Poster Abstracts

Wild brains — domesticated minds: opposites in welfare?

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Anthropomorphism implies that wild animals have the mental abilities to worry in human fashion over the chronic uncertainties and possible impending disasters of life in the wild. However, such a state is unevolvable — wild animals would be stressed out of existence! This conference broaches the concept that evolution has maintained wild brains so that this is not so. However, during domestication, despite an overall reduction in brain size, human selection for useful behaviours and sensitivities may have changed key areas of the brain, creating animals with minds that no longer tolerate the wild. To take them as models for wild animals is to make the anthropomorphic error over again. Domestic and wild animals differ in appearance, physiology and psychology, the latter being the subject of this presentation. This includes directly opposed responses to crowding, humans and restraint. The dog with its ten thousand years plus of human selection must be the extreme example of domestication, its psychology so changed that even our closest relatives, chimpanzees, trail behind dogs at reading the intentions, emotions and faces of humans. The power of human selection is dramatically illustrated by a Russian experiment where wild human-hating silver foxes were turned into face-licking, tail-wagging 'dogs' within 35 generations. However, brains have not been examined. We have wondered what might have changed in the brain of the dog to make them more human than chimps. We suggest expansion/development of areas which, in humans, generate their distinctive mental attributes such as: (i) Prefrontal cortex; dorsolateral — working memory, assembling data for conscious thought; orbitofrontal — expression, recall, and imagination of emotions; (ii) Parietal cortex; superior and inferior regions — quasi-spatial mental manipulation in thought; (iii) Temporal cortex; superior sulcus — polysensory data required for social awareness; (iv) A unique circuit involving sensory fibres, thalamic nuclei, a cortical area (the insula) — interoception (registration of signals from within the body), the basis for subjective self-awareness; and (v) Lateralisation of functions, eg the anterior portion of the insula, active in self-reflection. One would expect to find some of this developed beyond anything in wild species, emphasising the fundamental welfare error of treating wild animals as possessors of the same mental reactions as their domesticated relatives.

A systematic review of inherited defects in a selection of UK horse breeds

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Inherited defects in breeds of domestic dog have been a recent focus of debate in the media, however the extent to which these occur in other domesticated species, such as the domestic horse (*Equus caballus*), has been largely overlooked. Selective breeding of dogs initially focused on the function the dog was to perform, but over the last century has shifted towards breeding for appearance. This change in emphasis also seems to have occurred, to a lesser extent, with the breeding of the domestic horse. Practises associated with breeding for appearance in dogs, such as inbreeding and closed-stud systems, are also found in horse breeding and thus we might expect to find similar trends in inherited defects. Here, we apply a systematic review to objectively examine breed differences in disease and injury in the domestic horse. We ran a two-part search strategy: (i) a search of electronic bibliographic databases for published studies and (ii) a search of reference lists of published studies, existing online databases of inherited traits in animals and relevant literature from equine and veterinary organisations. Whilst our aim was to produce a comprehensive list of inherited traits in horses, here we have scope only to present the major genetic defects in horse breeds representative of the different types owned in the UK: Shetland and Fell Ponies, Thoroughbred, Arab and Draft Horse breeds such as the Shire. The most common problems associated with each of these breeds are outlined and interpretation given as to severity and possible outcomes. We found few cases where conformation directly resulted in defects. An example is osteoarthritis of the shoulder joint in Shetland Ponies due to the curvature of the joint being flatter and shallower. There were many more cases of deleterious inherited traits, for example Severe Combined Immunodeficiency (SCID), a fatal disease of Arab foals, causing a complete lack of antibody production and defective cell-mediated immunity. Interestingly, some behavioural traits, such as the development of stereotypies, have also been shown to have a genetic component in some breeds, primarily the Thoroughbred. Compared with dog breeds, the relatively low number of conformational problems in horses is encouraging because the solution to such problems requires a change in breed morphology. These results are important to assess the impact that current breeding practices have on the welfare of domestic horses and to suggest targets for breeding programmes against inherited defects.

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Long-term adaptation of farm animal welfare to selection for increased production efficiency

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Darwin has contributed substantially to our understanding of animal welfare. In the commonly used conceptual framework for welfare assessment the 'environment of evolutionary adaptation' largely determines the animals' setpoints, and welfare is considered to be a function of discrepancies between the animal's perception of its world and how it would like it to be. In this framework, modern domesticated animals are often believed to be having qualitatively similar needs to the needs of their wild ancestors and the prime concern is how to improve environmental conditions to meet the animal's welfare needs. In this approach, welfare scientists tend to follow Darwin in primarily looking back in time in trying to understand the present situation. However, evolutionary thinking can also be used to look into the future, at least for farm animals that are kept in intensive systems and that are being subjected to a predominant selection for increased production efficiency. Based on the evolutionary history of domestication and recent advances in modern quantitative genetics such as group selection, it may be possible to make a forecast of where ongoing selection for increased production efficiency will lead farm animals and their welfare. It may be anticipated that food-producing animals, while adapting to the prevailing selection pressures, will have to overcome substantial welfare problems. In the end, however, all welfare problems may be solved but at the same time farm animals may have evolved (some will say 'degenerated') into a state that could raise considerable ethical concerns related to 'natural living' and positive welfare.

