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SPRING 2019 ISSUE 5

THE AUSTRALIAN VETERINARIAN MAGAZINE

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MANAGING AGGRESSIVE DOG BEHAVIOUR

AGGRESSIVE BEHAVIOUR IN PET DOGS IS A SERIOUS PROBLEM FOR DOG OWNERS ACROSS THE WORLD, WITH BITE INJURIES REPRESENTING A SERIOUS RISK TO BOTH PEOPLE AND OTHER DOGS.

New research by the University of Bristol has explored the factors that influence how owners manage aggressive behaviour in their dogs. The study found that clinical animal behaviourists should focus on helping dog owners to feel confident in the effectiveness of the behaviour modification techniques that they recommend and, in their ability, to actually use them successfully.

Dogs are the most popular pet in the UK, with 31 per cent of households owning one or more dogs. However, the majority of dog owners report some aspect of their pet's behaviour problematic, or mention behavioural disorders as the main reason dogs are given to rehoming organisations.

The aim of the study was to find out what influences an owner's decision to use outdated punishment-based methods and what the barriers and drivers were to dog owners using positive reinforcement-based solutions. In particular, the researchers wanted to explore whether theoretical models and psychological concepts used in other contexts could help them to understand this issue.

Current evidence suggests that positive reinforcement-based behaviour modification techniques are both humane and effective in the treatment of aggressive behaviour in dogs and that the use of punishment-based techniques are likely to be detrimental to the welfare of the dog and can lead to an increase in aggression. However, many dog owners continue to use punishment-based techniques in an attempt to inhibit this problematic behaviour.

The research found owners' perceptions of how effective the behaviour modification techniques are and how effectively they feel they can apply them are key factors predicting their current and future use.

Although a lot of attention has been focused on the consequences to the dog of using certain training techniques, this is the first-time research has systematically examined the factors influencing an owner's choice of training technique, as well as the impact of this behaviour upon the owners of these dogs.

Dr Emily Blackwell, Director of Companion Animal Population Health at the Bristol Veterinary School, said "Our findings highlight the need for behaviourists to offer practical support to owners, to demonstrate the effectiveness of reward-based training and to provide them with an opportunity to practice under expert guidance, so that they feel confident in their ability to use the techniques before attempting to apply them independently.

"The study also shows the emotional impact that attempting to manage a reactive dog can have, with its associated ups and downs. It is therefore important for practitioners to consider the wellbeing of the owner as well as the dog, including the potential implications of this, when helping them along their journey."

Dr Emma Williams, VC Fellow in Digital Innovation and Wellbeing in the School of Psychological Science, added "The majority of research on companion animal behaviour has focused on the behaviour of the animal itself, rather than the behaviour of the owner. We believe this is the first time that psychological theories exploring how people respond to threatening situations, such as Protection Motivation Theory, have been applied to understand people's interactions with their pets."

The study has identified the potential for extreme negative emotional responses and feelings of failure experienced by owners when their dog reacts badly towards another person or dog. This provides a foundation from which, in the future, research can further explore the influence of different psychological factors on an owner's decision to use positive reinforcement techniques to manage their dog's aggressive behaviour.

This research will be built on by designing and testing improved communications-based interventions that encourage engagement with positive reinforcement-based techniques across different groups of dog owners and the various practitioners who work with them.

"The study also shows the emotional impact that attempting to manage a reactive dog can have, with its associated ups and downs. It is therefore important for practitioners to consider the wellbeing of the owner as well as the dog, including the potential implications of this, when helping them along their journey" Dr Emily Blackwell

Journal Reference:
Emma J. Williams, Emily Blackwell. Managing the Risk of Aggressive Dog Behaviour: Investigating the Influence of Owner Threat and Efficacy Perceptions. Risk Analysis, 2019; DOI: 10.1111/risa.13336

DOGS MIRROR OWNER'S STRESS

The levels of stress in dogs and their owners follow each other, according to a new study from Linköping University, Sweden. The scientists believe that dogs mirror their owner's stress level, rather than vice versa. The study has been published in the scientific journal Scientific Reports.

Researchers at Linköping University have examined how stress levels in dogs are influenced by lifestyle factors and by the people that the dogs live with. Previous work has shown that individuals of the same species can mirror each others' emotional states. There is, for example, a correlation between long-term stress in children and in their mothers. The recently published study arose from scientists speculating whether similar mirroring of stress levels over long time periods can also arise between species, such as between the domesticated dog and humans. The researchers determined stress levels over several months by measuring the concentration of a stress hormone, cortisol, in a few centimetres of hair from the dog and from its owner.

"We found that the levels of long-term cortisol in the dog and its owner were synchronised, such that owners with high cortisol levels have dogs with high cortisol levels, while owners with low cortisol levels have dogs with low levels," says Ann-Sofie Sundman of the Department of Physics, Chemistry and Biology (IFM) at LiU, principal author of the study and newly promoted doctor of ethology.

