 2018 to run the 2-day workshop when 21 of the animal welfare experts will invited to participate in the final round of the Delphi process.

Prof Dwyer, Prof Lawrence, Dr Connor and Dr Bacon also contributed to the project through support and advice on welfare issues, the Delphi approach and to provide contacts to build the expert panel. Prof Dwyer and Dr Bacon also contributed to leading some of the Delphi workshop activities.

How has the grant contributed to the professional development of the staff named above (including yourself)?

The management and coordination of this project has greatly contributed to the professional development of Dr Fiona Lang in many respects. Firstly, Fiona has had to learn about the theory and methodology of the Delphi technique (classical, modified, and conference). This is the first qualitative study that she has worked on so far in her career. In addition, this project required recruiting >140 experts in animal welfare across a variety of species. A much greater number of experts were contacted in order to recruit that final number, and this has provided Fiona with an excellent opportunity to grow her professional network within the animal welfare field, and across a variety of sectors. Fiona's scientific background, until now, has been limited to swine and cattle, but she has had to become familiar with the welfare challenges faced by a range of species (farm, companion, exotic, and wildlife). The Delphi study included 10 different groups, and it is anticipated that undertaking such novel research should yield a very high number of peer-reviewed manuscripts (4-5) which is very important for the development of young(ish) scientists. Finally, Fiona has relished in being a part of (even if from a distance) the wider JMICAWE team. The range of projects that they are involved in, and international work that they do has been hugely inspiring.

Use the space below for any other relevant information you wish to report on.

In the future, I would suggest that the AWF trustees could consider alternative or additional methodologies other than the Delphi process. I do believe this was a very valuable study, and the work on novel species has contributed to our understanding of the welfare issues that these groups may experience. However, it was very time consuming, and financially consuming (to AWF) and I believe that the most valuable results that we generated were largely from the 2-day in-person workshop, where our highly knowledgeable and respected experts were able to work through each of the activities face-to-face until they were able to reach consensus. If I were asked to repeat this process again, I would choose to focus more resources into the workshop portion and invite more people to participate. The process is reliant on the knowledge, experience and views of the experts on the basis of current scientific knowledge. It may be that in the future the process may yield different outcomes and perhaps that re-visiting this periodically might be beneficial to ensure that priorities keep pace with the accumulation of knowledge.

We recognize that the success of this study has relied upon the animal welfare experts who kindly volunteered their time to participate, and we are very thankful to their dedication.

APPENDIX I - Original Animal Welfare Lists

Original list of welfare issues used in first surveys (not ranked) as derived from the online discussion board (n=5) and literature / other resources (n=5):

Cat

(n=118)

1. Not seeking veterinary care
2. Delayed end of life decisions
3. Chronic stress (may result in excessive grooming)
4. Unrecognized / untreated pain (chronic)
5. Toxicity/accidental poisoning (e.g. permethrin, lilies, etc)
6. Common feline health issues: including dental disease, system-based disorders, urinary tract, parasites, etc
7. Common feline infectious diseases, especially FHV, FCV, FPV and FCoV/FIP
8. Diseases of ageing population especially osteoarthritis, hyperthyroidism and renal disease ('hidden' conditions)
9. Lack of disease management for stray/community cats
10. Physical Trauma: e.g. RTA, airguns, dog attacks, etc
11. Increased risk of rabies etc form relaxed PETS passport regulations (2012)
12. Poor dental care
13. Cat bite abscesses
14. Poor diagnosis of breed related issues due to lack of exercise (e.g. exercise induced respiratory distress in brachycephalic cats)
15. High mortality in stray kittens
16. Too many unsterilised queens
17. Homeopathy as alternative treatment
18. Obesity (especially for indoor cats)
19. Lack of exercise (especially for indoor cats)
20. Vegetarian and vegan cat diets (possible?)
21. Poor nutrition / diet
22. Lack of basic veterinary care (e.g. vaccinations, neutering, etc)
23. Lack of accessibility to subsidised preventive health care
24. Some veterinary care highly focussed on physical health at expense of overall welfare ("life at all costs" mentality)
25. Insufficient access to veterinary clinics ('cold spots' in poorer communities)
26. Not accessing veterinary care (e.g. logistics, cat fear, owner fear, perceived overselling)
27. Lack of professional consensus on welfare issues (e.g. FIV, neutering, vaccination)
28. Lack of understanding of some vets of impact of length of stay can greatly improve welfare
29. Lack of feline specific licensed veterinary products
30. Lack of knowledge about feline specific medicinal products
31. VMD act very restrictive over the use of non-licensed medicinal products (can create welfare issues)
32. Non-compliance (of owners) with veterinary instruction/medication
33. Poor pain management, including lack of post-op care following routine surgeries
34. Enforced group living (naturally solitary living)
35. Increasing cat density - close proximity due to modern home/estate design
36. Inappropriate home env. e.g. number of key resources (litter trays, scratching posts etc)
37. Inappropriate kitten socialisation
38. Change of environment e.g. moving house, relinquishment, cat shows
39. Long stay in rescue facilities
40. Shelter design limitations that don't provide choice and control (e.g. lack of outdoor space and places to hide and get up high, visibility to other cats)
41. Lack of registration requirements / compulsory microchipping which (reduce abandonment)

