

## AWRN Stakeholder Advisory Board (SAB): Output of meeting 1 (11/07/22)

Current animal welfare problems/requirements identified by the group (arranged in themes), the obstacles that are preventing these issues from being rectified or addressed, and the actions/research needed to make progress going forwards.

(A.) Issue/Requirement	(B.) Obstacles	(C.) What do we need to do?
<b>1. Improved welfare assessment</b>		
<p>Establishing welfare assessment/best practice with limited evidence (zoo)</p> <p>Logistics of welfare assessment across diverse taxa (zoo)</p>	<ul style="list-style-type: none"> <li>- Huge diversity of taxa kept in zoos and aquariums, including large numbers of understudied species</li> <li>- Lack of evidence/knowledge relating to welfare needs/priorities (i.e. when they are similar across taxa and can therefore be extrapolated across species, and where they differ and specific indicators are needed)</li> <li>- Lack of well-validated practical tools/species-specific welfare assessments</li> <li>- Capacity of zoo staff to develop, learn and regularly implement species specific assessment</li> <li>- Limited commercial value.</li> </ul>	<ul style="list-style-type: none"> <li>- Fund more research</li> <li>- Raise awareness of this as a welfare research need</li> <li>- Development of generic best practice or welfare assessment tools for use in the interim, when taxa-specific knowledge is lacking, until more specific tools can be developed and validated. To avoid the risk of no assessment performed.</li> <li>- Increasing access/availability/awareness of existing evidence to, and within, the zoo sector</li> <li>- Create a methodology/structure to detail how/when data can be extrapolated from similar taxa for species where direct evidence does not yet exist.</li> </ul>
<p>Standardised welfare outcome assessment (farm)</p> <p>Standardised welfare assessment for cross-sector welfare labelling scheme (m)</p>	<ul style="list-style-type: none"> <li>- The sample size of animals typically assessed for welfare outcomes on-farm is rarely large enough to make statistical inter- or intra- farm comparisons. Assurance schemes can only use data collected to infer whether welfare is improving at a 'scheme' level.</li> <li>- There are challenges associated with amending those methodologies that are already established and feeding into management decisions.</li> <li>- Some welfare data will be commercially sensitive, with retailers having different (possibly competing) standards and their own requirements for which welfare metrics/KPIs are recorded/reported.</li> <li>- Welfare 'equivalence' (and different challenges) across species and different production systems.</li> <li>- How do you balance behavioural and physiological welfare? e.g. organic hens have freedom to roam and are stocked at low density yet have increased mortality than caged hens.</li> </ul>	<ul style="list-style-type: none"> <li>- Automated KPI collection (to enable more comprehensive/frequent/standardised sampling).</li> <li>- Review of existing approaches (methodologies and associated data handling systems) to support development of a refined set of core metrics that accurately reflect whole lifecycle/ production method outcomes.</li> <li>- Develop more schemes that offer comprehensive, defined, regular monitoring of key welfare metrics by vets for all sectors, such as currently occurs under the 'Real Welfare' scheme (Pigs)</li> <li>- Develop metrics Potential use of IoT/sensors, tags and cloud-based data management systems to allow continuous monitoring and generation of a 'welfare index'</li> </ul>