On the concept of welfare: a case history

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Since the attention of scientists has been focused on the concept of animal welfare, a great number of definitions of the term itself have been proposed. A debate is still in progress. The evidence suggests that humans utilised different balance for different species: for pests no concepts of welfare are invoked, for pets they are emphasised. Welfare is seen as a continuum, ranging from very poor to very good, and the ethical question becomes one of what level of welfare is considered acceptable. But, this level, whatever it is, it's shaped for human needs. The only honest correct position about animal welfare should be that humans define welfare as a result of the compromise between human and animal interest in each specific context, time, and country. Such an idea is supported by the dog management issue. In Italy, where the no kill policy is applied by law, many dogs live their entire life in a shelter with poor consideration for the level of their welfare. Besides, Italian regional law allows the existence of stray dogs. Actually, our knowledge concerning the behaviour of free-ranging domestic dogs is scarce. In fact, there are not many canine social groups suitable for behavioural studies because, in most Westernised countries, the presence of stray dogs is forbidden by law. In addition, the available groups of feral/stray dogs are not likely to exist for very long before their activities come into conflict with those of human beings. The aim of the study (May 2005–August 2008) was to analyse the spacing pattern and the social dynamics of a free-ranging dog population of about 100 individuals. They could breed and move freely, but were dependent on humans for food. Data were collected by 'focal animal' and *ad libitum* sampling techniques. We found that dogs were organised in highly structured packs, characterised by a linear dominance hierarchy; packs travelled as a co-ordinated unit and were highly co-operative in conflicts against strangers; these are all aspects observed in other species of social canids. Conversely, we recorded low frequency of displacement activities and we did not observe disturbed behaviour. Therefore, the absence of abnormal behavioural patterns as well as the presence of behavioural patterns indicating a social organisation suggests that a reconsideration of the concept of welfare applied to management of the domestic dog is needed, without neglecting the conflict of interest that this situation elicits.

Genetic associations of group effects for growth, estimated using a co-operation model with post-mixing agonistic behaviours, skin lesions and activity in pigs

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Intense aggression after mixing pigs is common and can affect performance and welfare resulting in skin injuries which increase the risk of infection. To date, large genetic improvements in growth have been achieved through selection on individual performance. Recently, individual animal genetic effects (direct effects) have been shown to interact positively with genetic effects of others in the group (group effects) to co-operatively benefit growth. Selecting animals with a higher genetic potential to promote both their own growth and that of pen-mates could be overall

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most efficient. As group effects on growth are likely to operate through social interactions, the aim was to evaluate the possible consequences for agonistic behaviour, skin lesions and activity from including in selection indices the genetic effects of an individual on the average daily gain (ADG) of its pen-mates. Genetic parameters for direct and group effects for ADG were estimated in a Dutch pig population and were used to estimate breeding values of ADG from 35 to 100 kg in the study population (96 groups of 15 Swedish pigs). Agonistic behaviours were video-recorded for 24 h post-mixing; they included the duration and outcome (won, lost or winner unclear) of reciprocal fights and the duration of non-reciprocated bullying. Skin lesions accumulated over the first 24 h and observed again 3 weeks post-mixing were counted on the front, middle and rear part of the body. Activity was scanned hourly for 24 h at 3 weeks post-mixing. For all traits analysed, the statistical model included the fixed effects of sex, line, mixing weight and the random effects of pen and pig, plus a group effect for ADG. Genetic analyses were performed with ASReml software. Correlations between breeding values showed that pigs with a beneficial group effect on ADG spent more time fighting and bulling others at mixing. They also initiated more fights (r = +0.09, P < 0.01) and both won more (r = +0.07, P < 0.01) and lost more fights (r = +0.13, P < 0.001), suggesting that fewer fights ended with an unclear winner. Three weeks post-mixing, they had more lesions to the rear part of the body, indicative of retreat (r = +0.11, P < 0.001) and were less often active (r = –0.06, P < 0.05). The inclusion of group effects for ADG could favour selection of pigs involved in agonistic interactions at mixing, possibly benefitting pen-mates by speeding the establishment of dominance relationships. Later on, when social conditions are more stable, it would favour pigs that retreat from aggression and are calmer.

