RSPCA
for all creatures great & small

ANIMAL WELFARE SCIENCE UPDATE

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The aim of the animal welfare science update is to showcase recent animal welfare science publications that are relevant to the work of the RSPCA. The update provides summaries of some of the scientific papers and reports viewed by the RSPCA Australia office in the past quarter.

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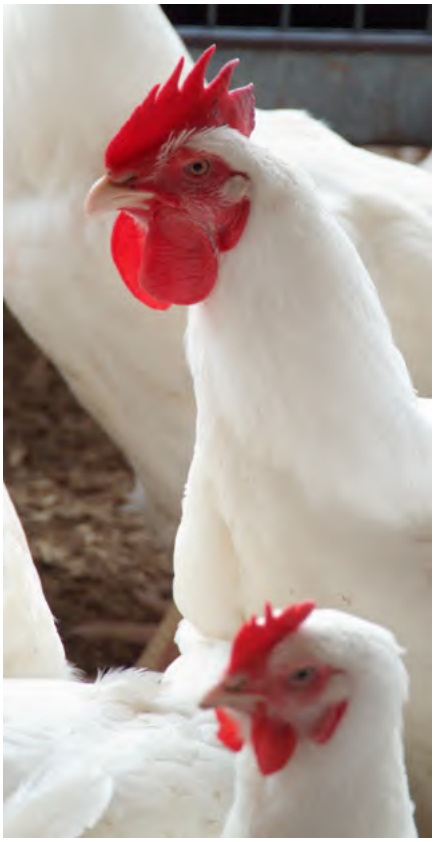

ANIMAL WELFARE SEMINAR 2026

RSPCA Australia's Animal Welfare Seminar is an annual event - with much lively debate - bringing together key experts in animal welfare research.

Each year features a different theme, and provides a forum to explore pressing animal welfare issues through diverse perspectives.

Innovations in digital technology are rapidly emerging and expanding across the world.

In many industries, including farming and veterinary science, novel technologies are being implemented with the aim of addressing challenges such as welfare assessment, early detection of disease, and task automation. However, effective and ethical application of novel technology requires challenges and risks to be identified, in addition to the opportunities. There may be hidden costs to animals even when the intention is to improve their welfare.

The RSPCA Animal Welfare Seminar 2026 will explore how digital technology is being used to improve and safeguard animal welfare, and how risks can be identified and mitigated for the best outcomes as the digital age continues to expand and progress.

A recording of the presentations will be available on the website after the Seminar.

For more details visit ***https://www.rspca.org.au/learn/animal-welfare-seminar/***

COMPANION ANIMALS

What makes adoption profiles more or less attractive?

Breed labels are commonly used in adoption profiles however they can be unreliable and negatively impact adoptability. Many shelter dogs are of unknown mixed breed and the typical method of visually identifying breeds often leads to inaccurate labelling. As a result, some shelters now use personality descriptions instead of, or in addition to, breed labels. However, there is a lack of knowledge on how breed labels and personality descriptions impact the adoptability of shelter dogs.

A survey was conducted with 103 in-person participants at a shelter in South-Central US and 1,113 online participants. The survey contained 19 questions, nine of which were about participant demographics. The remaining 10 questions were experimental prompts showing dog photos (all assumed to be mixed breeds) according to four conditions: 1) photo only, 2) photo with breed label, 3) photo with description, and 4) photo with both breed label and description. Some examples of the descriptors included 'Affectionate', 'Calm', 'Friendly', and 'Sociable'. Participants were asked to rate how likely they were to adopt the dog for each photo.

The results showed adoptability ratings overall were lower with breed labels than without, although this effect was stronger for some breeds than others. For example, breed labels lowered adoptability ratings for Chihuahua, Jack Russell Terrier, Chow, Terrier, and Miniature Pinscher mixes whereas ratings improved for Lab mixes. Adoptability ratings also improved with the presence of descriptions except for 'Energetic', which lowered the rating even more than when no description was provided. These findings support the removal of breed labels and the use of positive descriptors, to improve adoptability, provided they are realistic and accurately reflect the dog's personality. Inflated use of descriptors may lead to unrealistic owner expectations and a higher chance of post-adoption return.

Archer C, Hall NJ, Andrukonis A (2025) ***The role of breed and personality descriptions in influencing perceptions of shelter dog adoptability.*** *Anim Welf 34:e75*

Caregiver characteristics and dog's fear and anxiety may be key players in reactivity and aggression

Reactive and aggressive behaviours in dogs negatively impact the well-being and quality of life of both dogs and caregivers, as well as compromise the human-animal bond. Behavioural reactivity with aggressive manifestations (R/AMs) tends to worsen with negative emotional states such as fear, anxiety, and pain. In addition, caregiver-related factors such as attachment style, personality, mental health, and caregiving costs are all likely to play a role in its development. Despite being highly prevalent, the main factors contributing to R/AMs are not well-understood.

A Portuguese study conducted an online questionnaire with 730 caregivers to identify which caregiver-related factors were the strongest predictors of R/AMs. Several standard scales and questionnaires were used to assess caregiver characteristics, such as the Animal Empathy Scale for empathy, Monash Dog-Owner Relationship Scale for the caregiver-dog bond, and Big Five Personality Inventory for personality. Fear, anxiety, and R/AMs were assessed using specific questions related to the dog's behaviour based on the caregiver's self-report, for example, "Reacts by barking and pulling on the leash when it detects another dog".