The study examined 25 border collies and 33 Shetland sheepdogs, all of them owned by women. The owners and the dogs provided hair samples on two occasions separated by a few months. Since physical activity can increase cortisol levels, the researcher also wanted to compare companion dogs with dogs that competed in obedience or agility. The physical activity levels of the dogs were therefore recorded for a week using an activity collar.

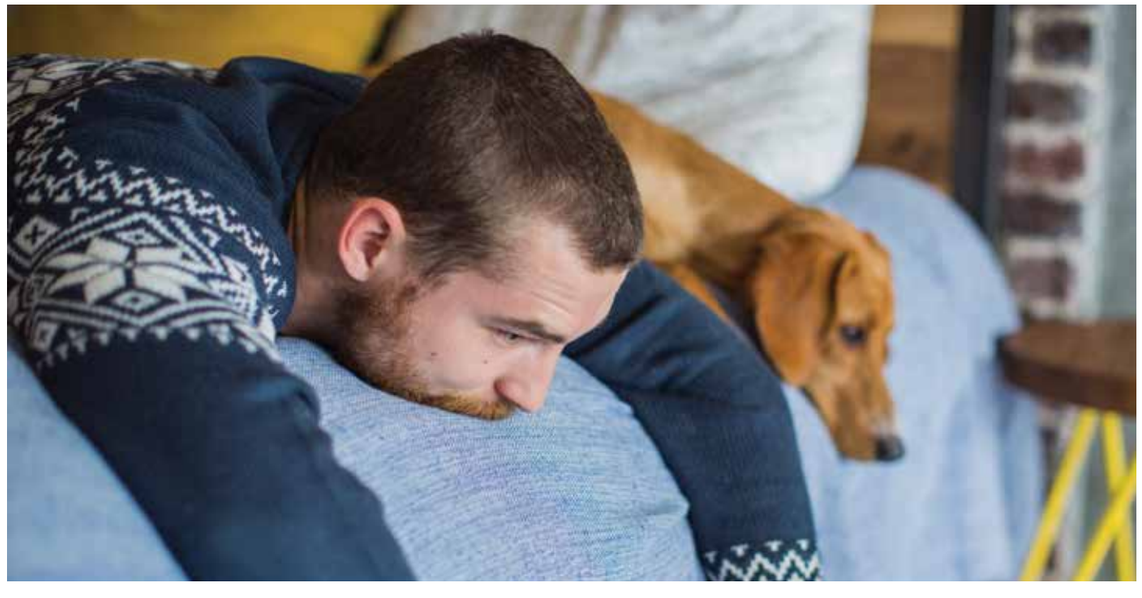
Previous research has shown that levels of short-term cortisol in saliva rise in a synchronous manner in both the dog and its owner when they compete together. The study presented here, in contrast, found that physical activity in dogs does not affect the long-term cortisol in their hair. On the other hand, the stress level of competing dogs seems to be linked more strongly with that of the owner. The scientists speculate that this may be associated with a higher degree of active interaction between the owner and the dog when they train and compete together.

The dog owners were also asked to complete two validated questionnaires related to their own and their dog's personality. The researchers investigated whether stress levels are correlated with personality traits.

"Surprisingly enough, we found no major effect of the dog's personality on long-term stress. The personality of the owner, on the other hand, had a strong effect. This has led us to suggest that the dog mirrors its owner's stress," says senior lecturer Lina Roth, also at IFM, and principal investigator for the study.

The result suggests that the match between an owner and a dog affects the dog's stress level. Further studies are, however, needed before we can draw any conclusions about the cause of the correlation. The researchers are now planning to study other breeds. Both the border collie and the Shetland sheepdog are herding dogs, which have been bred to collaborate well with humans and respond accurately and quickly to signals. The research group is planning to investigate whether a similar synchronisation takes place between dogs and humans in, for example, hunting dogs, which have been trained to be independent. Another line of research will look at whether the sex of the owner plays a role.

"If we learn more about how different types of dog are influenced by humans, it will be possible to match dog and owner in a way that is better for both, from a stress-management point of view. It may be that certain breeds are not so deeply affected if their owner has a high stress level," says Lina Roth.



ANIMALS' BRAIN ACTIVITY 'SYNCS' DURING SOCIAL INTERACTIONS

Egyptian fruit bats and mice, respectively, can 'sync' brainwaves in social situations. The synchronization of neural activity in the brains of human conversation partners has been shown previously, as a result of one person picking up social cues from the other and modulating their own behaviour based on those cues. These studies suggest that something similar occurs when animals engage in natural social interactions.

Two papers published in the journal Cell show that Egyptian fruit bats and mice, respectively, can "sync" brainwaves in social situations. The synchronization of neural activity in the brains of human conversation partners has been shown previously, as a result of one person picking up social cues from the other and modulating their own behaviour based on those cues. These studies now suggest that something similar occurs when animals engage in natural social interactions and find that some aspects of the animals' social behaviour can be predicted based on neural observations.