GM rodents use statistics: the Italian experience and perspective

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Application of genetic modification technology to animals can be used in medical research to create models of human disease. Such models help identify disease pathways and allow assessment of new therapies. Analysing gene function is an area in which the use of GM animals is likely to significantly increase, because by modifying a gene, the various roles it plays in different functional systems of the body can be identified. The development of GM animals has been hugely beneficial in many areas, but serious concerns remain about welfare and health and safety issues. The use of genetically modified rats and mice in biomedical research raises many concerns and considerations, including the ethics and scientific value of using these animals. On the basis of the above considerations, the authors conducted a statistical analysis of transgenic rodents used for experiments in Italy, including the number and the species used and types of research. The data show that in recent years there has been an obvious trend in the number of scientific procedures performed on these GM animals, as a result of new molecular biology techniques that are opening up new areas of research, leading to an increase in the use of genetically modified animals. Many more projects are employing genetically modified animals — though it might be the case that, within each individual project, the validity of the animal models is enhanced, so that results may be obtained more quickly and, ultimately, after the use of fewer animals than now. Arguably, the increase in use of genetically modified animals can be regarded as a present-day necessity, in that the justification is based on circumstances that did not exist 15 years ago and which might change over time, as benefits are realised and the need to use animals diminishes. Finally, fundamental ethical objections to the production and use of genetically modified animals are reported.

The use of GM rats and mice in Italy: specific animal welfare problems

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Recently, the use of GM rodents has significantly increased due to the complete sequencing of the rat and mouse genome. Hence, there is a need to fully understand the biology and genetics as well as the special needs for the breeding and care of these new strains. Genetic changes can produce several phenotypes which may sometimes cause suffering for the animals. GM rodents bred and supplied by large companies exist in fewer numbers than those created and bred in small laboratories and continuously exchanged within the scientific community worldwide. It is essential that all relevant information concerning the care of these new strains is spread as widely as possible, especially before transferring animals from one laboratory to another. Welfare and protection of experimental animals are provided by Legislative Decree 116/92 in efforts of Directive EEC 86/609 but there aren't specific indications regarding GM animals' welfare and production. Only FELASA has issued guidelines regarding the production and nomenclature of these new strains. This paper summarises the discussion of issues raised by the genetic modification of rodents, including: i) consequences for animal welfare, and strategies for improving the understanding of welfare

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effects; ii) benefits sought from genetic modification, and the need to use transgenic animals; and iii) brief legal remarks. In fact, some provisions require specific attention, which current Italian law does not provide, and revision based on more recently available scientific data and current good practices is therefore necessary.

Spacing patterns of laying hens

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The red jungle fowl (*Gallus gallus*) and feral hens congregate in small flocks for some activities (eg roosting) and disperse for other activities, such as foraging or nesting (McBride *et al* 1969). The domestic hen (*Gallus gallus domesticus*) in modern husbandry systems has seen divergent selection for fast growth (broilers bred for meat production) or increased egg production (laying hens). Free-roaming laying hens adopt behaviour patterns seen in their ancestors (Duncan *et al* 1978) suggesting that intense selection of production traits has had little impact on behavioural traits. In this study, we investigated the spacing behaviour of laying hens under semi-commercial enriched cages. Preliminary studies on adult laying hens had suggested they are seeking to maximise inter-bird distances within caged systems at conventional stocking densities (600 cm^2 per bird) (Albentosa & Cooper 2006). In this project we sought to directly assess spacing behaviour in caged hens using techniques derived from ecology such as nearest neighbour approaches. We measured the nearest neighbour distances for 8 flocks of 6 hens allowed free choice between two equally sized cages (6,000 cm^2 each). Data was recorded using overhead 24-h time-lapse video cameras during daytime (0500–2100h) and night-time (2100–0500h). Image-capture software was used to measure nearest neighbour distances for cages of 2, 3, 4 and 5 birds. Standard deviation was divided by the mean to give the co-efficient of variance (CoV) for each flock size. A randomly distributed flock would have CoV = 1, whereas CoV = 0 would indicate even distribution, and CoV > 1 suggests a clustered distribution. Overall, CoV did not vary with flock size (GLM; $F_{3,39}$ = 0.46, ns), with an average CoV = 0.243 ± 0.014. Birds did, however, show a lower CoV when roosting at night ([0.201 ± 0.027] than during the day [0.272 ± 0.013]; GLM; $F_{1,39}$ = 5.71, P = 0.022) and there was an interaction between time of day and flock size (GLM; $F_{3,39}$ = 4.10, P = 0.013), with day-time CoV declining with increasing flock size, but night-time CoV increasing with higher flock size. This data shows that as stocking density increases hens show more even distribution during the day, which is consistent with hens maximising inter-bird distances and suggests that there is insufficient space to show natural spacing patterns. Night-time spacing does not follow this pattern and it is suggested that measures of dispersion (eg variance-to-mean ratio) may be an alternative means of categorising spacing patterns in caged hens.