42. Inappropriate pedigree breeding leading to inherited and chronic disorders
43. Unregulated breeding / overpopulation (e.g. too many cats in UK, not enough homes)
44. Insufficient timely neutering (due to vet/owner perceptions myths)
45. Early litters due to late sterilisation
46. People trying to keep foetuses (not full term) alive from a pregnant spay
47. Behavioural restrictions e.g. house cats, and cats in pens (e.g. rescues, stud cats, pet shops, cat shows, etc)
48. Lack of control over environment (e.g. no cat flap)
49. General lack of feline behavioural knowledge by owners
50. Unqualified 'behaviourists and trainers' giving out damaging advice
51. General lack of feline health knowledge. Including incorrect health and welfare advice given by breeders
52. Hoarding
53. Lack of knowledge of where to seek professional behavioural help
54. Not accessing behavioural care/support (e.g. lack of awareness, costs, poor bond)
55. Poor environmental enrichment and inappropriate access to essential resources
56. Inappropriate human interaction (e.g. inappropriate play, flooding)
57. Early weaning
58. Handrearing
59. Neglect (e.g. matted coats and overgrown claws)
60. Inappropriate handling e.g. scruffing and clipnosis
61. Lack of owner knowledge about local schemes (e.g. neutering for reduced cost)
62. Inappropriate transportation of cats to vets (i.e. no box/in a blanket)
63. Lack of owner knowledge about what to do with healthy stray cats
64. Historical cat care (e.g. older owners who are unwilling to adapt to new advice
65. Turning to social media as the first point of call for cat care advice (vet diagnosis, medicinal advice, dosage rates)
66. Lack of knowledge of the Animal Welfare Act 2006 (meeting all cat welfare needs)
67. Aversive training methods, e.g. spray with water, rubbing their nose in urine, etc
68. Electronic training aids and invisible electric fences (to be banned?)
69. Owners lack of knowledge of what to do when their cat goes missing
70. Lack of knowledge of learning theory, and how to apply it
71. Cats taken to unfamiliar environments for assisted animal intervention programmes - can be very stressful (handling by unfamiliar people and new environment)
72. Inappropriate grooming regimes of long-haired cats
73. Inappropriate litter hygiene (cleaning routine)
74. Inappropriate interaction – owners not caring that their cats don't want to be picked up/cuddled etc
75. Electronic containment fences
76. Owners going on holiday etc and leaving cats with enough food to last them and no other care provisions in place.
77. "Stealing" other people's cats, e.g. feeding other's cats and encouraging into their homes, can lead to obesity, unknown allergies, abandonment if ownership becomes unclear
78. Lack of human understanding of the ethology of the cat
79. Lack of human understanding how the sensitive/socialisation period impacts cats' lives
80. Crowded shelter environments (especially during kitten season) and lack of rehoming leading to disease outbreaks (e.g. cat flu)
81. Management of unowned, stray and feral cats
82. "Rescuing" feral cats and trying to rehome them to a domestic environment, can take months/years of distress.
83. Inappropriate rehabilitation e.g. flooding
84. Unwanted behaviour e.g. spraying outside of litterbox
85. Misconceptions of feline emotions and motivations (e.g. saying the cat is spiteful, etc)
86. Fear, anxiety, frustration, pain, acute and/or chronic stress caused by xxx
87. The belief that "hiding under the bed" is "normal" behaviour and therefore acceptable.

88. Territorial disputes
89. Cat cafés - stressful?
90. Inappropriate anthropomorphism (e.g. social media, 'funny' cat videos on YouTube)
91. Inappropriate media representation (e.g. cats and cucumbers, cats in clothes)
92. Claw caps
93. Cats as school pets
94. The welfare of cats used during filming (e.g. stress levels, too hot under lights, excessive noise levels, long travel times, poor training, poor handling)
95. Inappropriate messaging using cats in advertising
96. Cats used in circuses and shows
97. No clear regulatory body for behaviourists/trainers to be recognised by DEFRA, RCVS etc
98. No clear regulation and guidelines for other industries e.g. groomers, rescue charities
99. Lack of definition and regulation of rescues, boarding catteries etc
100. Dominance myth (alpha status) in cats (e.g. owners trying to 'dominate' cat)
101. Research gaps (e.g. optimal use of analgesics, extreme procedures to prolong life)
102. Advertisement of ineffective products in major pet store chains
103. Religion (e.g. medicine and surgery not in line with some beliefs and values)
104. Cultural differences in relation to cats as pets
105. Cats/kittens being sold over the internet (e.g. Preloved, Gumtree, Facebook)
106. Celebrity culture reinforcing poor welfare (e.g. popularising brachycephalic breeds)
107. Inappropriate product messaging (e.g. food bowls and mats saying 'boss cat')
108. Lack of scientific knowledge on best hand rearing practices
109. Long-haul travel e.g. holidays, emigrating, or importing 'rescue' cats into UK
110. Loss or abandonment (exacerbated by lack of visible identification)
111. Uncertainties around legal status and 'ownership' of cats (affects attitudes towards responsibility, ownership, affects speed of rehoming)
112. Research gaps in of cats with disabilities e.g. paralysis, urinary/faecal incontinence
113. Teaching hospitals working up sick cats more than necessary for teaching students
114. Social media forums where lay people offer advice (often inappropriate), discouraging owners/carers to seek expert advice
115. Limited research and unregulated sale and use of cat deterrents e.g. ultrasonic devices?
116. Limited research and unregulated sale of anti-hunting devices e.g. bibs
117. Limited research on true impact of predation on wildlife (anti-cat lobbies etc)
118. Exposure to fireworks while either indoors or outdoors

Dog
(n=66)
1. Lack of basic veterinary care, e.g. vaccinations, neutering, etc
2. Not seeking or delayed veterinary care
3. Unrecognized / untreated pain (chronic) e.g. arthritis.
4. Toxicity/accidental poisoning e.g. grapes, chocolate
5. Common canine health issues: including dental disease, system-based disorders (GI, respiratory, cardiovascular, renal etc), parasites, etc
6. Common canine infectious diseases
7. Diseases of ageing population e.g. osteoarthritis, hyperthyroidism, etc
8. Lack of disease management for stray/community dogs (e.g. parvo, distemper)
9. Physical Trauma: e.g. RTA, airguns, dog attacks, abuse
10. Poor dental care
11. Poor diagnosis of breed related issues due to lack of exercise (e.g. exercise induced respiratory distress in brachycephalic dogs)
12. Homeopathy as alternative to traditional medicine
13. Obesity (and in some cases diabetes)