	<ul style="list-style-type: none"> <li>- Some 'positive' welfare measures (such as use of slower growing strains or lower stocking densities) will compete with (be contrary to) sustainability assessments [labelling]</li> </ul>	
Development of welfare indicators (fish)	<ul style="list-style-type: none"> <li>- Lack of welfare indicators (and tolerances) specific for different species, production systems (e.g., cages vs recirculating aquaculture systems) and life stages.</li> <li>- Populations are large with no means of individual recognition.</li> <li>- Fish do not obviously express pain like other species.</li> <li>- Individual recognition not possible.</li> <li>- Fish welfare is likely to be valued less by consumers than mammal welfare.</li> </ul>	<ul style="list-style-type: none"> <li>- Further funding into developing non-invasive (or semi-invasive) welfare indicators, such as camera systems to monitor behaviour, assays to measure baseline cortisol in skin mucous, communication pheromones/electrical signalling, etc.</li> </ul>
<b>2. Automated health and welfare monitoring</b>		
Non-invasive automated health/ welfare monitoring (fish)	<ul style="list-style-type: none"> <li>- Aquatic nature complicates observation, examination and data collection (e.g., poor visibility and dilution of excreted compounds).</li> <li>- Collection of health/welfare data often involves stressful handling of the fish (a significant welfare challenge in itself).</li> </ul>	<ul style="list-style-type: none"> <li>- Development of any technology that can non-invasively monitor activity, growth rate, position, fish colour within the underwater environment without necessitating fish handling.</li> </ul>
Automated KPI monitoring at farm - lameness (cows)	<ul style="list-style-type: none"> <li>- Many systems under development but none yet widely commercially available.</li> <li>- Technology likely to be prohibitively expensive compared to RoMS scorer</li> <li>- Clinical lameness is easy to visually detect; subtle changes are much harder due to individual variations in gait (e.g., immediately following a lying bout, compared to having stood for a long period).</li> </ul>	<ul style="list-style-type: none"> <li>- Once commercially viable systems are available government grants schemes could be beneficial to encourage roll-out</li> </ul>
Automated KPI monitoring at abattoir - tail lesions (pigs)	<ul style="list-style-type: none"> <li>- Camera based systems that measure tail length have been developed but not yet commercially available.</li> <li>- Installation is likely to be expensive - who pays?</li> <li>- No system yet developed to detect tail lesions.</li> <li>- Tail docking can produce tails of varying length which makes distinguishing between a bitten-yet-healed and a docked tail difficult.</li> </ul>	<ul style="list-style-type: none"> <li>- Government scheme to automate abattoirs for standardised routine KPI data collection would benefit welfare monitoring programmes.</li> <li>- Research into developing camera systems to detect tail lesions (via skin damage) in addition to monitoring tail length.</li> </ul>

<p>Automated KPI monitoring - feather score (hens)</p>	<ul style="list-style-type: none"> <li>- Most feather score data (from a small number of birds per flock) is currently self-reported by farmers as a proxy measure for injurious pecking.</li> <li>- There is no alternative; the visual assessment would be difficult to automate.</li> <li>- Expense of technology development/installation.</li> </ul>	<ul style="list-style-type: none"> <li>- Research funding to develop and automated system that utilises, e.g., thermal image cameras within nest boxes to provide an index of skin exposed, or colour contrast between skin and feathers if white feathered hens.</li> <li>- Support in rolling out this technology would be really useful for schemes targeting injurious pecking.</li> </ul>
<p>Non-invasive means of detecting keel fractures (hens)</p>	<ul style="list-style-type: none"> <li>- Attention has shifted away from keel fractures being a welfare issue as they are largely 'invisible' to farmers and difficulties in monitoring. Palpation requires training/experience, is not accurate, and handling can be painful for damaged birds</li> <li>- X-rays/dissection are the only accurate means of assessing keel fractures but are not currently logistically possible at farm/abattoir.</li> </ul>	<ul style="list-style-type: none"> <li>- Development of a non-invasive biomarker in eggs for bone fractures or x-ray systems that could be incorporated into the slaughter-line.</li> <li>- Breed laying hens to be less susceptible to keel fractures (without a huge impact upon productivity).</li> <li>- Feed trials to investigate whether dietary enrichment delivered at different life stages (e.g., omega-3) can reduce keel fractures, without consequences to egg productivity.</li> </ul>
<p>Increased use of data to drive improvements</p>	<ul style="list-style-type: none"> <li>- Non-targeted data collection for data's sake</li> <li>- Lack of understanding of, and access to, appropriate data collection and handling systems.</li> <li>- GDPR</li> <li>- Logistics of data collection often limits sample sizes and prevents statistical analysis.</li> <li>- Data ownership</li> </ul>	<ul style="list-style-type: none"> <li>- Better understanding of behavioural change/interaction between tech and producers/keepers</li> <li>- Define objectives and deliverables in advance (mindful of end result)</li> <li>- Collect more data (from key measures if resources stretched). Utilise stats and prevalence (from national database) to establish correct sample sizes.</li> <li>- Utilise benchmarking to compare performance with what is achievable at a national level.</li> <li>- Collect data at the correct 'point' of production to drive management decisions.</li> </ul>
<p><b>3. Positive behaviour</b></p>		
<p>Positive welfare</p>	<ul style="list-style-type: none"> <li>- Focus has been on just the 5 freedoms for too long</li> <li>- There is often no economic gain from producers investing in positive welfare</li> <li>- Consumers remain largely unaware of the concept of positive welfare</li> <li>- Indicators are hard to develop in fish due to aquatic environment</li> </ul>	<ul style="list-style-type: none"> <li>- Develop measures of positive welfare for all sectors and incorporate these into welfare assessments.</li> <li>- Promote awareness/language relating to positive welfare.</li> <li>- Include measures of positive welfare in future welfare labelling schemes.</li> <li>- More research into positive affective state in fish</li> </ul>