The study found caregiving costs were the strongest predictor of R/AMs, with higher perceived costs associated with higher perceived reactivity in dogs. R/AM scores were higher for younger dogs, and also when caregivers had higher stress scores, were more supportive of aversive training methods, or were less able to recognise chronic pain. Scores were also higher when the caregiver was male, however this should be interpreted cautiously as the participant group was predominantly women (95.2%). When fear and anxiety were included in the statistical model, the variation explained in the data increased from 16% to 41%, suggesting these negative emotions may be a core component of R/AMs. These results highlight the importance of considering caregiver-related factors as well as fear and anxiety when planning interventions to reduce R/AMs.

Batista MT, Lavrador C, Da Graça-Pereira G (2025) ***When dogs react: The role of caregiver factors and fear/anxiety in reactive and aggressive manifestations.*** *Appl Anim Behav Sci 293:106840*

Moving beyond cortisol towards a comprehensive understanding of dog welfare

As the focus of animal welfare shifts from preventing negative experiences to promoting positive experiences, there is a need for comprehensive indicators that can capture this spectrum. Therefore, indicators that are currently used to assess welfare should be re-examined. In canine welfare science, there are concerns around how traditional biomarkers have been used and interpreted. In particular, there has been an overreliance on single indicators of welfare for dogs, most notably cortisol, which can lead to oversimplification and conclusions that are incorrect and detrimental.

A review critically examined current evidence for canine physiological welfare indicators, identifying gaps in methodologies, and highlighting opportunities for promising indicators. Using a systems approach, the authors demonstrate the various factors that can influence the stress response including genetics, environment, and past experiences, highlighting the complexity and importance of contextual interpretation. A major methodological gap identified by the review was that most studies did not report or account for factors such as sex, age, body weight, and reproductive status. These can influence physiological processes and, therefore, what is ultimately measured. Some promising biomarkers of stress, in addition to cortisol, were heart rate variability, temperature measured through infrared thermography, salivary catestatin, and prolactin. Oxytocin was noted as a potential indicator of positive emotions, and telomere length as a measure of cumulative lifetime experiences or chronic stress. Opportunities with existing and emerging technologies were also highlighted, such as non-invasive functional magnetic resonance imaging for investigating brain processes, wearable technology that can monitor behaviour and physiology, and the Facial Action Coding System for measuring facial movements. It was concluded that a comprehensive, evidence-based approach incorporating multiple indicators will provide the most accurate representation of a dog's welfare state, however impact on the animal must be minimised when applying any method or technology.

Cobb ML, Jiménez AG, Dreschel NA (2025) ***Beyond cortisol! Physiological indicators of welfare for dogs: Deficits, misunderstandings and opportunities.*** *J Appl Anim Welf Sci 1–30. https://doi.org/10.1080/10888705.2025.2572616*

Bearded dragons prefer enriched environments over a standard one

Environmental enrichment, i.e. enhancing the living environment to be more complex and stimulating, can improve the welfare of captive animals by providing the animals with more opportunities to express species-specific behaviours, reducing stress, and enhancing their wellbeing. Despite bearded dragons being popular pets, their welfare in captivity is often poor, and no studies have investigated the effects of environmental enrichment on these reptiles.

To address this knowledge gap, a study at the University of Lincoln compared the effects of environmental enrichment on the welfare of 12 bearded dragons. They compared three different housing conditions: standard housing and two types of enriched housing (non-naturalistic and naturalistic). The standard housing was designed to represent a typical recommended setup with a food bowl, a water bowl, a rock hide under a heat lamp, and newspaper substrate. The enriched housing had increased environmental complexity including a large water bowl in which the reptile could submerge themselves, two rock hides (one under a heat lamp and one in a cooler area of the enclosure), a ramp connected to elevated platforms, a hammock, artificial plants, a food bowl, and play sand and topsoil substrate. The naturalistic enclosure had the same elements as the non-naturalistic but with additional elements to mimic a natural environment including bioactive soil and live plants. The behaviours of the bearded dragons were observed for 30 days in each type of enclosure, after which the animals underwent novel environment and object tests to assess their behaviour and welfare, as well as preference tests to see which housing condition they preferred.

The study found that the bearded dragons showed more tongue touches (tongue flicking on a surface or object) during the novel environment and novel object tests following being housed in the standard enclosure compared to enriched, which was used as an indicator of anxiety. They also spent more time interacting with the glass panel of the standard enclosure compared to enriched, which is considered an abnormal behaviour and could indicate stress or frustration. When given the choice, the animals spent more time in the enriched enclosures than the standard enclosures, and the naturalistic more than the non-naturalistic enriched enclosure. Therefore, the authors conclude that enriched environments could have significant benefits for bearded dragons and recommend providing naturalistic enriched enclosures to enhance their welfare where possible.

Crisante A, Wilkinson A, Pike TW, Rickman EL, Burman OHP (2025) ***Does environmental enrichment impact the behaviour and welfare of bearded dragons (Pogona vitticeps)?*** *Appl Anim Behav Sci 292:106751*

Children mistake dog snarls for smiles

Human-dog interactions can bring many psychosocial benefits including increasing self-esteem and empathy in children. However, the number of hospital admissions associated with dog bites are increasing in the UK every year and majority of these bites involve children. Studies have shown that both adults and children often have poor understanding of dog body language but our understanding of how children interpret dog facial expressions is still lacking. It is important to understand why this is the case in order to teach children how to safely interact with dogs to ensure the welfare of both.