14. Lack of exercise
15. Limited access to veterinary clinics due to 'cold spots' in the country
16. Lack of professional consensus on issues e.g. neutering, vaccination
17. Mouth/throat injuries from playing with sticks
18. Ingestion of foreign body objects
19. Dystocia
20. Vegetarian and vegan diets. Possible?
21. Poor nutrition / inappropriate diet
22. Elective/cosmetic surgeries/procedures e.g. ear cropping, tail docking, removal of dew claws
23. Surgical intervention required to correct conformation problems (e.g. nostril widening, eyelid surgery)
24. Skin burns caused by hair dye
25. Lack of positive mental states
26. Fear (of environment, caretaker, strangers, etc)
27. Separation anxiety
28. Aggression between dogs
29. Unwanted behaviours, separation-related behaviour, urinating indoors, etc
30. Long length of stay in rescue facilities
31. Shelter design limitations that don't provide choice and control
32. Kennelling
33. Behavioural restrictions from unstimulating environments
34. Latch-dogs (able to come/go from their house without owners present)
35. Social isolation
36. Lack of socialisation during critical socialisation period
37. Change of environment and transportation e.g. moving house, relinquishment dog shows, etc
38. Treating dogs as an accessory, "designer dogs" being carried in hand bags etc.
39. General lack of canine behavioural knowledge. Including unqualified `behaviourists and trainers' giving out damaging advice
40. General lack of canine health knowledge. Including incorrect health and welfare advice given by breeders
41. Poor management of stray/feral populations
42. Service animals e.g. in airports to reduce traveller's anxiety
43. Left alone for long periods of time (>5 hrs)
44. Inability of owners to recognise behavioural signals
45. Irresponsible ownership e.g. using dog as a weapon and accessory dogs
46. Inappropriate training methods (e.g. shock collars, prong collars)
47. Misunderstanding by owners between "best health possible" vs very good health
48. Dominance myth that owners need to be "top dog"
49. Unregulated breeding / overpopulation (owned + stray population)
50. Insufficient timely neutering due to vet and owner perceptions (myths)
51. Early litters due to late sterilisation
52. People trying to keep foetuses (not full term) alive from a pregnant spay
53. Overbreeding e.g. puppy farms
54. Illegal importation of puppies
55. Breed standards (may compromise welfare)
56. Deliberately breeding from dogs with inherited disease and chronic disorders
57. Delayed end of life decisions
58. Euthanasia of healthy dogs
59. The relaxed PETS passport regulations (increased risk of rabies in UK, etc)
60. Lack of registration requirements or compulsory microchipping which aid return of lost dogs and likely reduce abandonment
61. Dogs in TV commercials, films etc (lack of control of env., frequent travel, thermal stress)
62. No clear regulatory body for behaviourists and trainers
63. No clear regulation and guidelines for other industries (e.g. groomers, rescue/rehoming charities)

64. Media influence (ads) and celebrity culture popularising brachycephalic breeds etc
65. Anthropomorphism
66. Long distance travel e.g. holidays, emigrating, importing "rescue dogs" into UK

Horse
(n=84)
1. Lack of routine health care (e.g. vaccinations, dental, parasite prevention)
2. Large worm burdens
3. Lack of understanding re: worming / blanket worming, leading to resistance
4. Lack of easy access to medications
5. Lack of easy access to health care
6. Delay in veterinary/professional engagement
7. Neglect or sub-optimal care
8. Lack of equine knowledge by owner ('laziness' to learn, or refusal to change behaviour)
9. Cultural influences e.g. "letting nature take its course"
10. Financial restrictions of owner for better livery arrangements/prof. assistance
11. Unqualified service providers, e.g. unqualified farrier, dentistry, castration not by vet
12. Overworking young horses
13. Obesity e.g. due to lack of work, unrestricted grazing
14. Inappropriate diet in particular low-fibre, high energy concentrates, restricted access to high fibre forages
15. Rise in the blanket use of supplements
16. Undernourished (hunger)
17. Lack of access to fresh, clean water (thirst)
18. Poor hoof care e.g. lack of care or trimming by owner (inappropriately)
19. Delayed euthanasia e.g. quality of life evaluation methods often not implemented
20. Lack of a credible quality of life assessment mechanism
21. Inappropriate re-homing, especially elderly, euthanasia would be more appropriate
22. Lack of confidence in abattoir as an option for end of life
23. Fundamental lack of owner understanding horse's ethological needs
24. Overweight riders or inappropriate for the horse/pony
25. Horses being competed which are unfit with unfit riders
26. Hirelings e.g. Scottish Common riding equines overused by novice/unbalanced riders
27. Anthropomorphism
28. Fear and stress arising from use (work, sport, entertainment), e.g. shows, racing, polo
29. Injury during use, e.g. from racing, eventing, endurance events
30. Road racing horses (arguably not a traditional 'traveller/gypsy' activity)
31. Being ridden - not poor riding or training, but riding per se
32. Injury to hirelings (overweight riders, ill-fitting tack, overwork)
33. Unfit and unsuitable horses hired out
34. Inappropriate training methods e.g. punishment, negative reinforcement (bit or leg pressure not removed), unclear signals, pain, flooding
35. Public unable to interpret/replicate some training methods e.g. natural horsemanship
36. Lack of regulation of trainers
37. Poor handling and training: confusion, conflict, frustration, distress, stress, fear and sometimes pain as a result of the interactions they have with people
38. Lack of understanding of learning theory leading to poor training techniques
39. Inappropriate and restrictive tack, e.g. poorly fitted saddle, certain bits/nosebands
40. Long distance transport
41. Some domestic/local journeys are made in inappropriate vehicles (unsafe)
42. Little regard for fitness (of horse) to travel
43. Lack of biosecurity and disease surveillance
44. Lack of animal establishment licensing