4. Enrichment/ appropriate housing		
Enrichment (fish)	<ul style="list-style-type: none"> <li>- Lack of study/understanding.</li> </ul>	<ul style="list-style-type: none"> <li>- More research required (to better understand the impact "enrichment" can have on fish life experience and welfare).</li> </ul>
Enrichment (calves)	<ul style="list-style-type: none"> <li>- Dairy calves are often removed from mother at birth and housed singly in small hutches (with only straw bedding) to lower risk of disease transmission and prevent naval sucking.</li> </ul>	<ul style="list-style-type: none"> <li>- Develop enrichment to enable calves to be co-housed</li> <li>- knowledge exchange would be beneficial</li> <li>- More studies into the effect of enrichment on calf affective state</li> </ul>
Enrichment (general farm)	<ul style="list-style-type: none"> <li>- Cost (with no obvious commercial benefit)</li> <li>- Conflicting interpretation of existing legislation (where it exist) e.g., pigs.</li> <li>- Inadequate enrichment has become 'normal' and accepted - e.g., cows in indoor-housed dairy units may have access to a brush but not to pasture.</li> </ul>	<ul style="list-style-type: none"> <li>- Determine 'useful' enrichment across each species</li> <li>- Further guidance of application of existing legislation and enrichment types</li> <li>- Increased knowledge transfer regarding the benefit of variety in addition to quantity.</li> </ul>
Enrichment (lab animals)	<ul style="list-style-type: none"> <li>- Lack of data on welfare/physiologic effects.</li> <li>- Lack of understanding or evidence of effect on research model development or research outputs.</li> <li>- Impractical or expensive to implement (either in actual monetary cost or resource cost)</li> <li>- Lack of empathy for many small short-lived rodents that's sole purpose is to undergo an experimental procedure.</li> </ul>	<ul style="list-style-type: none"> <li>- Fund studies to assess welfare, physiological and research model/research measure effects of enrichments.</li> <li>- Compare financial cost of implementation to the welfare/physiologic benefits.</li> <li>- Investigate how enrichment improves research quality: good study design, quantitative endpoints.</li> <li>- Introduce regulation for minimal enrichment provision.</li> </ul>
Enrichment (under-represented zoo taxa)	<ul style="list-style-type: none"> <li>- Enrichment studies typically only focus on mammals or a small number of other charismatic taxa</li> <li>- Problems with data access: much data (case studies, ideas etc.) exist as grey literature or not documented at all.</li> </ul>	<ul style="list-style-type: none"> <li>- Improve mechanisms to record data and enable centralised access.</li> <li>- Improve experience and knowledge-transfer across sectors to maximise evidence that does exist</li> <li>- Produce a comprehensive literature review to document all existing enrichment knowledge across all sectors done, including methodologies for evaluation etc.</li> <li>- Develop species-specific focus groups including exotic enthusiasts/breeders.</li> <li>- Funding for field trips to study natural environment.</li> </ul>