A study in the UK involved 89 children (ages four to seven) and 30 adults who were asked to identify the facial expressions shown in 24 photos: 12 human faces and 12 dog faces. The photos were divided into three categories corresponding to the emotions "angry", "happy", and "neutral". The experiment included a debrief after the test in which the experimenter explained the facial expressions to the children to ensure they understood the correct response and were aware of the risk.

Children made the most mistakes, especially when interpreting the "angry" dog face (misinterpretation range 46-70%), with the majority misinterpreting it as "happy". The younger the children, the more mistakes they made. By contrast, only one adult made a mistake with the "angry" dog face. Children misinterpreted snarls as smiles, and an aggressive display with open mouth and teeth protruding as "laughing out loud", assuming the dogs were approachable and could be "cuddled and kissed". These findings highlight the need for increased awareness and intervention to teach children how to interpret dogs' signals, but also to take into account cognitive capacity of younger children and adapt supervision strategies accordingly to prevent dog bite incidences.

Meints K, Racca A (2025) ***Look, he's smiling! Children's misinterpretation of dogs' facial expressions.*** *Anthrozoös 1–28*

Post-adoption support can prevent dogs being returned to shelters, but owners are declining them

It is estimated that around 15% of adopted dogs are returned to shelters (re-relinquished) each year. This is not only detrimental to the dog, but also to shelters that often operate at capacity. Post-adoption support for managing dog behaviour can help reduce re-relinquishment, but the number of people that engage with this support is unexpectedly low. It is important to understand why adopters decline support for targeted behavioural strategies, which have the potential to improve post-adoption success.

A study explored factors and themes that could explain why adopters decline post-adoption support for behavioural concerns. The research involved 3,782 adopters from 20 UK Dogs Trust rehoming centres, with a total of 6,317 support calls made at three post-adoption timepoints: two days, two weeks, and four months. The adopters were asked questions to identify potentially aggressive behaviours, separation-related behaviours, other behaviours of concern, and whether they wanted a call back for behaviour support. If they declined support, they could provide additional information that was then included in a thematic analysis to determine reasons for declining.

Results showed support was declined in almost 70% of calls, and this was more likely at two weeks post-adoption than at two days. Owners were more likely to accept support if they were experiencing more than one behavioural concern. Themes that emerged from those who declined were: An awareness of potential behavioural concerns but wanting to wait and "see how it goes"; they were already trying their own management techniques; they did not feel support was needed (e.g. behaviour was improving or was not concerned by the behaviour); or they believed the cause of the behaviour was contextual and justified the behaviour. These findings highlight how timing and adopter attitudes can influence decisions to decline support, which can inform future studies and interventions to encourage support uptake.

Samet L, Giragosian K, Williams C, Woodward J, Jordan E, Casey R, Buckland E (2025) ***No callback required: Themes and factors associated with new adopters declining free dog behavior support.*** *J Appl Anim Welf Sci. https://doi.org/10.1080/10888705.2025.2572615*

Designing rabbit housing that truly meets their needs and models humane care

Rabbits are a often overlooked species of the animal shelter population. Housing for rabbits in shelters is often inadequate for addressing their needs, usually lacking the space and environmental complexity required for them to express their full range of species-specific behaviours. As they are a prey species and were domesticated relatively recently, the shelter environment can be particularly challenging for them. A group of shelter medicine veterinarians recognised the lack of species-appropriate housing for rabbits in shelters and developed 'The Association of Shelter Veterinarians' Guidelines for Humane Rabbit Housing in Animal Shelters' to address this issue.

The guidelines were developed based on a comprehensive literature review conducted by the authors. Facility guidelines cover important aspects such as optimal lighting, noise, air quality, and temperature. For example, lighting should match the natural dark/light cycle of rabbits and noise should be minimised by choosing a quiet location and using quiet cage-door latches. Guidelines are also provided for the rabbit's primary enclosure which is vital to the rabbit's wellbeing and must be enriched to meet the rabbit's needs. These include recommendations for minimum dimension, material, enrichment items, cohousing, and a setup that provides functional areas to meet their needs. Alternatives that could be better for the rabbit's welfare, such as housing in foster care should also be considered. Finally, recommendations for sanitation protocols and biosecurity measures are provided.

In addition to having a significant impact on rabbit welfare in care, shelter enclosures can serve as a model for adopters and the community, so it is essential they are designed appropriately to model humane care. These guidelines can help shelters and owners to provide humane housing that will allow the rabbits in their care to thrive.

Schumacher E, Berliner E, Hicks S, Aziz C, Wong Gordon E, Hedge Z, Hurley K, Reed J, Stuntebeck R (2025) ***The Association of Shelter Veterinarians' Guidelines for Humane Rabbit Housing in Animal Shelters.*** *JSMCAH 4(S2). https://doi.org/10.56771/jsmcah.v4.149*

FARMED ANIMALS

Laying hens can self-supplement their calcium needs from pecking blocks

Laying hens require more calcium than other vertebrates to meet the high demands of egg production and will adjust their calcium intake according to their needs when provided with a source of supplemental calcium, such as a pecking block. Pecking blocks may also provide a source of calcium for hens that are healing from bone fractures, although the impact of bone fractures on calcium-seeking behaviour with pecking blocks has not yet been explored.