"Animal models are really important for being able to study brain phenomena at levels that we can't normally access in humans," says Michael Yartsev of the Department of Bioengineering at the University of California, Berkeley, and senior author of one of the papers. "Because bats are extremely social and naturally live in highly complex social environments, they are a great model for tackling important scientific questions about social behaviour and the neural mechanisms underlying it."

"If you think of the brain like a black box that receives input and gives some kind of output in response, studying social interactions is like trying to understand how the output of one box provides input to another, and how those two boxes work together and create a loop," says Weizhe Hong of the Departments of Biological Chemistry and Neurobiology at the University of California, Los Angeles, and senior author of the other paper. "Our research in mice allows us to peer inside these black boxes and get a better look at the internal machinery."

Previous studies showing how neural activity in humans becomes synchronized during social interactions have used technologies like fMRI and EEG, which look at brain activity with relatively coarse spatial and temporal resolutions. These studies found that when two people interact, structures in their brain simultaneously decode and respond to signals from the other person.

Because the new studies looked at neural activity at a level of detail that is difficult to obtain in humans, they could explore the detailed neural mechanism underlying this phenomenon.

The Berkeley team monitored the bats for sessions of about 100 minutes each as they engaged in a wide range of natural social interactions, such as grooming, mating, and fighting. The bats were filmed with high-speed cameras, and their specific behaviours and interactions were carefully characterized.

As this was happening, the scientists were using a technology called wireless electrophysiology to simultaneously record the brain activity in the bats' frontal cortices across a wide range of neural signals, ranging from brain oscillations to individual neurons and local neural populations. They saw that the brains of different bats became highly correlated and that this correlation was most pronounced in the high-frequency range of brain oscillations. Furthermore, the correlation between the brains of individual bats extended across multiple timescales of social interactions, ranging from seconds to hours. Remarkably, by looking at the level of correlation, they could predict whether the bats would initiate social interactions or not.

The UCLA team took a different tack. They used a device called a miniaturized microendoscope to monitor the brain activities of mice during social situations. These tiny devices, which weigh only two grams, are fitted on the mice and allow the researchers to monitor the activity of hundreds of neurons at the same time in both animals. They saw that mice also exhibit interbrain correlations in natural social interactions where animals freely interact with each other. Moreover, the access to thousands of individual neurons gave them an unprecedented view of both animals' decision-making processes and revealed that interbrain correlation emerges from different sets of neurons that encode one's own behaviour and behaviour of the social partner.

Social interactions are often nested within the context of a dominance hierarchy. By imaging two mice in a competitive social interaction, they discovered that behaviour of the dominant animal drives synchrony more strongly than behaviour of the subordinate animal. Remarkably, they also found that the level of correlation between two brains predicts how mice will respond to each other's behaviour as well as the dominance relationships that develop between them.

"Natural social interactions are complex," says Wujie Zhang, a postdoctoral researcher in Yartsev's lab and first author of the fruit bat paper. "It is important to embrace this complexity in order to understand real-life social interactions at the neural level."

"We know that social interactions are altered in many mental diseases in human, including autism spectrum disorders and schizophrenia," says Lyle Kingsbury, a graduate student in Hong's lab and first author of the mouse paper. "Developing a genetically tractable model system opens up the possibility of exploring how interbrain synchrony is disrupted in people with these conditions and may provide novel information about possible interventions."

Journal References:

Wujie Zhang, Michael M. Yartsev. Correlated Neural Activity across the Brains of Socially Interacting Bats. Cell, 2019; DOI: 10.1016/j.cell.2019.05.023
Lyle Kingsbury, Shan Huang, Jun Wang, Ken Gu, Peyman Golshani, Ye Emily Wu, Weizhe Hong. Correlated Neural Activity and Encoding of Behaviour across Brains of Socially Interacting Animals. Cell, 2019; DOI: 10.1016/j.cell.2019.05.022

THE EVOLUTION OF PUPPY DOG EYES

Dogs have evolved new muscles around the eyes to better communicate with humans. New research comparing the anatomy and behaviour of dogs and wolves suggests dogs' facial anatomy has changed over thousands of years specifically to allow them to better communicate with humans.

In the first detailed analysis comparing the anatomy and behaviour of dogs and wolves, researchers found that the facial musculature of both species was similar, except above the eyes. Dogs have a small muscle, which allows them to intensely raise their inner eyebrow, which wolves do not.

The authors suggest that the inner eyebrow raising movement triggers a nurturing response in humans because it makes the dogs' eyes appear larger, more infant like and also resembles a movement humans produce when they are sad.

The research team, led by comparative psychologist Dr Juliane Kaminski, at the University of Portsmouth, included a team of behavioural and anatomical experts in the UK and USA.

It is published in the journal Proceedings of the National Academy of Sciences (PNAS).