References

Albentosa M and Cooper J 2006 Testing resource preferences in group-housed animals; an investigation of cage height preference and social spacing in laying hens. *Behavioural Processes 70*: 113-121

Duncan IJH, Savory CJ and Wood-Gush DGM 1978 Observations on the reproductive behaviour of domestic fowl in the wild. *Applied Animal Ethology 4*: 29-42

McBride G, Parer IP and Foenander F 1969 The social organisation and behaviour of the feral domestic fowl. *Animal Behaviour Monographs 2*: 125-181

The evolution and selection of the laboratory ferret

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Captive ferrets (*Mustela putorius furo*) are decedents of the European polecat (*Mustela putorius*). They have been domesticated for over 2,000 years and were originally used solely for hunting. They are still used for this purpose but are becoming an increasingly popular choice of pet, as well as for scientific models in work research in the study of influenza, reproductive physiology, anatomy and endocrinology. They share anatomic, metabolic and physiologic features similar to humans which makes them excellent research models for these studies. These divergent uses for ferrets require different temperaments. For example, a pet ferret should not bite people or attack other animals such as rabbits, a hunting ferret should seek out prey but not kill and eat the prey, whilst a laboratory ferret may not have been selected for hunting behaviour at all. Wild ferrets are generally solitary nocturnal animals, but in captivity they can be housed in groups, and solitary ferrets can demonstrate stereotypic behaviour such as pawing at the bars of the cage and head swaying. Housing these individuals in compatible groups can, however, reduce this trait. Captive ferrets in the laboratory and kept as pets may not be allowed to maintain their natural nocturnal patterns of activity and often are awake during the day. This paper will look at the captive ferret compared to its wild counterparts, discussing whether there has been artificial selection of the animals used in the laboratory industry compared to hunting or wild polecats. It will explore the interactions between the animal and humans, and the interplay between genotype and environment in determining behavioural traits. These will be discussed in terms of their fitness in terms of evolutionary processes as well as for laboratory purposes and the consequence of human interference on species-typical behaviour.

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Investigating the behavioural consequences of selective breeding for robustness in dairy cows

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There is a general consensus that dairy cows are not as healthy and long-lived (robust) as they were in the past. Traditionally, breeding goals have focused primarily on selecting for increased milk production, however this had led to an increase in involuntary culling as a result of poorer health, fertility and reduced longevity. There is an urgent need to address these concerns by developing balanced breeding goals to include fitness traits (health, fertility and lifespan). Although this is desirable, it is important to consider any consequences that such breeding goals may have on dairy cow temperament and welfare. Some of the behavioural concerns for breeding for robust dairy cows that we identified are: responsiveness to humans and the environment, sociability and cow-to-cow aggression during feeding. The aim was to measure these behaviours on first lactation Holstein-Friesian dairy cows selected from sires that scored high (Hi) and low (Lo) for fitness traits. These behaviours were recorded on at least 8 Hi (n = 238) and 8 Lo cows (n = 183) on each of the 33 commercial farms visited. A novel object test (NOT) and a human interaction test (HIT) were designed to record behavioural responsiveness of cows to their environment and humans, respectively. Instantaneous scan sampling was used to record social behaviour, position, neighbour identity, distance to nearest neighbour and social synchrony of the Hi and Lo cows within the herd. Continuous focal sampling was used to record aggressive behaviour during feeding of Hi and Lo cows within the herd. Cows from the Hi group displayed significantly more interaction to the NOT ($W = 6.11$, $P < 0.05$). There was no difference in fear related response to the novel object between Hi and Lo groups ($W = 1.61$, $P = 0.205$). Hi cows showed less social synchrony ($F_1 = 4.14$, $P = 0.042$) and spent more time with first lactation cows as neighbours ($F_1 = 4.82$, $P = 0.028$). However, no significant differences were found for nearest neighbour distance ($P > 0.05$) and position within the housing area ($P > 0.05$). Cows from the Hi group were involved in more aggressive interactions ($W_1 = 3.82$, $P = 0.049$), initiated more aggression ($W_1 = 4.51$, $P = 0.034$) and received more aggression ($W_1 = 4.36$, $P = 0.037$) than cows from the Lo group. There was a strong influence of management factors influencing behaviour traits such as the quality of stockmanship, feedface design and nutrition. This study highlights the importance of assessing the correlated effects of selective breeding, in this case for fitness, on behavioural traits.