45. No regulation of small rescue establishments (sometimes hoarding)
46. Stray and abandoned horses (injuries to themselves and others)
47. Problems stemming from how industry sets standards/views 'normal'
48. Tendency (of industry) to tackle symptoms, not cause (e.g. livery layout, routines)
49. Lack of enforced, mandatory Microchips - leads to abandonments
50. The passport process: not fit for purpose
51. Poor weaning methods
52. Stabling 24/7- lack of natural behavioural expression due to restrictions
53. Social isolation (no or limited contact with own species)
54. Being kept in a herd that is constantly changing (unstable social groups)
55. Being kept where an individual animal can't escape from aggressive animals
56. Being kept in group where dominant animals restrict access to resouces
57. Restrictions on normal behaviours to satisfy basic dietary needs
58. Feeding methods of stabled horsed contrary to their evolution (for low energy forage)
59. Turned out 24/7 on green grass (e.g. relative high energy, risk of obesity/laminitis)
60. Rugging outside horses 24h/d for half the year - no control if too hot/cold/itchy
61. 'Well-meaning but ill-informed owners' (management traditions)
62. Lack of environmental control/frustration - horse is motivated to act but cannot
63. Poor field management, including ragwort, grazing too rich/poor, mud
64. Unsuitable living environment e.g. unsafe fencing
65. Fly grazing
66. Tethering without provision of adequate, shelter, attention, water, etc
67. Breeding decisions e.g. exaggerated conformation
68. Breeding low value horses with conformational/physiological compromising conditions
69. Broodmares being bred indiscriminately - i.e. 'given a job to do' when retired
70. Management of stallions - often isolated, unable to perform normal social interactions
71. Inaccurate portrayal of stallions in our culture (feisty, difficult to handle)
72. Indiscriminate breeding and failing to castrate colts
73. Lack of recognition of pain behaviour (before it becomes overt)
74. Pain behaviour misinterpreted as behavioural issue (interpreted as bolshy/naughty)
75. Negative affective states e.g. atypical myopathy, fear, frustration, depression, anxiety
76. Culture of using horses in a utilitarian way
77. Boredom, even with access to turnout - usually a square monoculture field
78. Selling horses online - ill-prepared potential owners buying unsuitable horses
79. Lack of licensing, inspection, or agreed standards of care in equine establishments (e.g. livery yards, dealers, sanctuaries and rescues)
80. Lack of health checks at some ports/entry points, potential introduction of diseases
81. Growing population of owners not knowing where to obtain information
82. Owners receiving poor "trusted information" from yard and online
83. Horses used as a status symbol e.g. upper levels of sport may depend on poor welfare approaches
84. Use of horses as status symbols within the traveller community

Rabbit
(n=76)
1. Unrecognised or undertreated diseases e.g. dental, ocular, flystrike
2. Unrecognised or untreated injuries
3. General preventative health care (e.g. routine vet visits, microchipping) not seen as standard for rabbits
4. Many owners still do not routinely neuter
5. Lack of owner awareness about benefits of neutering e.g uterine cancer
6. Inappropriate diet - can cause dental disease and GI stasis
7. Albino rabbits may lack eye protection (on sunny days)
8. Ear disease

9. Lack of owner awareness (failure to vaccinate) for RHD, myxomatosis
10. Many vets still not recommending vaccination against RHD-2 to owners
11. Rabbits not valued in practice economics (RVNs often lead practice), increases owner perception of a cheap pet
12. Lack of rabbit specific knowledge by vets, not up-to-date with changes to rabbit medicine/surgery
13. Lack of rabbit specific teaching to vet students (different level of care afforded to cats/dogs)
14. Not all practices run health care programmes/advice smiliar to dogs and cats
15. Permanently housed in hutches with no, or unpredictable access to exercise area
16. Pet stores often selling too small hutches
17. Breeders still using stacking cages/hutches
18. Rabbits in hutches often transferred to exercise area, at inactive times (crepuscular)
19. Owners unable to easily source suitable accommodation
20. Rabbits not housed with enough space to hop, jump, explore, stand fully upright on their hind legs without their ears touching roof
21. Water bottles - animals do not naturally drink from bottles
22. Rabbits are unable to exhibit normal behaviours (run, jump, dig, graze, chew, etc)
23. Many indoor rabbits inadequately protected from dangers e.g. foreign body ingestion, inadequate hiding places, over-handling etc
24. Too firm flooring - increasing risk and severity of pododermatitis
25. Inappropriate shelter from elements e.g. lack of sufficient bedding (winter), shade (summer)
26. Owners unaware that rabbits don't just doze if they are given enough space, furnishings, interaction
27. Lack of mental stimulation, facilitating movement (increases confidence, reduces frustration, aggression etc)
28. Lack of nesting substrate to hide in / forage / dig / create shallow rest areas
29. Lack of "quality" space, not just quantity
30. Many owners do not understand rabbit dietary needs e.g. lacking high-quality fibre
31. Lack of provision of fresh clean water
32. Pet food manufacturers (some) still produce inappropriate foods marketed for rabbits (rabbit muesli)
33. Owners feeding diets high in concentrated food, sugary treats, and carrots in high quantities
34. Solitary living (social species – boredom, frustration, fear)
35. Poor bonding (to a companion) experience - can be difficult to bond them in the future (solitary life)
36. Inappropriate companionship: cats, dogs, guinea pigs, entire animals together
37. Inappropriate socialisation
38. Too many rabbits in a small space (overstocking) can increase aggression
39. Mis-handled animals can lead to them being fearful or biting
40. Not grooming long haired rabbits
41. Owners unable to recognise subtle changes, not noticing they are ill/in pain etc
42. Owners regarding rabbits as 'disposable' – e.g. cheaper to buy a new one than pay for medication
43. Many owners unaware of, and unprepared for, the costs associated with ownership
44. Many find ownership harder work than they thought
45. New owners fail to thoroughly research the needs of rabbits before acquiring them
46. Rabbits bought cheaply/easily, fuelling number in rescue centres
47. Owners using rabbits as children's pets or 'starter' pets.
48. Rabbits alone at the bottom of garden: infrequent visits to be fed/cleaned/stimulated
49. Lack of early socialisation and/or inappropriate handling can leave rabbits fearful of grooming, health checks, handling
50. Lack of research regarding importance of socialisation periods in rabbits
51. Pet industry and large scale breeders not considering socialisation and living as pets
52. Owners inducing tonic immobility and incorrectly believing it induces a 'relaxed' state
53. Handling not demonstrated to new rabbit owners
54. Breeding for exaggerated conformation (e.g. lop ears, brachycephalic, dwarf)
55. Breeding from animals with hereditary problems e.g. malocclusion, split penis, etc
56. Mis sexing at point of acquisition, resulting in accidental litters, and/or fighting
57. Failing to separate the sexes of offspring litter, can breed