Juliane said "The evidence is compelling that dogs developed a muscle to raise the inner eyebrow after they were domesticated from wolves.

"We also studied dogs' and wolves' behaviour, and when exposed to a human for two minutes, dogs raised their inner eyebrows more and at higher intensities than wolves.

"The findings suggest that expressive eyebrows in dogs may be a result of humans unconscious preferences that influenced selection during domestication. When dogs make the movement, it seems to elicit a strong desire in humans to look after them. This would give dogs, that move their eyebrows more, a selection advantage over others and reinforce the 'puppy dog eyes' trait for future generations."

Dr Juliane Kaminski's previous research showed dogs moved their eyebrows significantly more when humans were looking at them compared to when they were not looking at them.

She said "The AU101 movement is significant in the human-dog bond because it might elicit a caring response from humans but also might create the illusion of human-like communication."

Lead anatomist Professor Anne Burrows, at Duquesne University, Pittsburgh, USA, co-author of the paper, said "To determine whether this eyebrow movement is a result of evolution, we compared the facial anatomy and behaviour of these two species and found the muscle that allows for the eyebrow raise in dogs was, in wolves, a scant, irregular cluster of fibres.

"The raised inner eyebrow movement in dogs is driven by a muscle which doesn't consistently exist in their closest living relative, the wolf.

"This is a striking difference for species separated only 33,000 years ago and we think that the remarkably fast facial muscular changes can be directly linked to dogs' enhanced social interaction with humans."

Dr Juliane Kaminski and co-author, evolutionary psychologist Professor Bridget Waller, also at the University of Portsmouth, previously mapped the facial muscular structure of dogs, naming the movement responsible for a raised inner eyebrow the Action Unit (AU) 101.

Professor Bridget Waller said "This movement makes a dogs' eyes appear larger, giving them a childlike appearance. It could also mimic the facial movement humans make when they're sad.

"Our findings show how important faces can be in capturing our attention, and how powerful facial expression can be in social interaction."

Co-author and anatomist Adam Hartstone-Rose, at North Carolina State University, USA, said "These muscles are so thin that you can literally see through them - and yet the movement that they allow seems to have such a powerful effect that it appears to have been under substantial evolutionary pressure. It is really remarkable that these simple differences in facial expression may have helped define the relationship between early dogs and humans."

Co-author Rui Diogo, an anatomist at Howard University, Washington DC, USA, said "I must admit that I was surprised to see the results myself because the gross anatomy of muscles is normally very slow to change in evolution, and this happened very fast indeed, in just some dozens of thousands of years."

Soft tissue, including muscle, doesn't tend to survive in the fossil record, making the study of this type of evolution harder. The only dog species in the study that did not have the muscle was the Siberian husky, which is among more ancient dog breeds.

An alternative reason for the human-dog bond could be that humans have a preference for other individuals which have whites in the eye and that intense AU 101 movements exposes the white part of the dogs eyes. It is not known why or precisely when humans first brought wolves in from the cold and the evolution from wolf to dog began, but this research helps us understand some of the likely mechanisms underlying dog domestication.

Journal Reference:

Juliane Kaminski, Bridget M. Waller, Rui Diogo, Adam Hartstone-Rose, Anne M. Burrows. Evolution of facial muscle anatomy in dogs. Proceedings of the National Academy of Sciences, June 17, 2019; DOI: 10.1073/pnas.1820653116

DIABETES CAN BE DETECTED IN GUT OF CATS

The cat is the only animal, aside from humans and primates, which spontaneously develops type 2 diabetes. Therefore, researchers are interested in studying how diabetes develops in cats in order to learn more about the disease in general.

Now an interdisciplinary team of researchers from the University of Copenhagen have come a step closer to understanding the disease by studying it in cats. The new study shows that the composition of gut bacteria in cats suffering from diabetes is different from the composition seen in healthy cats.

'We can tell that the diversity of gut bacteria is reduced in cats with diabetes. The same has been detected in humans, and there thus appear to be more similarities in diabetes across species than previously assumed. In fact, our results disprove another, smaller study', says PhD Student Ida Nordang Kieler from the Department of Veterinary Clinical Sciences.

Interdisciplinarity Strengthens the Results

The researchers have studied 82 cats from Denmark and Switzerland, and as there were no differences between the two populations, the results thereby relate to diabetes and not the origin or lifestyle of the cats. At the same time, they have received interdisciplinary input from researchers in other fields.

'We would not have been able to complete this study without interdisciplinary collaboration. It has really strengthened our results that we have been able to get feedback in the process and develop the study design together with experts from different fields', says Professor Charlotte Reinhard Bjørnvad from the Department of Veterinary Clinical Sciences.

The researchers have collaborated with leading researchers from the Novo Nordisk Foundation Center for Basic Metabolic Research and the Natural History Museum of Denmark. The collaboration provided the veterinary experts with valuable ideas on genetics across species as well as gut bacteria and diabetes in humans.