<p>Behavioural restriction (farm)</p>	<ul style="list-style-type: none"> <li>- Activity can conflict with productivity parameters (e.g., by lowering the feed conversion rate).</li> <li>- Lack of understanding within supply chains.</li> <li>- Caged housing can improve physical health (e.g., caged hens can have lower disease/mortality/keel bone fracture levels and be less at risk of being feather pecked; farrowing pens are used to reduce piglet mortality).</li> </ul>	<ul style="list-style-type: none"> <li>- Defining and promoting behaviours that are beneficial/positive across different species.</li> <li>- As with mutilations some examples of behavioural restriction are utilised to address husbandry inadequacies. There is a need, therefore, to address these underlying failures.</li> <li>- Consumer education. Greater use of labelling schemes to allow farmers that utilise best welfare practise to charge more for their produce.</li> <li>- Provide additional space to promote natural behaviour, e.g., loafing areas (cattle), verandas (laying hens).</li> </ul>
<p>Stress due to lack of understanding re: species needs (cats*) <i>*may also be relevant to lab animals</i></p>	<ul style="list-style-type: none"> <li>- People often own lots of cats, even though extended proximity to other cats may negatively impact welfare.</li> <li>- Many cats lack full socialisation as a kitten, leading to maladaptation to the domestic setting (and increase potential for relinquishment of ownership).</li> <li>- A misunderstanding of cats needs/behaviours is often perpetuated by inaccurate representation of cats in the media, through negative anthropomorphism and a celebrity culture that reinforces poor welfare.</li> <li>- People may often have unrealistic expectations of what a cat is able to cope well with, or adapt to, in terms of both their social and physical environment.</li> </ul>	<ul style="list-style-type: none"> <li>- These are all fundamentally human education/behaviour change issues which require cross-disciplinary research to develop effective educational campaigns.</li> <li>- Further use of educational videos made for social media aimed at reducing stress in cats.</li> </ul>
<p>Mutilations (farm)</p>	<ul style="list-style-type: none"> <li>- Utilised to manage adverse/injurious behaviour that has health/welfare and cost consequences, e.g., tails are docked to reduce biting (pigs), beaks are trimmed to reduce feather pecking (hens).</li> <li>- Tail docking in pigs is legally only permitted when there is a demonstrated problem/need for it; in reality, it is widely and routinely performed. This reduces any impetus to address the underlying ‘triggers’ such as inadequate housing practices or health issues.</li> </ul>	<ul style="list-style-type: none"> <li>- Commercial evidence of successful management approaches.</li> <li>- Use of labelling schemes to promote best welfare practice.</li> <li>- Legislation may be required if progress is not made to address the underlying ‘triggers’. Most mutilations reduce but do not stop injurious behaviour.</li> <li>- Genetic selection has been suggested as a solution for injurious behaviour, but this must be subtle (i.e., docile breeds not blind chickens)</li> </ul>
<p><b>5. Sustainable breeds (genetics)</b></p>		

<p>Pedigree-breed related health/welfare issues (cats)</p>	<ul style="list-style-type: none"> <li>- A rise in the popularity of certain ‘designer’ cat breeds, bred to exhibit extreme conformational changes such as dwarfism or hairlessness to produce a particular ‘look’ can impact physical health and ability to exhibit normal cat behaviours.</li> <li>- Increased ownership of wild cat hybrids is also a concern; their wild characteristics can render them unsuited to the domestic environment and they may be fearful or stressed in such settings.</li> <li>- Pedigree cats have a high risk of suboptimal management, e.g. more likely to be housed indoors or be subjected to greater human-social pressures.</li> <li>- Owners of brachycephalic cats often have a limited understanding of the associated health problems (respiratory issues and tear staining).</li> </ul>	<ul style="list-style-type: none"> <li>- Public education campaigns with multidisciplinary input from psychologists, and human behaviour change scientists to ensure efficacy/impact</li> <li>- Legislative change, i.e. licensing or even banning of certain breeds/breed characteristics.</li> </ul>
<p>Cattle breeds no longer suited for pasture/grazing (farm)</p>	<ul style="list-style-type: none"> <li>- Use of indoor-housed Holsteins maximises milk production. Holsteins are no longer metabolically or anatomically suited to graze.</li> </ul>	<ul style="list-style-type: none"> <li>- Invest in technology to improve pasture management.</li> <li>- Better welfare labelling to promote pasture access and distinguish extensive breeds.</li> <li>- Campaign to breed smaller cows (larger cows eat more food so ultimately less sustainable).</li> </ul>
<p>Sustainability/economic benefits of robust and dual-purpose breeds (farm)</p>	<ul style="list-style-type: none"> <li>- The importance of maximising production parameters favours the selection of extreme genotypes.</li> </ul>	<ul style="list-style-type: none"> <li>- Acquire a better understanding of systems in a holistic context rather than just focusing on the environmental/economic impact.</li> <li>- Promote the benefits of robust breeds, e.g., the greater ability of slower growing chickens to utilise lower quality feed ingredients (such as food waste/more sustainable raw materials than soya).</li> <li>- Explore the use of dual-purpose chicken breeds whereby the females lay (fewer) eggs (and have less welfare problems as a result), and the males can be raised for meat (which would reduce the number of male layer chicks that are culled annually)</li> </ul>
<p><b>6. Pain mitigation</b></p>		