58. Keeping entire rabbits together leads to fighting, then separation, then living solitarily
59. Over breeding (planned or unplanned)
60. Incorrect husbandry advice given by breeders / sellers to new owners
61. Lack of legislation that cover other species (e.g. dogs and cats)
62. No legal minimum housing standards
63. Often inadequate or highly varied levels of training of pet store staff
64. Breeders – some may have outdated/bias advice
65. Lack of regulation of breeders
66. Owners receiving misguided information on online forums
67. Lack of research undertaken on rabbit health/welfare, compared to dogs and cats
68. Reduced life expectancy of UK pet rabbit population (can be >12 years)
69. Inappropriate representation in the media does not help with educating the public
70. No home checks or follow ups from sellers
71. Local authorities do not prioritise complaints to pet shops - reliance on RSPCA
72. School rabbits - bad example to children (e.g. expected to be active, inappropriate housing conditions, multiple caretakers)
73. No inspections or licences of petting zoos / farm parks / mobile zoos
74. Mobile petting zoos e.g. transport, temporary housing, over-handling, stressful stimuli
75. Lack of cohesive public messaging from scientists, vets, professionals on best care practices
76. Lack of basic standards of care e.g. legal min floor space, etc

Wildlife
(n=54)
1. Release of invasive alien species of fauna (potential pathogens)
2. Feeding wild birds (can affect host-pathogen interactions)
3. Habitat loss/destruction
4. Emerging or re-emerging infectious diseases
5. Cat predation: risk to many species, especially small passerines, bats, etc
6. Methods of population control often inhumane e.g. poisoning, glue traps, anti-coagulants, gassing, baiting, break-back traps, snaring, Larsen traps
7. Environmental contaminants e.g. agrichemicals, plastics, PCBs, heavy metals
8. Impacts of tourism e.g. invading habitats, stress
9. Wild animals used in entertainment, e.g. xmas reindeer, petting zoos, raptors, etc
10. Wildlife rehabilitation and release (standards of care, handling, captivity, etc)
11. Rehabilitating pest species that are prohibited for release
12. Handling wild animals (acute stress + capture myopathy)
13. Lack of post-release monitoring
14. Reintroductions and translocations (stress)
15. Pathogen spread by released wildlife
16. Lack of licensing / inspection of rescue centers
17. Trade in wildlife products e.g. skulls, pelts, eggs
18. Capture of wild animals for the pet trade
19. Habitat loss/destruction
20. Hunting and illegal culling e.g. badgers, pinnipeds, gulls
21. Taming wildlife e.g. 'pet' foxes, unsuitable for captivity or release
22. Dogs used to flush foxes from cover to be shot
23. Hare coursing
24. Wounding from inaccurate shooting
25. Accidental poisoning e.g. lead shot
26. Inadequate winter feeding for park deer (quantity and/or quality)
27. Orphaning dependent deer juveniles
28. Traffic collisions
29. Fish left to suffocate when caught

30. Frequent "catch and release" at stocked fish ponds
31. Wild fish capture methods
32. Rearing/release of gamebirds for shooting – poor survival skills
33. Stress of capture / handling of game birds - essentially wild birds
34. Inadequate housing of game birds (e.g. small, barren wire-bottomed cages, close proximity of many males, thermal challenge / lack of shelter
35. Mortality from 'divorce' in partridges (pairings to fail and one bird pecked to death
36. Ectoparasitism
37. Lack of training (husbandry, handling, etc) for seasonally employed staff, risk of accidental injury
38. Lack of statutory regulation of industry and lack of research on husbandry methods.
39. Gamebird parent generation: wild for part of the year, caught and caged/boxed for several months (if not shot)
40. Feather pecking in breeding gamebirds
41. Wounding from inaccurate shooting
42. Hare coursing
43. Deliberate destruction of living environment (e.g. badger sets, bat roosts)
44. Free shooting badgers (bTB control)
45. Traffic collisions
46. Birds (and bats) colliding with turbines, pylons, windows, flypaper etc
47. Wounding of birds by cats
48. Inappropriate housing, handling or training of raptors
49. Raptors accidentally caught in Larsen traps
50. Raptor flying displays, birds chained or in small barren cages for majority of day
51. Scabies in urban foxes
52. Seal shooting (in particular during breeding season)
53. Disturbance/harassment of marine mammals
54. Bycatch from fisheries (e.g. cetaceans and other wildlife)

Exotic
(n=34)
1. Inappropriate social groupings e.g. social species kept alone, mixed sexes etc
2. Poor enclosure design (to permit natural behaviours)
3. Over-cleaning enclosure (removes important scent cues)
4. Stress caused by having a person in their environment to clean
5. Limited visibility from enclosure
6. Enclosure lighting and sound levels
7. Limited knowledge for many species of good husbandry/ethological needs
8. Poor husbandry by owners/keepers
9. Neglect (due to ignorance, or not)
10. Keeping invasive alien species - risk to our native wildlife
11. Mixed species groups - sometimes incompatible species
12. Intentional release by owners to the wild
13. Lack of enrichment/furnishings to fulfil behavioural needs (e.g. climbing apparatus for arboreal animals, opportunity for digging)
14. No mandatory expert advice provided to owners at point of sale
15. Difficulty in ability to identify early signs of ill health/pain/poor welfare
16. Social isolation is a problem for many species
17. Humans attributing less sentience to certain species i.e. fish, reptiles
18. Lack of access to reliable expert information for public
19. Owners accessing inaccurate information/advice from the Internet
20. Accepted "norm" to keep exotic pets in such a way that they suffer
21. Lack of legislation preventing animals unsuited to UK captive environment being sold
22. Vendors often providing little or no information about caring for new pets

23. Many exotics wrongly sold as "easy pets"
24. Lack of availability of exotics vets - often hard to find, far away, expensive
25. Lack of welfare assessment methods for exotic animals
26. Lack of education/training for vet undergraduates
27. Inappropriate practices in pet trade, e.g. removal of teeth for owner safety
28. Low cost of purchase encourages "disposable" pet mentality, impulse purchasing
29. Over breeding for pet trade - surplus animals, breeding genetic mutations
30. Wild capture for pet trade - stressful, impact on wild populations (family groups)
31. Illegal trade of endangered species
32. Animals being sold that are not suited to life as a pet (suffering, relinquishment)
33. Legislation gaps - AWA2006 failure to develop codes of practice beyond farm animals
34. Pet shops housing DWA as customer attraction (small, barren enclosures)