Bacteria Library for Cats

In the future, the researchers hope to be able to use studies like this one to better understand and treat diabetes in cats, while perhaps at the same time enhancing our knowledge of glucose metabolism and diabetes in humans. Because some uncertainties are easier to control in animal tests, Charlotte Reinhard Bjørnvad explains.

'We hope that more researchers want to collaborate on studying diabetes in cats, because in some respects these studies are easier to control than studies involving humans. You can control the nutrition of the cats meticulously and thus remove any disturbing elements and, with fewer animals, get more stable results', she elaborates.

In addition, the researchers are now trying to establish a complete library of intestinal bacteria in cats, a type of encyclopedia for researchers studying cats. Such libraries are already available for humans and dogs. To do so they will continue to collaborate with the researchers from the Natural History Museum of Denmark.

Journal Reference:

Ida Nordang Kieler, Melania Osto, Leoni Hugentobler, Lara Puetz, M. Thomas P. Gilbert, Torben Hansen, Oluf Pedersen, Claudia E. Reusch, Eric Zini, Thomas A. Lutz, Charlotte Reinhard Bjørnvad. Diabetic cats have decreased gut microbial diversity and a lack of butyrate producing bacteria. Scientific Reports, 2019; 9 (1) DOI: 10.1038/s41598-019-41195-0

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GENE-EDITED CHICKEN CELLS RESIST BIRD FLU VIRUS

Bird flu is a major threat to farmed chickens worldwide, with severe strains killing up to 100 per cent of birds in a flock. In rare instances, certain variations of the virus can infect people and cause serious illness. Efforts to control the spread of the disease are urgently needed.

Scientists have used gene-editing techniques to stop the virus from spreading in chicken cells grown in the lab.

The findings raise the possibility of producing gene-edited chickens that are resistant to the disease.

Preventing hijacking by flu viruses

Scientists prevented the virus from taking hold by deleting a section of chicken DNA inside lab-grown cells.

They targeted a specific molecule inside chicken cells called ANP32A. Researchers at Imperial College London found that during an infection, flu viruses hijack this molecule to help replicate themselves. Working with experts from the Roslin Institute, the researchers used gene-editing techniques to remove the section of DNA responsible for producing ANP32A.

They found the virus was no longer able to grow inside cells with the genetic change. The next step will be to try to produce chickens with the genetic change. No birds have been produced yet, the team says.

The study was funded by the UK Government's Biotechnology and Biological Sciences Research Council. PhD student funding was provided by the global poultry research company Cobb-Vantress. The research is published in the journal "eLife".

The smallest possible genetic change

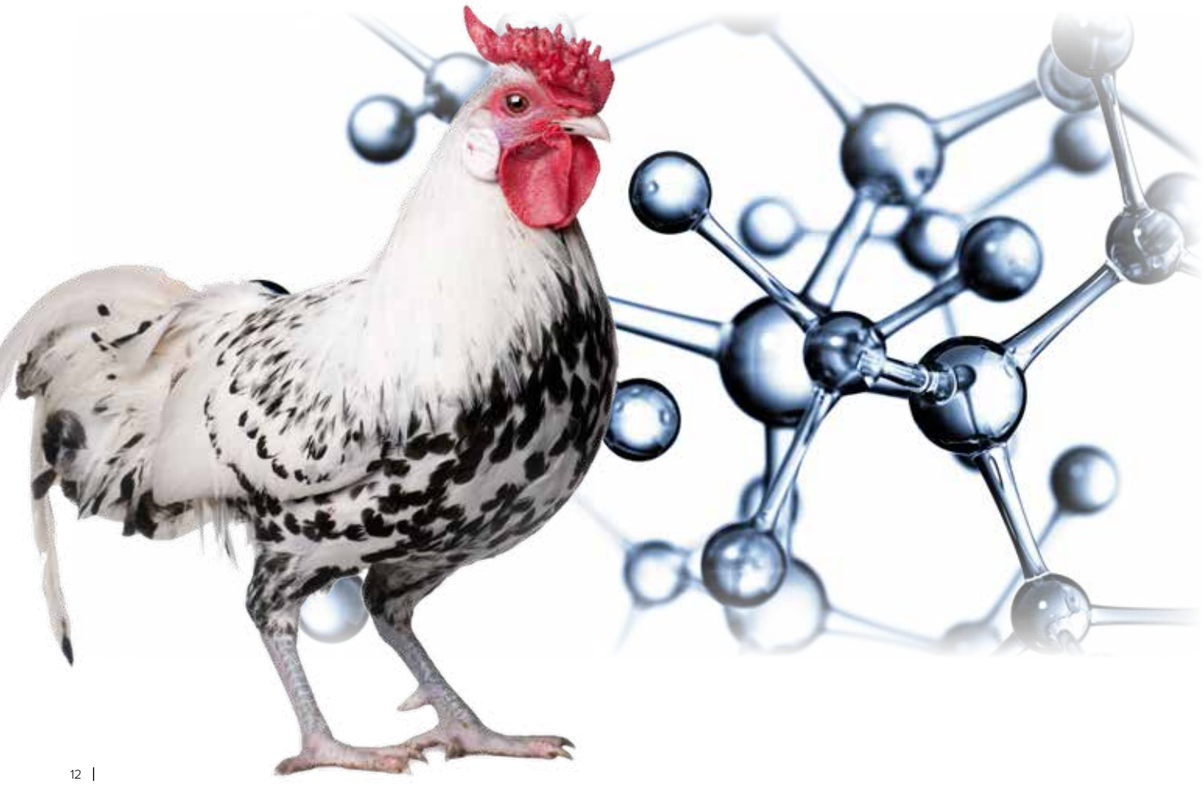
"This is an important advance that suggests we may be able to use gene-editing techniques to produce chickens that are resistant to bird flu. We haven't produced any birds yet and we need to check if the DNA change has any other effects on the bird cells before we can take this next step." Dr Mike McGrew, Group Leader, Roslin Institute