This study was conducted at the University of Guelph in Canada using 240 laying hens to investigate the relationship between pecking block preference, keel bone fracture status, and eggshell quality. The hens were housed in groups of 20 in furnished cages, and a subset from each group was randomly selected as focal animals for behavioural observations. Three commercial pecking blocks with varying calcium and grain content were offered to the hens over several weeks for paired preference testing. Hens were categorised as "users" or "nonusers" based on the total number of pecks to the blocks throughout the experiment. Eggs were analysed for their weight, shell thickness, and shell-breaking force. Hens were radiographed and scored for severity of keel bone fractures.

The hens showed individual preferences for different types of pecking blocks, and these preferences were fairly consistent over time but not associated with shell quality or the presence of keel bone fractures. "Users" had stronger eggshells and maintained shell thickness over time, whereas thickness decreased for "nonusers". Hens that sustained new fractures during the experiment pecked at the blocks more than those without new fractures. These findings suggest hens may be using the pecking blocks to meet their individual calcium needs for eggshell formation and possibly bone repair, highlighting the importance of providing hens with opportunities to meet their additional calcium requirements.

Ehigbor TF, Edwards AM, Rentsch AK, Kiarie EG, Harlander A, Widowski TM (2025) ***Pecking block use at individual level is associated with improved eggshell quality and keel fractures in laying hens.*** *Poultry Sci 104(11):105716*

Rams have unique vocal signatures that convey emotional information

Vocalisations carry information that allow social animals to identify members of their own species, maintain social cohesion, and communicate their emotional state, all of which are essential for their survival. Sheep are a gregarious species that show distinctive vocalisations in different contexts such as high-pitched bleats when they are stressed. They also show vocal individuality especially in the early postnatal period to support ewe-lamb bonding. Despite being well-studied in ewes and lambs, little is known about vocal individuality and distinctiveness in rams.

A study on a commercial Assaf sheep breeding farm in Greece recorded vocalisations of 15 rams in five different contexts: 1) isolated in the morning, 2) isolated and hearing the ewes' bells, 3) isolated in the evening, 4) isolated and anticipating feed, 5) isolated and denied feed. Each ram was isolated for three minutes and the vocalisations recorded. Contexts 1, 3 and 5 were expected to be negative, and contexts 2 and 4 were expected to be positive for the rams. Nineteen acoustic parameters were analysed to see if they contained information about the individual ram vocal signatures and whether they could be classified according to the different emotional contexts.

The results showed that rams do have individually distinct vocalisations that can be recognised with 59-80% accuracy within each context. Calls made in negative contexts (e.g. being denied food, evening isolation) had greater formant (or resonating sound) dispersion and amplitude variation compared to positive contexts (e.g. anticipating feed) which had higher formant frequencies. Interestingly, these higher frequencies also encoded information about the identity of the ram. This suggests rams produce deeper, more unstable calls when in negative emotional states and more high-pitched calls when anticipating feed and communicating individual identity. These findings suggest rams do communicate emotion information through their vocalisations, showing further potential for this non-invasive method for on-farm sheep welfare monitoring.

Frantzola A, Ntairis A, Laliotis GP (2025) ***Vocal signatures in rams: Exploring individual distinctiveness across different contexts.*** *Ruminants 5(4):53*

The dairy landscape is changing

Recent shifts towards positive animal welfare have important implications for the dairy industry as animal welfare is crucial to the industry's social license to operate, economic performance, and sustainability. Due to limited resources and competing priorities, industry and scientists need to understand which welfare issues to prioritise. A systematic scoping review examined research papers from the past 25 years to understand trends in research on pasture-based dairy farming, identify knowledge gaps, and suggest priorities for future research.

The authors extracted 678 articles that were published between 2000 and 2024. Each article was categorised according to the cattle class (preweaning calf, weaned youngstock, cow), and welfare domain according to the Five Domains framework (nutrition, health, environment, behaviour, mental state). Key words were also assigned to summarise the main topics of each article.

The review found most of the studies focused on cows (74%), with less research on calves and weaned youngstock. Health was the most studied welfare domain across all cattle classes, while studies on mental states comprised less than 1%. Calf welfare is currently focused on extended suckling (i.e. cow-calf contact) systems. Research on weaned youngstock continues to focus on parasite control. Cow welfare is currently focused on emerging technologies, closely followed by pasture access. The review recommends future research for calves to continue investigating extended suckling as well as assessing environmental enrichment, milk feeding practices, and group size in pasture-based systems. For weaned youngstock, there is a need to understand the influence of early-life experiences on resilience and heifer welfare. For cows, future studies should prioritise climate-related challenges such as provision of shade and shelter, nutritional variability, and virtual fencing. Overall, a greater focus is needed on mental states and the use of technology to improve cow welfare.

Verdon M, Field L, Schütz K, Bryant R (2025) ***Invited review: Animal welfare in pasture-based dairy systems—A systematic scoping review to identify progress, priorities, and future directions.*** *J Dairy Sci 108(12):12924–12948*

Deep learning models help to detect stress-prone pigs

Prenatal stress in sows can impair piglet growth and development, increase stress sensitivity, and weaken their immune system. However, practical methods for detecting prenatal stress in the sows and in their affected offspring are lacking. A promising approach utilises computer vision techniques to automatically detect stress in facial features, providing a potentially scalable on-farm tool.