Intensive selection in broilers has not altered normal patterns of short-term feeding behaviour

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Selection for increased growth rate in livestock may be accompanied by increases in requirements for energy and nutrients. It has been suggested that intensively selected broilers have altered food intake control mechanisms and could be constantly hungry, due to high resource demands, which would be a major welfare issue. Such alterations in control mechanisms, as a side-effect of genetic selection, would lead to changes in feeding behaviour, such as the clustering of visits into meals and the probability of birds starting a new meal in relation to the time since the last meal. The aim of this study was to test whether broilers intensively selected for growth showed any alteration in the structure of their feeding behaviour that would indicate a change in the underlying hunger and satiety control mechanisms. Data of visits to feeders of 16,823 broilers from four lines, differing in their degree of selection for growth, were grouped into meals using meal criteria estimated per line by mathematical models. Birds were aged from two to five weeks and housed with *ad libitum* access to feed. The probability of birds starting a meal within the next min was calculated as the number of intervals between visits $> t$ and $\leq t + 1$ divided by the number of intervals $> t$, where t = interval length in minutes between two subsequent visits to feeders by the same bird. Differences in bouting between lines were analysed by calculating the frequency ratios between the relative frequencies of the bin containing the meal criterion and the bin containing the peak in frequency of the long intervals, using histograms of intervals between visits. Significant differences between the lines were found in the degree of bouting and change in probability of starting to feed, but this did not vary systematically with growth rate. No essential difference in the distributions of intervals between visits was seen, with all lines showing clustering of visits into discrete meals. No alteration in the overall organisation of feeding behaviour in relation to selection intensity was observed, with all lines showing an increase in probability of starting to feed with time, in common with a wide variety of other species, from insects to large herbivores. There is no evidence from this study that supports the hypothesis that intensive selection for growth has disturbed normal satiety and hunger mechanisms underlying feeding behaviour and led to birds that are constantly hungry.

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Efficient, fast and lean: the welfare of meat-producing animals… and their parents

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Genetic selection for efficient and fast meat production has led to increases in the growth rates of pigs and broilers of 20 and 66%, respectively, in the last 30 years. This has been achieved through focused quantitative selection without invoking more recent techniques of genetic assessment and manipulation. The goal of profitable and efficient meat production has been fulfilled; however, this vastly increased yield has come at a cost. As a direct consequence of their genetic make-up, modern broiler chickens and slaughter pigs are prone to a number of diseases and pathological conditions, such as lameness and cardiovascular problems. In addition, behavioural changes are seen, in particular, when comparing modern broiler strains with slower growing breeds. Some of these changes, such as decreased activity and increased panting, are a result of the massive increase in protein deposition seen in these birds. In order to obtain production animals with a high genetic potential for growth, the parent stock have to be in possession of these traits as well. However, in order to be able to breed, the hens and sows are fed restrictively for long periods of time during rearing and gestation, respectively. The level of restriction of these females corresponds to 30–50% of their *ad libitum* energy intake. In an evolutionary sense, modern pig and broiler strains are highly adapted to their very specific surroundings, where only the best (in terms of production potential, that is) are allowed to breed the next generation. Usually, however, we do not consider artificial selection as part of evolution, and if left to fend for themselves in more natural settings, these animals will fare very poorly. They are only superior when resources are plentiful, and cannot compete with ancestral conspecifics that are better adapted to more variable and at times harsh environments (Reznick *et al* 2000). The question remains, whether it is at all possible to achieve a high level of welfare for these production animals? More fibre is now included in the diets of broiler breeders and pregnant sows, with an aim to reduce hunger and prolong satiety; and breeding companies currently include more welfare-related traits, such as actively selecting against leg problems. But are these efforts too little too late, and do we have to start from scratch to be able to engage the full genetic diversity (Muir *et al* 2008)? This talk/paper will address these issues.

References

Muir WM, Wong GK-S, Zhang Y, Wang J, Groenen MAM, Crooijmans RPMA, Megens H-J, Zhang H, Okimoto R, Vereijken A, Jungerius A, Albers GAA, Lawley CT, Delany ME, MacEachern S and Cheng HH 2008 Genome-wide assessment of worldwide chicken SNP genetic diversity indicates significant absence of rare alleles in commercial breeds. *Proceedings of the National Academy of Sciences 105*: 17312-17317

Reznick D, Nunney L and Tessier A 2000 Big houses, big cars, superfleas and the cost of reproduction. *Trends in Ecology & Evolution 15*: 421-425