Cattle
(n=72)
1. Lack of routine health care (e.g. vaccinations, parasite prevention, etc)
2. Lack of veterinary services in some areas ("cold spots")
3. Poor health status (e.g. metabolic/reproductive/respiratory disease)
4. Common production diseases e.g. mastitis, etc
5. Common cattle infectious diseases (e.g. BVD, Johne's, TB, etc)
6. Lack of proper foot care (e.g. regular paring, foot bathing, treatment, etc)
7. Poor foot health (e.g. white line disease, digital dermatitis, lameness, etc)
8. Underutilisation of NSAIDS
9. Exposure/ingestion of toxic substances/plants (e.g. photosensitisation)
10. High morbidity/mortality rates for calves
11. Mineral deficiency
12. Poor body condition
13. Dystocia
14. Early maternal separation (dairy)
15. Method and timing of weaning (beef)
16. Calving management & bull selection (e.g. breeding oversized calves)
17. Poor management and nutrition of orphan beef calves
18. Poor colostrum management
19. Inappropriate drying off techniques (diary)
20. Intensive finishing systems (beef) e.g. high energy finisher diets
21. Lack of fibre in diets (important for rumen health)
22. Inadequate provision of feed/forage (e.g. quantity)
23. No continuous provision of clean water
24. Build up of stale/contaminated feed or water
25. Feeding inappropriate diet to changing animal requirements (e.g. parturient cattle nutrition)
26. Limited key resources (e.g. feeder spaces, drinkers, cubicles, etc)
27. Insufficient space allowance (e.g. housed and grazed animals)
28. Group composition (e.g. unstable social groups disrupt hierarchy, sex ratios, etc)
29. Stress caused by isolation (temporary or permanent)
30. Poor maternal behaviour (cow-calf bonding)
31. Presence of abnormal behaviours (stereotypy e.g. tongue rolling, etc)
32. Aggression/injuries between cattle
33. Poor cubicle design (dairy)
34. Permanent housing (no access to pasture/grazing)
35. Poor lighting regime for housed livestock (e.g. lux, length of time, etc)
36. Poor air quality in buildings (e.g. dust, etc)
37. Lack of shelter/shade for grazing animals (thermal comfort)
38. Lack of bedding material (or poor quality) in buildings

39. Poor flooring surface and hygiene (e.g. wet, slippy, soiled)
40. Poor maintenance of equipment/building e.g. handling facilities, fencing
41. Poor pasture quality e.g. wet, muddy
42. Lack of environmental enrichment (ability to express natural behaviours) for housed animals
43. No provision of hospital/relief pen for sick animals
44. Excessive noise levels (constant or sudden)
45. Poor handling skills (e.g. tail twisting, slapping, yelling, etc)
46. Stress caused by routine handling e.g. gathering, milking, weighing
47. Lack of ability of stockpeople to interpret cattle behaviour (ethology)
48. Lack of recognition of clinical signs of poor health/disease
49. Neglect - failure to regularly inspect livestock (e.g. heifers)
50. Delayed calving intervention
51. Use and control of farm dogs (biting, stress)
52. Unskilled/incompetent service providers (e.g. foot trimmer, etc)
53. Pain caused by castration
54. Pain caused be disbudding/dehorning
55. Pain caused by electro-ejaculator
56. Pain from vasectomy
57. Pain caused by tattooing
58. Pain caused by ear notching
59. Breeding for exaggerated conformation traits e.g. double muscling
60. Breeding selection for increased production (e.g. increasingly high milk yields)
61. Use of appropriate breed/genotype for rearing environment (e.g. ability to withstand climatic conditions)
62. Reproductive management practices (use of artificial insemination)
63. Live transport (short and long distances)
64. Transport of vulnerable cattle (e.g. cull cows, pregnant cows, etc)
65. Domestic transport in inappropriate/substandard vehicles
66. Premature pre-transport feed withdrawal
67. Understocking/overstocking truck compartments
68. Delayed euthanasia decisions for sick/injured animals
69. Mass depopulation (e.g. methods, and unpreparedness, etc)
70. Unwanted male dairy calves
71. Poor pest control (bio-security) e.g. birds, rodents, insects, spreading disease
72. Presence of horns (physical injuries and blindness due to horn occlusion)

Pig
(n=80)

1. Lack of routine health care (e.g. vaccinations, parasite prevention, etc)
2. Poor general health status (e.g. metabolic/reproductive/respiratory disease)
3. Lack of recognition of clinical signs of poor health/disease (by stockperson)
4. Common swine diseases (e.g. Brucellosis, PED, E.coli, etc)
5. Common pre-weaning diseases (e.g. PRRS, Rotavirus, etc)
6. Poor hoof health / lameness
7. Failure to recognize or treat painful conditions (e.g. lameness, arthritis, etc)
8. Underutilisation of NSAIDS
9. Delayed veterinary care
10. "Cold spots" in UK of access to swine veterinarians
11. Excessive parasitic burdens (outdoor pigs)
12. Poor body condition (thin or obese)
13. High morbidity/mortality rates of piglets
14. Method and timing of weaning