Using this technology, a study in Scotland investigated whether they could detect stress-related facial features in sows and identify similar features in their offspring. The study used over 7000 facial images from six batches of 18 sows and 53 daughters. Baseline images of sow faces were taken as sows entered their individual feeding stalls. Images were then taken on days 70 and 90 of gestation during food competition tests. Salivary cortisol and behavioural responses collected during these tests were used to classify the sows as either low- (LR) or high-stress responders (HR). Five deep learning models were trained on sow datasets to classify LR and HR in the daughters. A cross-generational validation strategy was used, meaning the daughters were never evaluated using a model trained with the dataset of their biological mother to ensure the features being identified were indeed stress-related rather than familial resemblance.

The results showed that, of the five deep learning models used, the Vision Transformer (ViT) was consistently the highest performing with an average accuracy of 0.78 and F1-score (a metric balancing precision and recall) of 0.76 when classifying LR and HR. This was across all batches despite there being variability between them, suggesting that it is a reliable and generalisable model. The ViT also consistently focused on the eyes, snout, and ears, which are biologically relevant for facial expression of stress, whilst other models did not. This shows the promise of meaningful detection of stress-related facial features in pigs, which can used to support early detection and management of stress-prone individuals to safeguard their welfare and potentially reducing antibiotic use.

Yunas SU, Shahbaz A, Baxter EM, Rutherford KMD, Hansen MF, Smith ML, Smith LN (2025) ***A deep learning framework for detecting cross-generational facial markers associated with stress in pigs.*** *Agriculture 15(21):2253*

ANIMALS IN SPORT, ENTERTAINMENT, PERFORMANCE, RECREATION AND WORK

Too tight! Exponential rise in pressure on the nasal bone as noseband is progressively tightened on a horse cadaver

The practice of tightening nosebands in equestrian sports is controversial given the concerns for horse welfare. This technique is popular amongst riders to train and compete with horses but does not rely on negative reinforcement (i.e. pressure is applied and then released when the horse performs the desired behaviour) as pressure is constantly applied despite desired behaviours being performed. The current working guideline recommends a tightness that allows fitting two adult human fingers underneath the noseband across the front of the nose, though this is based on traditional horse-riding texts and the origin of its basis is unknown. The global governing equestrian body, Fédération Équestre Internationale (FEI), recently introduced the requirement that noseband tightness will be measured at all FEI competitions using a new measuring device ("pull-through" gauge) that approximately equates to a maximum tightness of 1.5 fingers. However, there is a lack of empirical evidence linking noseband tightness to the actual pressure on the nasal bones.

This study aimed to investigate the relationship between noseband tension and pressure on the nasal bone, frontal nasal plane, and second premolar tooth. Using a single horse cadaver, a standard noseband was progressively tightened. The International Society for Equitation Science (ISES) Noseband Taper Gauge was used to estimate the tightness, a pressure sensor to measure data pressure (kPa), and a strain gauge to measure the tension (Newton) at each pre-punched hole of the noseband.

Pressure ranges from the loosest to the tightest noseband fitting were 0 to 403.19 kPa at the left nasal bone, 0 to 185.2 kPa at the frontal nasal plane midline, and 0.07 kPa to 7.13 kPa at the second premolar tooth. The highest pressure is far beyond the level known to cause pain and tissue damage. Pressures rose exponentially from a tightness level of approximately 1.4 fingers' space. As pressures are expected to be greater in a live horse wearing a bit, with tension from the reins, and with movement, the authors recommend retaining the traditional guideline of two fingers' space. Though there are limitations to this study given the use of a single specimen with only one type of noseband, the pressures measured at the nasal bone are of concern.

Doherty O, Conway R, McGreevy P (2025) ***Using an equine cadaver head to investigate associations between sub-noseband space, noseband tension, and sub-noseband pressure at three locations.*** *Animals 15(14):2141*

Trotters versus Gallopers: Assessing welfare indicators and links to racing performance

The management conditions of racehorses present several welfare challenges including environments that restrict social behaviour and movement, as well as stress associated with racing. It is important to monitor welfare to prevent these detrimental effects, which can also impact race performance. Using animal-based measures (i.e. measurements taken directly from the animal) rather than relying on traditionally used environment-based measures (i.e. factors in the environment that can impact welfare) provide a better understanding of the horse's experience. Few studies have explored the relationship between horse welfare and racing performance.

A French study assessed the welfare of 52 trotters and 32 gallopers using the European Animal Welfare Indicators Project (AWIN) horse protocol, which combines environment-based and animal-based measures. Abnormal behaviours (e.g. inactivity, stereotypies, alert posture) were also observed and used as additional indicators to detect potential welfare problems. Race placing was categorised according to the percentage of races where the horse finished in the top three, top five, or was disqualified. Potential links between animal-based measures from the AWIN protocol and abnormal behaviours (that were observed in at least 20% of the horses) and race placing were explored.

Notable differences (although non-statistical) were found between the trotters and gallopers particularly for the environment-based measures, whereby gallopers had a more restrictive environment with fewer opportunities for social interactions and access to free exercise compared to trotters. Mouth corner lesions (23.1% in trotters and 18.8% in gallopers) and limb skin lesions (40.4% in trotters and 25% in gallopers) were also prevalent in both populations and were identified as welfare risks. A (weak) negative relationship was found only between race placing and inactivity for trotters, meaning the more the horses were inactive in their living environment, the lower the percentage of races where they placed in the top three or top five. This suggests inactivity may be a relevant welfare indicator relating to race performance. Other potential factors such as training, genetics, and racing conditions should be investigated in future studies.