Affect and cognition: changes in husbandry and judgements of ambiguity in rats

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Emotional processes are an integral part of an animal's ability to adaptively respond to a changing internal and external world. In humans, for example, different emotions are associated with characteristic changes in certain cognitive processes, such as attention, judgements and memory; these changes can, in turn, be understood with reference to the functional nature of the associated affective state, and the circumstances which elicited it. If such co-variation, between emotion and cognition, extends to non-human animals, then by measuring changes in certain cognitive processes, we may develop useful proxy measures of non-human subjective emotion and, hence, welfare. A number of recent studies have begun to examine this proposal, and here we further develop the methodology of one of these paradigms, employing it to examine changes in non-human cognitive processing across treatments designed to manipulate emotional state. We trained 16 rats to press a lever when they heard a particular tone to receive two pellets of food, and to press a different lever when they heard a different tone to receive one pellet of food (a pilot study showed that rats prefer two pellets over one pellet). Once trained, the subjects underwent a series of counterbalanced treatments, and their response to (ambiguous) probe tones of a frequency different to those encountered in their training was recorded. In Experiment 1, unpredictable events, designed to be mildly stressful, were introduced to the husbandry regime of half the rats, with the regime of the other half remaining as before (ie 'predictable'); in Experiment 2, half the rats received extra 'environmental enrichments', whilst the remaining subjects had some of their pre-existing 'enrichments' removed. In both of these experiments it was hypothesised that subjects undergoing a treatment designed to induce a negative change in affect (ie the 'unpredictable' and 'unenriched' groups, respectively) would have a reduced tendency to respond to the probe tones as if judging them to be associated with the more preferred outcome (by pressing the relevant lever) — ie a reduced tendency to be 'optimistic'; such cognitive biases, across affect, are found in humans. The results did not support these hypotheses, at least not in simple terms and, instead, a complex pattern of treatment-related differences in response choice and latency was revealed; this may be understood with reference to affect-related changes in cognitive capacity, as well as cognitive selectivity (such as 'optimism'), and the implications of these findings for future work will be discussed.

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Veterinary intervention on wild elephants in Sri Lanka

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Sri Lanka is considered as one of the major 'biodiversity hot spots' in the world. Its biodiversity per unit land area is very much greater than in most countries in the Asian region. There are 91 species of mammal that have been recorded so far in the country. The elephant is the largest of them. There are around 4,000: (a tenth of the total Asian elephant population) free-ranging elephants in Sri Lanka. The subspecies, *Elephas maximus maximus*, is unique to the country. As the flagship species, conservation of the elephant is the major as well as challenging conservation task in the country. There are 6 wildlife veterinarians who work in the Department of Wildlife Conservation in Sri Lanka. They contribute much to the conservation of elephants: treating wounded and sick elephants; rehabilitation of orphan baby elephants; translocation of problematic and displaced elephants; conducting post mortems; conducting, and collaborating in health and other wildlife research; conducting health monitoring programmes and implementing preventive measures regarding disease outbreaks; supporting habitat enrichment activities; judiciary activities and public awareness. On average, four elephants per week undergo medical treatment. The majority are treated for wounds. The wounds are due to gunshots (83%), noose (6%), natural (4%) or others (7%). In addition, sick elephants and old animals with debility also undergo treatment. Due to habitat loss, fragmentation and disturbances, coupled with other man-made issues, every two to three days an elephant dies. The post mortems are conducted as part of the health monitoring activities. An average of 150–200 elephant post mortems are conducted per year. More than 90% of deaths are due human activities. Elephant translocations are common in Sri Lanka due to intense human-elephant conflict. Translocations are conducted mainly for rogue elephants. Physically disabled or wounded elephants and orphaned baby elephants, as well as elephants living in fragmented habitats, are also translocated where necessary. Around 20 elephants are translocated per year. The mortality rate associated with translocation is less than eight percent. The Elephant Transit Home is the place for orphan baby elephant rehabilitation. There are 57 elephants which have been able to be rehabilitated successfully. They were freed to the National Park and monitored using radio telemetry. Presently, 33 baby elephants are rehabilitating at the Transit Home.

Different selections, different responsibilities

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According to mainstream philosophical animal ethics, non-human animals deserve moral respect because of some of the properties they possess. For example, utilitarian animal ethics stresses the importance of animal capacities to experience suffering and pleasure (and interests connected to such capacities). According to this framework, moral status is granted by the characteristics animals have as individuals, irrespective of the reasons why they came into being. Whether an animal is 'spontaneously' born in the wild or the product of human breeding seems not to be of any particular moral meaning. But human relations with animals are *de facto* divided into two broad categories: relations with animals 'produced' by natural selection and relations with animals 'created' by human artificial selection. Since theoretical ethical concepts must incorporate human daily moral experience, the aim of our paper is to debate whether this difference is absolutely free of moral significance. From a theoretical point of view, we agree wholeheartedly with an individualistic concept of moral status whereby animals deserve respect for capacities they have as individuals, independent from the ancestry of their species. But it is questionable whether our responsibilities towards animals derive simply from this principle. We shall argue that the fact that some animals are a human 'product' is a reason to argue for a particular responsibility toward them. Furthermore, we shall outline the nature of this responsibility and the way in which it differs from human responsibility towards 'wild' animals. Finally, we will try to sketch how such a difference ought to effect the design and management of conservation in wild fauna. Since the responsibility we bear for laboratory animals is not the same as that for wild species, should we be using different concepts of animal welfare in these different contexts?