15. Poor pest control / bio-security (e.g. birds, rodents, insects)
16. No provision of hospital pen for sick animals
17. No provision of relief pen for sows not coping in group housing systems
18. Inadequate provision of feed/forage (quality or quantity)
19. Non-continuous provision of clean water
20. Feeding a diet appropriate for animal age/stage of production (e.g. parturient)
21. Chronic hunger in sows (fed limited ration)
22. Build-up of stale/contaminated feed/water
23. Insufficient space allowance: no opportunity to exercise / avoid aggressive interactions
24. Insufficient space allowance: no opportunity to separate feeding, lying and dunging areas
25. Unstable social groups (mixing unfamiliar pigs disrupts hierarchy – aggression)
26. Confinement systems e.g. farrowing crates
27. High stocking densities
28. Stress from solitary living (temporary of permanent)
29. Pain caused by castration
30. Pain caused by tail docking
31. Pain and/or distress caused by ear notching
32. Pain and/or distress caused by tattoo slapping
33. Pain and/or distress caused by teeth clipping (piglets)
34. Pain and/or distress caused by tusk trimming (boars)
35. Pain and/or distress caused by nose rings (boars)
36. Poor maternal behaviour (sow-piglet bonding)
37. Belly-nosing (re-directed suckling behaviour towards litter mates)
38. Presence of abnormal behaviours (stereotypy, bar biting, sham chewing)
39. Tail biting outbreaks
40. Aggression between pen-mates
41. Lack of provision, or poor quality, bedding in pens
42. Poor flooring surface / hygiene (e.g. wet, soiled lying areas, slippy)
43. Poor quality of buildings / equipment (e.g. handling facilities) and causing injuries
44. Limited key resources (e.g. feeders, drinkers, enrichment)
45. Barren environments - lack of ability to express natural behaviours (exploration, foraging, rooting, nest building at farrowing).
46. Artificial lighting regimes (e.g. lux, and length of time, etc)
47. Air quality e.g. dust
48. Air quality e.g. high conc. of atmospheric ammonia, carbon dioxide etc
49. Excessive noise levels (constant or sudden)
50. Lack of barriers/dividers in group housing pens (to avoid aggressive interactions)
51. Competitive feeding systems (e.g. floor feeding)
52. Confinement systems (e.g. farrowing crates)
53. Lack of shelter/shade for outdoor animals (thermal comfort/control)
54. No provision of wallows or dust bowls for outdoor pigs
55. Poor pasture quality for outdoor pigs
56. Lack of thermal control indoors
57. Delayed or inappropriate intervention at farrowing
58. Poor handling/stockperson skills (e.g. slapping, yelling, etc)
59. Inability of stockpeople to interpret pig behaviour (ethology)
60. Neglect – lack of regular herd inspection
61. Selection of animals suited to management system (e.g. appropriate breed or genotype)
62. Breeding for increasingly large litter sizes (ability of sow to cope?)
63. Inbreeding micro-pigs to select for smaller animals (increased risk of deformities)
64. Stress/injury caused from loading animals onto truck
65. Premature pre-transport feed withdrawal
66. Stress/injury caused by transport – long and short distances
67. Transporting vulnerable animals – specifically pregnant and cull sows

68. Domestic transport in inappropriate/substandard vehicles
69. Understocking/overstocking vehicle compartments
70. Delayed euthanasia decisions for sick/injured animals
71. Euthanasia method not carried out correctly
72. Mass depopulation (methods, and unpreparedness)
73. Tail length (too short)
74. Confinement and management of teaser boars
75. Predation (outdoor pigs)
76. Lack of vet undergraduate training on pigs
77. Piglet crushing by sows in the farrowing crate
78. Owners purchasing pet pigs without doing research of specific welfare needs
79. Too easy to buy "mini pigs" and other pet pigs online
80. Overfeeding pet pigs

Poultry
(n=81)
1. Lack of routine health care (e.g. vaccinations, parasite prevention, etc)
2. Poor leg & foot health (e.g. lameness, pododermatitis, hock burn, foot pad lesions)
3. Keel bone fractures & damage (laying hens)
4. Lack of medicine available specific to poultry
5. Not using antibiotics even when required (NAE,RWA)
6. Delayed veterinary care
7. Hock, breast, and foot pad burns due to contact with damp litter
8. General poor health status (e.g. common metabolic/reproductive/respiratory diseases)
9. Severe ascites (fluid in peritoneal cavity) esp. in broilers
10. Reduced feather cover (result of poor feed intake, feather pecking, etc)
11. Poor management of hypothermia
12. Neglect – lack of regular flock inspection
13. Lack of pest control /biosecurity (e.g. rodents, insect infestation)
14. Unpreparedness for emergency (e.g. fire, flood, disease outbreak, etc)
15. Practices to discourage broody behaviour
16. Delayed action to manage outbreak of feather pecking or cannibalism
17. Chronic hunger in broilers and turkey breeders
18. Inadequate provision of feed/forage
19. No continuous provision of clean water
20. Feeding a diet, or diet form, inappropriate for their ages/stage of production
21. Lack of access to insoluble grit (to aid digestion)
22. Build-up of stale/contaminated feed or water
23. Restrictive feeding regimens (e.g. to control weight gain during pre-lay)
24. Stress caused by solitary living (group species)
25. Limited key resources in housed poultry (e.g. feeders, drinkers, perches, nest boxes)
26. Group composition (unstable social groups will disrupt social hierarchy, sex ratios)
27. Insufficient space allowance (e.g. no opportunity for exercise, inability to stretch wings, etc)
28. Presence of abnormal behaviours (e.g. stereotypy, feather pecking, etc)
29. Aggression/injuries between birds
30. Cages for layers (general)
31. Lack of appropriate environmental enrichment (no ability to express natural behaviours e.g. dust bathing, litter for scratching, foraging, etc)
32. Unsuitable flooring for housed birds (e.g. causing discomfort, injury, etc)
33. Injury from on farm facilities (e.g. wire, plastic, sharp edges)
34. Lack of provision or poor quality bedding/litter
35. Artificial lighting regimes (e.g. lux, and length of time, etc)
36. Air quality - dust levels