"We have long known that chickens are a reservoir for flu viruses that might spark the next pandemic. In this research, we have identified the smallest possible genetic change we can make to chickens that can help to stop the virus taking hold. This has the potential to stop the next flu pandemic at its source." Professor Wendy Barclay, Chair in Influenza Virology, Imperial College London

"Avian influenza resistance in broiler production is of global significance and this research is an important step toward that goal. It is exciting for Cobb to be a part of exploring new technologies that could be used to advance poultry breeding in the future." Rachel Hawken, Senior Director of Genomics and Quantitative Genetics, Cobb-Vantress

Previous research

Researchers at the Roslin Institute previously worked with experts from Cambridge University to produce chickens that did not transmit bird flu to other chickens following infection, using genetic modification techniques. The new approach is different because it does not involve introducing new genetic material into the bird's DNA.



KOALA DRINKING STATIONS CAN REDUCE IMPACT OF CLIMATE CHANGE

New research shows the koala will supplement its water needs from free-standing sources, raising hope that drinking stations can be an important strategy to support this and other species from the impacts of climate change.

A long-held view that koalas get all their hydration from eating leaves has been overturned by new research published today from Dr Valentina Mella and colleagues at the University of Sydney.

The study in PLOS ONE offers hope in the fight to conserve this threatened species, with researchers finding that koalas will regularly use artificial water stations, particularly during hot and dry conditions.

"Drinking stations could help koalas during heat and drought events and might help mitigate the effects of climate change," said Dr Mella from the School of Life and Environmental Sciences.

Dr Mella also said drinking stations could prove a useful strategy to support other arboreal folivores such as gliders and possums in Australia and sloths, lemurs and some monkeys on other continents.

Koala populations along Australia's east coast have been declining due to lost habitat from deforestation, diseases such as chlamydia, attacks from feral animals, fire and vehicle collisions.

The Australian Department of Environment estimates that combined koala populations in Queensland and New South Wales declined from 326,400 in 1990 to 188,000 in 2010, a drop of 42 percent.

However, koalas are also particularly vulnerable to the effects of climate change, suffering heat stress, Dr Mella said, and because the trees they rely on are affected by temperature and rainfall change.

Koalas can't simply eat more leaves to compensate for reduced water content in their favourite food. This is because koalas are limited in their food intake by leaf toxins.

"It is predicted that increased CO2 emissions will increase the level of phenolics and tannins in eucalyptus leaves," Dr Mella said. "This means koalas will need alternative strategies to find water - and that's where we can help with drinking stations."

Dr Mella has been conducting field work in Gunnedah in western NSW where, in 2009, a heat wave killed an estimated quarter of Gunnedah's koala population.

"We weren't sure if the water stations could be used to mitigate the impact of extreme weather events," Dr Mella said. "But our results clearly show koalas will regularly use these stations to supplement their water needs."

During the first 12 months of the study, Dr Mella and her team recorded 605 visits to 10 pairs of water stations, with 401 of these visits resulting in koalas drinking.

They found that the total number of visits and total time drinking doubled during summer compared to other seasons.

"Frequent access to water may be fundamental for koalas to assist thermoregulation when temperatures are high," Dr Mella said.

Initial findings about koalas' drinking behaviour were announced in 2017 with videos that showed widespread use of water by the iconic mammals, particularly during drier periods.

The release of these findings prompted a successful fundraising campaign at the University to support further research into koala conservation that raised more than $150,000.

Dr Mella's study has influenced the direction of state and national koala research, with water supplementation adopted by the NSW Office of Environment and Heritage, included as a specific feature of the NSW Koala Research Strategy and used by the North West Local Land Services as a central concept to koala management on private properties.

These results also prompted Campbelltown council in Adelaide to install drinking stations for koalas.