Play in the assessment of animal welfare: the importance of considering function

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In recent years there has been a shift in animal welfare research towards assessing positive welfare. Play is often cited as a candidate indicator for positive welfare. However, there is currently little evidence to support this assumption. To date, most research on play behaviour has focused specifically upon functional explanations. The ultimate function of any given behaviour can reveal much about an animal's motivation to perform it. Such motivations are central to the study of animal welfare. Here, we discuss the implications for welfare of the five main theories of the function of play: (i) development of motor and social skills; (ii) behavioural flexibility; (iii) social cohesion; (iv) surplus energy and; (v) alleviating boredom. Although predictions regarding the potential of play as a welfare indicator can be

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drawn from these respective theories, it is highly likely that play evolved through a combination of selective pressures that generated a suite of functionally distinct play types. Therefore, the motivation to play may differ depending on the type of play an animal is engaged in, the age of that animal, as well as the life history of that species. An important conclusion of this review is that more research is required to understand the association between play and affective state. The validity of play as an indicator of positive welfare will ultimately depend upon whether it is elicited by, or induces, a positive affective state in animals.

Pedigree dog breeding the UK: a major welfare concern?

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There is currently significant interest and concern regarding the welfare implications of UK pedigree dog breeding and showing practices. However, with 209 breeds currently registered by the UK Kennel Club, the situation is complex. A new independent report has been commissioned and produced by the RSPCA in order to help inform all those committed to protecting and improving the welfare of pedigree dogs. It addresses the impact of traditional selective breeding practices on pedigree dog welfare. Specifically, it focuses on welfare issues associated with exaggerated anatomical features and inherited disease. Whilst conclusions are centered on the specific situation in the UK, the report reviews what is well-recognised to be an international problem. As an independent report, its contents are the findings, views and conclusions of its authors and contributors, who are recognised experts in the fields of animal welfare science, genetics, epidemiology and veterinary science. The report contains a review of the scientific literature and proposes, in brief, possible ways to improve the welfare of pedigree dogs. The topics addressed within the report include: the problem and its cause; exaggerated anatomical features that reduce quality of life; increased prevalence of inherited disorders; and possible ways forward. This includes a list of 36 distinct actions, which have all been posed as possible routes forward (compiled by the authors from research findings, past reports and discussions with prominent experts in the field). Based on a quantitative survey of twenty experts, the authors derived the fourteen actions believed to hold the greatest potential value for improving pedigree dog welfare, which include:

• 'Systematic collection of morbidity and mortality data from all dogs';

• 'Revision of registration rules to prevent the registration of the offspring of any mating between first-degree and second-degree relatives';

• 'Open stud books to allow more frequent introduction of new genetic material into established breeds'; and

• 'Setting up systems to monitor the effectiveness of any interventions and changes in breeding strategies'.

It is hoped that this report will be seen as a constructive contribution to the current debate on the welfare of pedigree dogs and that it will help stimulate and focus essential, wider discussion amongst all relevant stakeholders in order to identify and implement practical, evidence-based, effective solutions.

The consequences of artificial selection of layer hens on their welfare in all current housing systems

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The modern domestic layer hen has been subject to artificial selection such that some strains now lay 300+ eggs per year. The size of the eggs relative to the size of the bird has also increased dramatically. Such selection for intense production may have direct consequences for the welfare of the hens (eg tearing of the cloaca during oviposition), and might also cause changes in their fundamental biology which affects their welfare indirectly (reduced calcium deposition weakening bones). Debate about hen welfare has focused predominantly on the effects of housing system, but here we present data that raise issues about hen welfare in *all* current housing systems. A total of 26 flocks representing conventional cages (6 CC), furnished cages (6 FC), barn (7 B) and free-range (7 FR) systems were studied and data collected in three ways. Each flock was visited three times throughout the laying period, producers returned a weekly questionnaire on welfare and husbandry and, at the end of lay, 100 hens from each flock underwent post-mortem examination. The physical condition of the birds at the end of the laying period was cause for concern, regardless of the housing system they were kept in. Thus, 25.5% of birds had medium or severe keel protusion indicating an emaciated body condition, despite the apparent presence of *ad libitum* food; 81.2% of birds had medium or severe vent or abdominal feather damage, with 9.4% of birds showing signs of vent pecking. Keel-bone fractures occurred in 55.7% of birds, with 19.7% of all birds sustaining fractures in the medium or severe category, indicating reduced musculoskeletal integrity. Between 1 and 2% of all eggs laid were bloodstained. Bloodstained eggs can occur because of mismatch between the size of the bird and the size of the egg, the occurrence of vent pecking, or chronic infection, any of which would be unlikely to happen if a bird laid only one clutch of eggs per season. It is argued that artificial selection for high productivity in modern layer hens is the primary cause of these welfare problems, which are only marginally influenced by the housing system.