Hennes N, Ruet A, Phelipon R, Duluard A, Bourguignon H, Lansade L (2025) ***Poor welfare indicators may be associated with performance limitations in racehorses.*** *Appl Anim Behav Sci 290:106697*

A second chance for Thoroughbred racehorses through suitability for equestrian retraining

Every year, thousands of Thoroughbred horses compete for new homes when they leave the Australian racing industry due to the limited number of available homes. A potential avenue for these horses, termed off-the-track Thoroughbreds (OTTTBs), is to be retrained for equestrian purposes. Horses retrained for equestrian purposes are more likely to be rehomed than those who are not. However, their suitability for equestrian retraining depends on their behaviour, as this is important for both horse welfare and human safety. Knowledge on behavioural characteristics of OTTTBs exist anecdotally but evidence-based information is lacking.

This study used the Equine Behavior Assessment and Research Questionnaire (E-BARQ) global database to gather information on horse behaviour reported by owners and carers. The final sample size was 1633 horses: 265 OTTTBs (cases) and 1368 other horses (controls). Exploratory factor analysis was used to make meaningful groupings of the E-BARQ items, which retained 27 E-BARQ items resulting in four behavioural categories: 1) Working Compliance + Easy to Stop; 2) Boldness + Novel Object Confidence; 3) Rideability + Forward Going; 4) Trainability.

The OTTTBs from this survey showed lower working compliance in terms of how consistent and correct their responses are to trained cues given by the handler or rider. They also showed lower responsiveness to cues to decelerate, which could be a result of desensitisation from race training when constant pressure is applied.

An unexpected finding was that the OTTTBs were higher in boldness (less fear-averse) compared to other horses, contrary to past research. Given the implications of fear-related behaviour for human safety, the authors caution this finding and suggest further research is needed. There were no significant differences between the OTTTBs and other horses in their responsiveness to accelerations signals, rideability, and trainability. These findings provide a basis for future studies on OTTTB behaviour and inform evidence-based training and management of Thoroughbreds to improve their post-racing opportunities.

Knox A-L, Fenner K, Zsoldos RR, Wilson B, McGreevy P (2025) ***Owner-observed behavioral characteristics in Off-the-Track Thoroughbreds (OTTTBs) in equestrian second careers.*** *Animals 15(14):2046*

Rest and recovery: Racehorses need adequate rest periods to prevent bone fractures

Thoroughbred racehorses are subject to high-intensity training that can lead to bone fractures that cause considerable pain and distress. Research on the links between training and bone fractures are conflicting, where some studies have found increased speed and distances during training linked to more injuries, whilst others have found greater cumulative gallop distances throughout the horse's career to be linked with less fractures (a protective effect). This discrepancy highlights the need to better understand the underlying mechanisms of bone adaptation and how damage occurs and repairs. Although a previous study has mathematically modelled bone adaptation in racehorses, this did not account for the dynamic process of damage formation and repair.

Building on this previous bone adaptation model, a study incorporated dynamic bone resorption, damage formation and repair into an extended model of the metacarpal (bones in the lower front leg) subchondral bone, a common site of injury for racehorses. This mathematical model was used to simulate bone adaptation responses to a typical training program of racehorses in Victoria, Australia. The training program consisted of a rest period, followed by pre-training, progressive training, and race-fit training for which distances covered and damage incurred at various speeds were calculated. This training cycle was repeated four times in the simulation to investigate the rate of damage and repair across the phases of training.

The results showed that most damage was incurred at high speeds (above 13.8m/s) during progressive and race-fit training. Joint stress and the number of strides per day were key predictors of bone damage. Importantly, the simulations showed that the average 6.3-week rest period is not sufficient to repair the accumulated damage under typical racing preparations in Victoria. The authors recommend longer or more frequent rest to prevent fractures.

Pan M, Malekipour F, Pivonka P, Morrice-West AV, Flegg JA, Whitton RC, Hitchens PL (2025) ***A mathematical model of metacarpal subchondral bone adaptation, microdamage and repair in racehorses.*** *J R Soc Interface 22(231):20250297*

ANIMALS IN RESEARCH AND TEACHING

Welfare toolboxes for Europe's most farmed fish species

Fish used in European aquaculture research are legally protected under the Directive 2010/63/EU (which supports the application of the 3Rs principles of replacement, reduction and refinement) and its amendment Commission Delegated Directive (EU) 2024/1262. However, the lack of species-specific and life-stage-specific details makes the requirements difficult to apply in practice. Having standardised, species-specific indicators that can be applied are essential for proper welfare monitoring and evaluation.

A review proposes comprehensive welfare indicator toolboxes for five fish species that have the highest production volume in European fish farming: the Atlantic salmon, rainbow trout, European seabass, gilthead seabream, and the common carp. The review breaks down each welfare indicator specified in Annex III of the Directive 2010/63/EU (e.g. temperature, oxygen, pH), providing detailed species (and life-stage, where possible) considerations and specific examples for the five focus species, as well as noting where little to no information is available, highlighting knowledge gaps. The toolboxes also incorporate additional outcome-based (or animal-based) indicators, going beyond the Directive that only includes input-based (or environment-based) indicators. It is important to measure multiple indicators in tandem as important factors may be missed if only one indicator is used, especially in farms where conditions are much more variable.