Requirement for greater medication: to address pain/symptoms associated with disease (fish)	<ul style="list-style-type: none"> <li>- Lack of research</li> <li>- The current (limited) suite of available medicines treats the pathogen, they do not alleviate pain or the symptoms within the fish.</li> </ul>	<ul style="list-style-type: none"> <li>- More research funding and interdisciplinary collaboration.</li> </ul>
Poor pain management (cats)	<ul style="list-style-type: none"> <li>- Lack of research.</li> <li>- Owners and vets may fail to adequately recognise pain and discomfort in cats. This can result in poor pain management, delayed euthanasia and neglect of many conditions affecting cats in old age.</li> <li>- Lack of suitable pain relief options for cats. This also applies to other species such as ferrets which often get administered drugs/doses recommended for cats (with fatalities) as vets don't have alternatives.</li> </ul>	<ul style="list-style-type: none"> <li>- More research</li> <li>- Increase awareness of the clinical signs of pain in cats and highlight relationships between pain and behaviour.</li> <li>- More practical tools to help owners understand if their cat could be in pain.</li> <li>- More practical resources to support owner management of their cat when being investigated/treated for pain linked conditions.</li> </ul>
Pain recognition and management (farm)  Lack of pain mitigation following mutilations (farm)	<ul style="list-style-type: none"> <li>- Cows and sheep (herd prey animals) are very good at disguising pain so it can often be missed.</li> <li>- Pain mitigation can be expensive and there are time/labour costs associated with injecting and waiting for drugs to kick in.</li> <li>- Lack of farmer-vet communication re: pain relief means that farmers can be unaware of health/welfare benefits.</li> <li>- Current legislation is outdated. Calves under the age of 2 months can be castrated without any pain management.</li> </ul>	<ul style="list-style-type: none"> <li>- Improve farmer-vet communications re: benefits of pain relief (should be best practice as can improve ADG and increase disease resistance).</li> <li>- Update legislation to make use of analgesia compulsory for certain pathologies (e.g., lameness) or when conducting routine procedures (e.g., mutilations).</li> </ul>
<b>7. Need for more cross-cutting</b>		
Requirement for more collaborative R&D (all)	<ul style="list-style-type: none"> <li>- Challenge of knowledge exchange across disciplines (e.g., social science, economics + biological sciences; computer vision + biological sciences).</li> <li>- Research not being co-created with end users.</li> <li>- Research silos.</li> <li>- Hesitancy among businesses to collaborate with other businesses on a shared challenge (IP).</li> <li>- Tendencies for disciplines (e.g., zoo/lab/farm) to remain insular rather than utilise collaborative groups working together on similar interests.</li> </ul>	<ul style="list-style-type: none"> <li>- More collaborative groups to share opportunities/resources.</li> <li>- The development of the RSPCA assured welfare standard for farmed salmon and trout is a really great example of the impact a big picture, collaborative approach like this can have for animals, producers, retailers, and consumers.</li> <li>- Engaging with regulators/legislators/policy makers early on in research.</li> </ul>