This abstract is dedicated to the memory of Dr Sue Haslam.

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Behaviour of unhandled, British semi-feral ponies at simulated market facilities and their flight distance

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For centuries, British native ponies have been managed extensively in their natural habitats. They rarely come into close contact with humans, except when they are drifted annually to establish ownership and undergo welfare checks or when they are sold at livestock markets. This will be the first time they encounter handling, loading and confinement during transport. At markets, they will experience unloading, mixing with unfamiliar animals and close encounters with unfamiliar people. The aim of this study was to investigate the effects of mixing unfamiliar ponies at simulated market facilities and to assess flight distance to humans. Twenty Welsh Mountain Section-A fillies (1- to 2-year old) were penned, in familiar groups, at simulated market facilities (pens, raceway, enclosed sale ring). Ponies were driven to the sale ring in mixed or non-mixed pairs, driven around the sale ring and then moved into an after-sale pen (for at least 30 min). Their behaviour was monitored using overhead video-cameras (continuous observations and scans). Flight distance was assessed by approaching a group of familiar ponies or a focal pony (in a pair of familiar ponies). In both tests, the distance at which the group/focal pony started to move away from the experimenter was recorded. Data (of pairs of ponies) were analysed with non-parametric statistics (Mann-Whitney U or Kolmogorov-Smirnov test). Results showed that during movement in the sale ring, mixed ponies faced in the opposite direction from one another more frequently than non-mixed ponies ($P < 0.05$). In the after-sale pens, mixed ponies showed less investigatory behaviour ($P < 0.01$) and analysis of the movement of the animals showed that mixed ponies moved around the pen more frequently than non-mixed ponies ($P < 0.05$). Ponies in mixed pairs showed more aggression and retreats from aggressive behaviour (both $P < 0.05$) and chose to distance themselves from the other pony. Mixed pairs spent only 20% of the time in the same pen half, whereas this was approximately 80% for non-mixed pairs ($P < 0.01$). Flight distance for unhandled ponies in familiar groups was 2.0 (± 0.09) m and for individual ponies 2.2 (± 0.04) m. The results suggested that mixing unfamiliar ponies in the sale ring and after sale pens was aversive to them and caused social unrest. This can make handling more difficult. The flight distance has welfare implications for unhandled ponies at markets, where ponies are not able to distance themselves from the public.

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Questions in relation to natural and artificial selection and animal welfare

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Relevant questions in relation to natural and artificial selection and animal welfare are:

• Is the welfare of wild animals in nature guaranteed?

• What is the influence of artificial selection on animal welfare?

• Is it possible to improve welfare by selection?

• What do animals adapted to intensive husbandry systems look like?

(i) Wild animals in nature are, in general, in harmony with themselves and their environment. Stress in nature is mostly of the short-term variety whilst domestic animals operating under intensive husbandry conditions mostly experience chronic stress. Indeed, many domestic animals under intensive husbandry conditions have been said to be disturbed to a degree comparable to that of psychiatric patients. Never before throughout evolution have such animals had such high fitness; due to all kinds of artificial measurements in present intensive husbandry systems (van Rooijen 1983).

(ii) Domestication may have changed the genotype by: (a) conscious selection (as on production factors, ease of reproduction, tameness); (b) correlated responses to conscious selection; (c) unconscious selection (as on tameness); (d) genetic drift (especially in founder and other bottleneck effects); (e) absence of selection pressures (resulting in corresponding rudimentary structures) and; (f) hybridisation between subspecies (van Rooijen 1982). These changes may affect animal welfare. For instance, selection on production traits may create a situation whereby animals are no longer in harmony with themselves (for instance when larger egg size is not correlated with a larger cloaca). Correlated responses, such as increased aggression, may diminish welfare. Tameness may diminish the stress caused by the fight/flight reaction. Randomisation of genetic material may make animals more tolerant towards sexual partners or housing conditions. Hybridisation may result in animals with incompatible tendencies (for instance, for social and solitary behaviour).

(iii) The previous point, (ii), shows that a change in genotype may improve welfare. However, this approach is dangerous. For instance, selection for blindness in hens to prevent feather pecking makes the animals less in harmony with themselves (van Rooijen 1983).

(iv) In intensive husbandry, animals are kept under conditions that resemble the niches of internal parasites (constant temperature, regular food distribution, etc). Animals adapted to intensive husbandry conditions will, therefore, look like internal parasites. Such an adaptation damages the integrity of the animals (van Rooijen 1983).

References

van Rooijen J 1982 The value of choice tests in assessing welfare of domestic animals. *Applied Animal Ethology 8*: 295-299

van Rooijen J 1983 Genetic adaptation and welfare. *International Journal for the Study of Animal Problems 4*: 191-197