"We need to monitor how effective these are - as the stations can also attract feral animals and predators. Fortunately, we haven't seen any deaths from predators near the drinking stations in Gunnedah," Dr Mella said.

To mitigate this risk, her team has now developed drinking stations that are inaccessible to ground-based predators.

"Our next steps will be to see if disease, such as chlamydia, influences koala drinking behaviour," Dr Mella said. "And we will also monitor individual koalas to examine these drinking behaviours over a longer time period."

BEHAVIOURAL CORRELATIONS OF THE DOMESTICATION SYNDROME ARE DECOUPLED IN MODERN DOG BREEDS

Scientists since Darwin have been intrigued by the simultaneous alteration of multiple morphological, physiological and behavioural traits across a wide range of domesticated animals, such as horses, pigs and dogs. For instance, reduced brain size, floppy ears, increased docility and hormonal changes are commonly seen in domesticated animals but not their wild ancestors. This phenomenon is known as the domestication syndrome, and the traits within this syndrome are assumed to change together in a correlated fashion during domestication. But surprisingly, whether or not any of these traits are in fact correlated has never been formally tested.

A new study published in Nature Communications by a team of researchers from Stockholm University used behavioural data from more than 76,000 dogs, to test the hypothesis that key behaviours in the domestication syndrome are correlated. Domesticated animals are more social and playful, and less aggressive and fearful than their wild counterparts. Because domestication drives behavioural change in which aggression and fearfulness decrease while sociability and playfulness increase, there is an expectation that behavioural alterations during domestication are correlated in a direction-specific manner. For instance, we should expect sociability to be positively correlated with playfulness, but negative correlated with aggression and so forth. These assumed correlational patterns were exactly what the researchers tested in dogs.

The dataset of 76,158 dogs came from the Swedish Kennel Clubs database and consisted of dogs that had completed the Dog Mental Assessment, a behavioural test that thousands of Swedish dogs go through every year. In this test, behavioural responses to varying kinds of stimuli are assessed under standardized conditions, and among these responses are the behaviours in the domestication syndrome; aggression, fearfulness, sociability and playfulness. With this dataset the researchers had a unique opportunity to test the domestication syndrome hypothesis on an extraordinary large sample size of dogs.

The 78 dog breeds in the study, which ranged from Akitas to Chihuahuas to Mastiffs, were divided into ancient and modern breeds. Ancient breeds belong to a small group of dogs in which wolf genes can still be detected, and this breed group is believed to have an origin approximately 500 years ago. Modern breeds, which make up the majority of present-day dog breeds, have no detectable wolf component and an origin less than 200 years ago. This division of breeds representing early and late stages of dog domestication allowed the researchers to test the domestication syndrome hypothesis on a temporal evolutionary scale.

“Surprisingly, we found that the correlations among behaviours varied between dog breeds representing early and late stages of domestication. The expected correlations among our measured behaviours are generally strong in ancient breeds, such as Siberian Huskies and Alaskan Malamutes, but several of these correlations are weak or gone in the modern breeds, such as Golden Retrievers and Dalmatians,” says Christina Hansen Wheat from Stockholm University. This difference between ancient and modern breeds suggests that the behaviours of the domestication syndrome have been decoupled during dog domestication. This decoupling could be caused by a recent shift in selection pressures in modern dog breeds for highly breed-specific traits, such as colour, coat structure or specific behaviours. Importantly, this means that domestication-related behaviours can be selected upon independently in modern dog breeds. With the recent increased focus on animal domestication, and the domestication syndrome in particular, this study provides new insight that invites for a re-evaluation of our expectations to how domestication affects behaviour.

DOG DNA FIND COULD AID BREATHING PROBLEMS

Scientists have discovered a DNA mutation linked to breathing problems in popular dog breeds.

Breathing difficulties are most often associated with flat-faced breeds, such as French bull dogs and pugs, but scientists have found the mutation is also carried by Norwich terriers, which have proportional noses.

The finding could inform future genetic tests that could help vets identify animals at risk, and help breeders avoid producing affected pups.

Health problem French bulldogs are the most popular dog breed in the UK but underneath their prized features can lie a life-threatening health problem.

The breed - and others such as English bulldogs and pugs - is commonly affected by a condition called Brachycephalic Obstructive Airway Syndrome - or BOAS - which leaves dogs gasping for breath.

DNA mutation Scientists had thought their short faces were the only explanation for their breathing problems, however, Norwich terriers suffer from a similar breathing problem called Upper Airway Syndrome, despite having proportional noses.

A team led by The Roslin Institute analysed DNA from more than 400 Norwich terriers. Vets also carried out clinical examinations of the dogs to check their airways for signs of disease.

The researchers pinpointed a DNA mutation in a gene called ADAMTS3, which is not linked to skull shape and has previously been found to cause fluid retention and swelling.

The mutated version of the gene was also common in French and English bulldogs, which may help to explain why some dogs of these breeds develop breathing problems and complications after surgery to treat them.