<p>Integrating animal welfare with sustainability (farm)</p> <p>Ensuring the drive to zero does not compromise welfare (all)</p>	<ul style="list-style-type: none"> <li>- Many welfare 'solutions' are at odds with environmental targets - e.g., the Better Chicken Commitment (BCC) requires slower-growing longer-lived birds to be housed at lower stocking density (good for welfare but utilises more resources/energy).</li> </ul>	<ul style="list-style-type: none"> <li>- Need to ensure that the drive to zero does not compromise welfare.</li> <li>- We should be looking to the Netherlands - they have produced several high-welfare laying hen systems that utilise human food waste and sustainable energy.</li> </ul>
<p>Consideration of both animal and human welfare (lab animals)</p>	<ul style="list-style-type: none"> <li>- Business productivity drives 'more with less' to increase profits.</li> <li>- 'Culture of care' environments require time and resource investment.</li> <li>- Compassion fatigue carries mental health stigma.</li> </ul>	<ul style="list-style-type: none"> <li>- Research into how improved animal welfare impacts the mental health/affective state of animal caregivers, and vice-versa, could be useful to further promote the benefits of investing. Utilising a farming example: farmers report to 'prefer' to raise BCC chickens and take pride in having a well-feathered laying hen flock.</li> </ul>
<p>One Health, One Welfare (working equines)</p>	<ul style="list-style-type: none"> <li>- Lack of data re: the opportunities for 'One Health, One Welfare' approaches to interventions - where are the interplays between working equid health, and human and environmental health?</li> <li>- Lack of data re: whether strengthened animal health systems always lead to healthy animals and how does this impact communities?</li> <li>- Lack of data re: whether working equids in good welfare (including health) contribute more to society than those in poor welfare.</li> <li>- Lack of data re: whether thriving communities with strong livelihoods put more resource into taking care of their animals.</li> <li>- Working equids are not a priority for many researchers and/or funders.</li> </ul>	<ul style="list-style-type: none"> <li>- More research to understand the links between strengthened animal health systems and thriving communities.</li> <li>- Find synergies between species/sectors so that we may better understand which (health) systems, when strengthened, benefit all and work on those areas together.</li> <li>- Raise the profile of working equids as working livestock – in recognition of their role in society.</li> </ul>
<p><b>8. Health</b></p>		
<p>Complex health and welfare issues (fish)</p>	<ul style="list-style-type: none"> <li>- Lack of understanding of complex health and welfare issues (fish are rarely affected by one health issue: e.g., Complex Gill Disease).</li> </ul>	<ul style="list-style-type: none"> <li>- Need more science/research to target/better understand complex health and welfare challenges.</li> </ul>
<p>On farm health management</p>	<ul style="list-style-type: none"> <li>- Veterinary care is expensive</li> <li>- Sub-clinical disease is 'invisible' but can have substantial impacts upon affective state and productivity parameters.</li> </ul>	<ul style="list-style-type: none"> <li>- Encourage membership of national health schemes.</li> <li>- Development of technology to detect disease before it becomes clinical.</li> </ul>
<p>Reducing lameness (farm)</p>	<ul style="list-style-type: none"> <li>- Increasing productivity pressures have led to greater body size which places excessive pressure upon feet/ legs (e.g., Holstein cows and meat chickens).</li> <li>- Incorrect dairy foot-bath chemical use can burn feet.</li> <li>- Lameness in cattle herds is 'normalised' as so common.</li> </ul>	<ul style="list-style-type: none"> <li>- Automate (or increase frequency of) monitoring - cows often only scored quarterly (sheep less frequently).</li> <li>- Select for smaller sized cows and slower growing broilers.</li> </ul>



	- In traditional parlours cows often stand/wait 1-2 hours to be milked.	
Lack of veterinary registration (cats)	- >1 million owned cats not registered with a vet (likely due to limited vet capacity and cost of veterinary care). - Many owners source advice from the internet and social media, which increases risk of misinformation re: their cat's health or welfare.	- Make vet registration and annual check-up (to include vaccinations) compulsory. - Provide incentives for people to register vet such as subsidizing veterinary costs for low-income owners and provide more 'vets in community' type services.
<b>9. Slaughter/culling</b>		
Emergency slaughter (farm)	- Farmers often have their own way for slaughtering animals that they are comfortable with and consider effective - these methods may not officially be considered best practice.	- More compulsory training in emergency slaughter procedures (e.g., non-penetrative captive bolt devices).
More stunning options for fish on ice slurry		
<b>10. Other</b>		
The role of compassion/human behaviour change 'HBC' (working equids)	- Lack of data to understand the role of compassion in driving HBC in relation to working equids. - Tools to measure 'compassion' are not easily developed due to the word not being easily translated.	- Defining the concept in the correct context and validating an appropriate tool for use in the study of HBC. - More research.
Role of animals in resilience to disaster management (working equids)	- Lack of data to understand the role of working equids in both resilience to shocks (environmental and livelihoods) and disaster management. - The role of working equids is not widely recognised, and so limited attention or support is given to understanding their role in disaster management and resilience.	- More cross-disciplinary research that considers humanitarian, development and climate issues and studies the interplay between people, animals and the environment. - Research to understand how interventions can support working equids during disasters, and how communities can be supported to increase resilience (where relevant to their working equids). - Raise the profile of the role of working equids.