37. Air quality - high conc. of atmospheric ammonia, carbon dioxide, etc
38. Excessive noise levels (constant or sudden)
39. Lack of continuous daytime access to open runs for outdoor (free-range) birds
40. Lack of shelter/shade for outdoor animals (thermal comfort)
41. Lack of overhead cover for outdoor birds (fear of predation)
42. Poor pasture quality (e.g. not clean/dry)
43. Predation (outdoor birds)
44. Poor handling skills e.g. carrying birds solely by the head, neck, one wing/leg, or tail feathers, injury during chick and poult processing
45. Lack of ability of stockpeople to interpret poultry behaviour (ethology)
46. Delayed removal of dead birds from cages
47. Caretakers inability to recognize poor health status / clinical signs
48. Pain caused by beak trimming (hot blade trimming)
49. Pain caused by beak treatment (infrared energy light)
50. Pain caused by retrimming adult bird beaks
51. Pain caused by dubbing broilers (removing comb or wattle)
52. Breeding for exaggerated body conformation
53. Breeding animals with inheritable defects
54. Use of 'spiking' roosters in flock aggression
55. Selection for rapid growth (link to e.g. lameness, heart disease, etc)
56. Use of appropriate breed or genotype (ability to withstand env. / climatic conditions)
57. Transport (general) – both long and short distances
58. Stress caused by gathering (pre-transport)
59. Automated handling procedures (pre-slaughter)
60. Premature pre-transport feed withdrawal
61. Fitness for transport (esp. chicks and poults)
62. Understocking and overstocking of transport boxes
63. Inappropriate handling of transport boxes (injury, dropped from heights, etc)
64. Housing facilities unprepared for receiving chicks/poults (thermal stress, hunger, etc)
65. Delayed euthanasia decisions for sick/injured birds
66. Euthanasia methods
67. Mass depopulation (e.g. methods, and unpreparedness)
68. Disposal of spent laying hens
69. Unwanted male chicks
70. Lack of vet undergraduate training on poultry
71. Mis-sexing of pet chickens (e.g. can lead to relinquishment of roosters, etc)
72. Uncleanliness of plumage
73. Purchase of birds online etc without suitable preparation/knowledge/research
74. Despurring turkeys (removing spur bud)
75. Declawing turkeys (removal of dew and pivot claw)
76. Not using turkey saddles before mating
77. Improper toe cutting of turkeys (should be done by vet > 72 hrs)
78. Desnooding turkeys (should be done by vet > 21 days)
79. Mutilation of wing tissue (inc. dewinging, pinioning, severing tendons)
80. Semen collection of tom turkeys (pain, handling, cloacal bleeding, overstimulation)
81. No provision of open water access for ducks (for drinking, bathing, and swimming)

Small Ruminants
(n=76)
1. Lack of routine health care (e.g. vaccinations, parasite prevention, etc)
2. Poor health status (e.g. metabolic/reproductive/respiratory disease)
3. Common sm. ruminant health issues (e.g. myiasis, sheep scab, etc)
4. Common sm. ruminant infectious diseases (e.g. brucellosis etc)

5. Poor foot health (e.g. lameness, scald, foot rot, digital dermatitis)
6. Gastrointestinal parasites
7. Reduced range of suitable analgesics for small ruminants
8. Lack of veterinary services in some areas (cold spots)
9. Underutilisation of NSAIDS
10. Poor dental health (condition of molar and incisor teeth)
11. Exposure/ingestion of toxic substances/plants
12. Poor lamb/kid vigour at birth - high neonatal mortality
13. Delay in veterinary/professional engagement
14. Poor body condition
15. Dystocia
16. Poor management of orphan lambs/kids (inc. fostering and hand rearing)
17. Inadequate pest control / bio-security measures
18. Method and timing of weaning (excluding dairy goats/sheep)
19. Early separation (or temporary separation) of lambs/kids from dam
20. Terething ewes e.g. used as lamb adopter
21. Stress caused by isolation (including temporary)
22. Failing to shear mature sheep min once per year (of breeds that require it)
23. Shearing in winter (lack of protection from weather conditions)
24. Mineral deficiency
25. Poor colostrum management
26. Inadequate provision of feed/forage
27. No continuous provision of clean water
28. Feeding inappropriate diet to changing animal requirements (e.g. parturient)
29. Build-up of stale/contaminated feed or water
30. High stocking density for housed and grazed animals
31. Group composition (e.g. mixing unfamiliar sheep, sex ratios, etc)
32. Poor maternal behaviour (ewe-lamb bonding)
33. Aggression/injuries between animals
34. Permanent housing of dairy goats (no access to pasture)
35. Poor artificial lighting for housed livestock (lux, length of time, etc)
36. Poor building ventilation (air quality)
37. Lack of shelter/shade for grazing animals (thermal comfort)
38. Lack of bedding material (or poor quality) in housing
39. Poor flooring surface and hygiene (e.g. slippy, soiled)
40. Poor maintenance of equipment/buildings e.g. handling facilities, fencing, on-farm debris
41. Poor pasture quality e.g. wet, muddy
42. Lack of environmental enrichment (ability to express natural behaviours) for housed animals
43. No provision of hospital/relief pen for sick animals
44. Limited key resources for housed animals (feeding racks, drinkers, etc)
45. Excessive noise levels (constant or sudden)
46. Poor handling skills (e.g. lifting/dragging by fleece, tail, horns, etc)
47. Stress caused by routine handling e.g. gathering, milking, etc
48. Lack of ability of stockpeople to interpret sheep/goat behaviour
49. Neglect – failure to regularly check flock (e.g. cast sheep)
50. Delayed lambing intervention
51. Lack of recognition of clinical signs of poor health/disease by stockperson
52. Use and control of farm dogs (biting, stress)
53. Unskilled/incompetent service providers e.g. shearers
54. Pain caused by castration
55. Pain caused by tail docking
56. Pain caused by electro-ejaculator
57. Pain from vasectomy
58. Pain caused by ear notching

59. Pain caused by tattooing
60. Improper disbudding
61. Breeding for exaggerated body conformation (e.g. double muscling)
62. Use of appropriate breed or genotype for environment/management system (e.g. able to thrive on grass, ability to withstand climatic conditions)
63. Breeding animals with inheritable defects
64. Reproductive management practices (e.g. use of artificial insemination)
65. Transport – long and short distances
66. Transport of vulnerable animals e.g. pregnant and lame sheep/goats
67. Domestic transport in inappropriate/substandard vehicles
68. Understocking/overstocking truck compartments
69. Delayed euthanasia decisions for sick/injured animals
70. Correct fitting and maintenance of ram equipment (harness, raddle)
71. Presence of horns (e.g. physical injuries and blindness due to horn occlusion)
72. Predation
73. Unwanted male goat kids
74. Lack of vet undergraduate training on sheep/goats
75. Fleece or coat cleanliness/quality
76. Tail length (too short)