Opportunities and challenges regarding the use of technology to measure and monitor welfare indicators are also discussed, many of which are non-invasive and could significantly advance fish welfare assessment. As there are some overlaps between commercial aquaculture and aquaculture research, there are possibilities for knowledge sharing whereby relevant information from industry are included in the toolbox and industry can also use the toolbox to inform their welfare assessments, helping to deliver the EU Directive's goals in safeguarding fish welfare.

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Towards more ethical and reproducible science with the use of non-animal-derived antibodies

Antibodies are a vital part of biomedical research, but the largescale use of animal-derived antibodies raises serious scientific and ethical concerns. Animal-derived antibodies often have poor reproducibility and lack specificity for their targets, resulting in unreliable outcomes and substantial economic losses. Despite the availability of more reliable and ethical non-animal-derived alternatives, they comprise only 5% of what is currently used in research. To address the barriers preventing the uptake of these alternatives, the 'Recombinant Antibodies & Mimetics Database' was developed by the Centre for Human Specific Research in the UK. This review summarises what this database is, compares non-animal-derived reagents with traditional animal-derived methods, and makes recommendations for the future.

The Recombinant Antibodies & Mimetics Database is an open-access, online platform that provides easy access to information on available sequence-defined reagents (i.e. molecules with a known sequence). The database is organised by colour-coded categories (A to F) that highlight key information on how the reagent was discovered and if animal-derived products are used at any stage during development or manufacturing. Categories A and B both align with the recommendation by the European Union Reference Laboratory for alternatives to animal testing to avoid methods that use active immunisation of animals, whereas reagents falling under categories C to F still use active animal immunisation. This information can be used to help scientists ensure their chosen methods align with best scientific and ethical practices.

Moving forward, rigorous validation of antibodies is key to reliability and building confidence in non-animal alternatives. Open-science initiatives and making resources publicly available is also essential in preventing barriers to access. Ultimately, the goal of this tool is to drive systemic change towards a future where animal-free antibodies are the standard and science is more humane and reproducible.

Modi S (2025) ***The recombinant antibodies & mimetics database: Redefining the future of antibody use in science.*** *Altern Lab Anim 53(5):271–280*

Time to rethink reliance on fetal bovine serum

Fetal bovine serum (FBS) has long been the "gold standard" for cell culture media. However, its use raises significant concerns. Fetal bovine serum is by nature variable and undefined, causing spontaneous changes to cell cultures contributing to the reproducibility crisis in science. The transport and slaughter of the pregnant dam and invasive retrieval of FBS from bovine foetuses raise serious welfare and ethical concerns. Furthermore, FBS may contain pathogens or xenogenic (foreign) substances risking contamination and inducing immune responses, which has serious safety implications when used in human applications such as stem cell transplantation.

To address these concerns, significant advancements have been made over the years to replace FBS. This review aimed to highlight examples where FBS has been successfully replaced, what challenges may still exist, and ways forward to an FBS-free future. Although various examples show successful replacement of FBS for cell culture media, animal-derived products may still be used during other processes. For example, animal-derived antibodies may still be used in immunocytochemical staining for the development of organ-on-a-chip systems and bioprinting of tissues. In other cases, FBS-free media may exist but are proprietary owned and their contents are not disclosed, resulting in the same reliability and reproducibility issues as FBS. These highlight the need for greater transparency both for the existing use of animal-derived products and disclosure of contents of animal-free media.

The authors emphasise the need to raise awareness around the pitfalls of FBS and the alternatives that already exist. They advocate that the ultimate goal should be the complete replacement of all animal-derived materials throughout the entire process of cell culture to achieve safe, ethical, and reliable science.

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WILD ANIMALS

Catching diverse stakeholders with an open-access database to improve fish welfare

The recognition of fish as sentient animals capable of experiencing pain and suffering raises significant concerns for their welfare in commercial fishing. There are welfare concerns at every stage in fisheries from capture to retrieval, handling, storage, stunning, and slaughter. Within the capturing process, impacts on welfare can vary depending on the method as well as the species. The assessment of welfare during catching in fisheries is rare. This article investigates the potential of using the fair-fish database|catch, an open-access platform that gathers ethological knowledge to inform fish welfare, and to help assess fish suffering during catching.

The fair-fish database|catch was first launched in 2013 with a focus on aquaculture, and has since expanded to include fisheries from 2023 led by an international consortium of members from Switzerland, Portugal, Italy, and France. As of May 2025, it includes data on 93 fish species. The database is structured in terms of profiles called 'WelfareChecks', which provide the welfare status of each fish species for a particular catching method, based on a comprehensive review of the literature. This is organised into two categories: 1) Catching steps structure and 2) Hazard consequences structure. The catching step structure comprises 10 criteria addressing welfare hazards at each catching step. These criteria are then scored Low, Medium, High, Unclear, or No findings for their Certainty, Potential, and Likelihood for good welfare. The Hazard consequences structure comprises 11 criteria covering various welfare consequences such as physical damage, stress and temperature shock to provide an overview without scores. Each profile is reviewed internally and is currently being updated roughly every 6-7 years.

Since the expansion to fisheries, the authors have published five WelfareChecks and aim to continue increasing the number of profiles for more species and catching methods. The fair-fish database|catch can be used by multiple, diverse stakeholders to improve fishing standards in practice, inform policy-making, address scientific knowledge gaps, and raise public awareness around fish welfare.