Reduction and refinement (lab animals)	<ul style="list-style-type: none"> <li>- Inconsistent application of the ethical review.</li> <li>- Lack of data and expert agreement on refinements.</li> <li>- Regulatory agency acceptance/enforcement of replacement use.</li> <li>- Lack of translation of academic research in these areas to commercially applicable platforms</li> <li>- Lack of communication of replacements/refinements from academic to industry awareness</li> </ul>	<ul style="list-style-type: none"> <li>- Encourage multi-country collaborations on regulations/work with global accrediting bodies like AAALAC to harmonize this process.</li> <li>- Since AAALAC uses the Guide and the Guide is currently starting revision process, need to encourage and fund more direct research where ILAR listening sessions are indicating more data is needed.</li> <li>- Facilitate discussions between academic and industry to encourage implementable research from study design phase.</li> <li>- Facilitate communication/collaborations of research results from academic to industry for implementation.</li> </ul>
Oversupply and reduced quality of life 'QoL' (cats)	<ul style="list-style-type: none"> <li>- Oversupply of cats increases length-of-stay in shelters, where the five welfare needs cannot be met.</li> <li>- A large population of feral cats (&gt;250,000) leads to uncontrolled breeding, injury, and increased infectious and reproductive disease.</li> <li>- The ease at which cats can be acquired/purchased via non-rehoming charity routes is problematic – when charities make it too difficult for prospective owners to meet their adoption criteria, these individuals may obtain cats from less responsible sources and thus miss out on cats that have been thoroughly health checked, neutered and vaccinated.</li> </ul>	<ul style="list-style-type: none"> <li>- Help with neutering costs if low-income.</li> <li>- Greater regulations for breeding of cats.</li> <li>- Making it more difficult for people to be able to purchase cats online.</li> <li>- Educating charities on what criteria are essential versus desirable when it comes to rehoming decisions.</li> <li>- Increasing charity website presence when people search online for cats.</li> </ul>
Transport duration (farm)		

**11. Invertebrates**

<p>Welfare indicators for farmed insects</p>	<ul style="list-style-type: none"> <li>- Broad range of insect species that could potentially be used for farming. Although there are a handful of key ones being proposed by the FAO.</li> <li>- Different life cycle stages add an extra burden in terms of focus/research, as larval and adult needs will differ.</li> <li>- Buy-in in terms of funding, should we be caring about insects?</li> <li>- Little is known about insects generally, let alone in terms of how to develop welfare best-practice.</li> <li>- Farming systems vary widely for insects.</li> </ul>	<ul style="list-style-type: none"> <li>- Establish priorities in terms of insect species, life cycle stage, and production system that are most important to focus on/most likely to impact welfare.</li> <li>- Develop welfare-indicators for specific species for the different stages identified in production.</li> <li>- Establish whether welfare matters? Are they sentient, or is the precautionary principle enough to start with?</li> <li>- Assess the impacts of focusing on a circular economy and using waste-streams etc in terms of welfare impacts.</li> <li>- Assess impacts of intensive production, including associated health issues.</li> </ul>
<p>Humane slaughter methods for farmed insects (species/life-stage)</p>	<ul style="list-style-type: none"> <li>- Different species and different lifecycle stages.</li> <li>- Very little is known as a starting point. Current practices vary and are best guesses.</li> <li>- End-product quality is affected by slaughter choice (texture, nutritional content etc).</li> <li>- Funding challenges- are they sentient and worthy of consideration?</li> </ul>	<ul style="list-style-type: none"> <li>- Establish priorities in terms of species/ life cycle stages.</li> <li>- Establish criteria for assessing welfare using different slaughter methods.</li> <li>- Research into nociception, pain and sentience.</li> </ul>
<p>Humane stun/slaughter methods for cephalopod molluscs</p>	<ul style="list-style-type: none"> <li>- Wild capture is a challenge as no consistency and infrastructure built in.</li> <li>- Challenges in establishing humane practices based on physiology.</li> </ul>	<ul style="list-style-type: none"> <li>- Establish humane stun and slaughter methods for use in various conditions including during wild capture.</li> </ul>
<p>Best practice for transportation of decapod crustaceans</p>	<ul style="list-style-type: none"> <li>- Needs of decapods likely to contradict economical needs and practices that have been in place for some time.</li> <li>- Attitudes may be challenging as decapods are new to the sentience circle.</li> <li>- Transport systems are likely to vary widely.</li> </ul>	<ul style="list-style-type: none"> <li>- Develop welfare indicators for key decapod crustaceans.</li> <li>- Assess common transportation systems against welfare indicators.</li> <li>- Assess impacts of key transport impacts on decapod welfare (stocking densities, temperature and humidity, journey length, handling etc)</li> </ul>