Maia CM, Cabrera-Álvarez MJ, Volstorf J (2025) ***fair-fish database|catch: A platform for global assessment of welfare hazards affecting aquatic animals in fisheries.*** *Appl Anim Beh Sci 291:106732*

Size matters: Body size and tag position inform ethical limits for shark tagging

Marine animal tagging is crucial for monitoring behaviour, movement, and ecology, especially in the face of growing environmental threats. In particular, the use of electronic tags to track sharks has increased significantly in the past decade. However, tagging can unintentionally alter swimming behaviour if the size, shape, or position of the tag is inappropriate, which can impact shark survival. Minimising these negative effects is essential to improve animal welfare as well as the reliability of the data collected. Currently, there is no evidence-based, ethical threshold for shark tagging.

A study using 3D modelling and computational fluid dynamics simulated water flow around tagged and untagged mako sharks. Two tag shapes were compared: 1) MiniPAT placed along the body of the shark at four different positions, and 2) SPOT-258 fin-mount tag placed on the dorsal fin of the shark. The study investigated the effects of tag position on energy costs to the shark.

Results showed that the SPOT tag (placed on the fin) increased drag of up to 31.2%. This increased resistance makes swimming more energetically demanding and affects stability and control due to the pressure imbalance between the two sides of the fin. In contrast, the MiniPAT tags had little effect on drag on larger sharks (>1.5m fork length (FL*)), though there was a significant increase in drag force and energetic demand for the smallest shark size (1m FL). There were also some differences between MiniPAT tag positions in water flow dynamics and the side force that can cause the tag to be dislodged from the body, though further research is needed to determine which position is best. These simulation results suggest that tag position and body size do affect shark behaviour and energy costs, and a lower limit of >1.5m FL should result in minimal negative impacts.

**FL is the distance from the nose to the fork in the caudal fin*

Maillard TC, Garzon F, Hawkes LA, Tabor GR, Witt MJ (2025) ***Refining electronic tagging of marine animals: Computational fluid dynamics and pelagic sharks.*** *Animals 15(20):2956*

TRANSPORTATION OF ANIMALS

Brrrr! Colder climates impact broiler breeder welfare during transportation

Transportation of farm animals poses significant welfare concerns due to the pain and suffering caused by inappropriate conditions which can lead to death. Broiler breeders are handled, transported, and processed in the same way as broiler chickens despite being much larger in size and weight. Most research so far on transportation conditions has been on broiler chickens, not broiler breeders.

A study analysed two years of data from a commercial slaughterhouse in Turkey, covering 2.4 million broiler breeders transported in 554 trucks. Transport events were categorised according to season (northern summer, autumn, winter, spring) and transport distance (short: 0-200km, long: 201-400km). Number of animals that died during transport (dead-on-arrival), animals that were rejected at the slaughterhouse due to damage (reject rate), and body weight loss from transport were calculated to investigate if these outcomes were related to season and transport distance.

Results showed deaths and rejection rates were the lowest in summer and highest in spring. This could be because the side curtains of transport trucks were typically open in summer whereas they were closed during cold weather, increasing the risk of suffocation. Damages that result in rejected carcasses are typically due to improper handling and stocking density during transport. Body weight loss was not impacted by season but by transport distance, where losses were higher for long transport distances. Therefore, the author recommends paying attention to the local climate (particularly cold weather) when managing transport conditions, reducing transport time, and considering stocking density to improve animal welfare and reduce economic losses due to transport.

Çavuşoğlu E (2025) ***Impact of seasonal variation and transportation distance on welfare and economic parameters in broiler breeder chickens during transit to slaughterhouses.*** *Brit Poultry Sci 1–7. https://doi.org/10.1080/00071668.2025.2559394*

MISCELLANEOUS

Multidisciplinary workshop on studying animal emotions and using artificial intelligence

Emotions are closely linked to animal welfare: positive emotions like play and positive anticipation are associated with higher welfare, while negative emotions like frustration, fear, and anxiety can indicate potential stress and poorer welfare. However, identifying correlates of emotions in animals is complex due to the subjective nature of emotions and species-specific differences. Despite research progressing rapidly, it remains a widely debated topic. This report article summarises the first International Workshop on Research Methods for Animal Emotion Analysis (RM4AEA) which brought together experts from various fields to address this emerging topic.

The online workshop focused on the measurement of visual behaviour cues given they are highly accessible and non-invasive, and the majority of work in automatic detection currently focuses on visual cues. However, data collection in this field is not without its challenges, including observer biases, small sample sizes, species differences, ethical considerations, and an overemphasis on facial cues. Artificial intelligence can also inherit these human biases and errors as they require human-labelled datasets for training. A list of human and AI biases can be found in the article's supplementary material, and it is important to be aware of them.

Moving forward, there is interest in continuing to develop the Facial Action Coding System (FACS) and the Body Action and Posture Systems (BAPS), which objectively measure subtle changes in facial and body expressions, for more species. Automating these systems will also help reduce time and costs typically associated with coding behaviour. More collaboration between interdisciplinary experts is needed to improve datasets, establish ground truths for animal emotion detection, and exchange ideas, knowledge, and datasets to successfully advance work in this field.

Correia-Caeiro C, Zamansky A, Karl S, Bremhorst A (2025) ***Research methods for the analysis of visual emotion cues in animals: A workshop report.*** *Animals 15(21):3142*

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