Fluid retention Researchers say their findings shift our understanding of breathing problems in dogs. They suggest fluid retention in the tissue that lines the airways could make it more likely that dogs with the mutation will develop breathing problems.

The study, published in PLOS Genetics, also involved experts from the Royal Veterinary College and the University of Bern in Switzerland.

BOAS is a complex disease. Although skull shape remains an important risk factor, our study suggests that the status of ADAMTS3 should be considered as well. More studies are needed to dissect the complex nature of this devastating disease.

BRAINS OF BIRDS SYNCHRONISE WHEN THEY SING DUETS

When a male or female white-browed sparrow-weaver begins its song, its partner joins in at a certain time. They duet with each other by singing in turn and precisely in tune. A team led by researchers from the Max Planck Institute for Ornithology in Seewiesen used mobile transmitters to simultaneously record neural and acoustic signals from pairs of birds singing duets in their natural habitat. They found that the nerve cell activity in the brain of the singing bird changes and synchronizes with its partner when the partner begins to sing. The brains of both animals then essentially function as one, which leads to the perfect duet.

White-browed sparrow-weavers (Plocepasser mahali) live together in small groups in trees in southern and eastern Africa. Each bird has a roosting nest with an entrance and an exit. The dominant pair will have a breeding nest which is easily recognisable by the fact that one passage is closed to prevent eggs from falling out. In addition to the dominant pair, there are up to eight other birds in the group that help build nests and raise the young. All group members defend their territory against rival groups through duets of the dominant pair and choruses together with the helpers.

White-browed sparrow-weavers are one of the few bird species that sing in duet. It was assumed that some cognitive coordination between individuals was required to synchronise the syllables in the duet, however the underlying neuronal mechanisms of such coordination were unknown.

Miniature transmitters enable recording under natural conditions

"White-browed sparrow-weavers cannot develop their complex social structure in the laboratory. We were therefore only able to investigate the mechanisms of the duet singing in the natural habitat of the birds," says Cornelia Voigt, one of the three lead authors of the study. Because of this, researchers and technicians at the Max Planck Institute for Ornithology in Seewiesen developed mobile microphone transmitters to record the singing in the wild. These weigh only 0.6 g and were attached to the bird like a backpack.

With another newly developed transmitter, weighing only 1g, the scientists could also make a synchronous record of the brain activity in the birds while they were singing in their natural environment. An antenna placed near the birds' tree recorded up to eight of these signals in parallel. With the help of an external sound card and a laptop, the singing and the brain signals were synchronously recorded with millisecond precision. "The technology we have developed must withstand the extreme conditions of the Kalahari Savannah in northern South Africa," says Susanne Hoffmann, a scientist in the Department of Behavioural Neurobiology. "The electronics for recording the signals were stored in a car. During the day, it got so hot that the laptop almost began to glow. But the recordings all worked well, even when the birds and their transmitters were caught in one of the few downpours."

Brain activity of the duetting birds synchronizes

Lisa Trost, also a scientist in the department, says: "Fortunately, the procedure for fixing the implants for neuronal measurements on the heads of the birds did not take long. After complete recovery, the respective bird was quickly returned to the group and did not lose its social status. All birds sang in the tree immediately after their return." The researchers recorded almost 650 duets. In many cases, the males began with the song and the partner joined in after some introductory syllables. The syllables between the duetting pair followed each other without delay and in perfect coordination. The coordination was so precise that analysis showed only a 0.25s delay between the duetting partners' singing bouts.

The singing of songbirds is controlled by a network of brain nuclei, the vocal control system. In one of these nuclei, the HVC, the call of the partner bird triggers a change in neuronal activity in the bird that began singing. This, in turn, affects its own singing. The result is a precise synchronization of the brain activity of both birds. "The rhythmic duet of the individuals is achieved through sensory information that comes from the partner," says Manfred Gahr, who led the study. The brains of the partners form a network that functions like an extended circuit to organize the temporal pattern for the duet. The researchers suspect that similar mechanisms are also responsible for coordinating movement during social interactions in humans (e.g. dancing with a partner).

"Until now, this kind of study has only been performed in the laboratory. Measuring the activity of nerve cells in the field using wireless transmitters is much less stressful for the birds," says Susanne Hoffmann. "We hope this study has laid the foundation for the further development of neuroethology."

OMEGA-3 FATTY ACID SUPPLEMENTS, HYPOTHYROIDISM COULD LOWER RISK OF T-ZONE LYMPHOMA IN DOGS

Dogs that receive omega-3 fatty acid supplements or have hypothyroidism may be less likely to develop T-zone lymphoma (TZL). Those are two findings from Morris Animal Foundation-funded researchers at Colorado State University, who studied associations of environment and health history of the disease among golden retrievers. They published their results in the Journal of Veterinary Internal Medicine.

"Although controlled prospective studies would be necessary to firmly establish protection by omega-3 fatty acids, our observations raise the possibility of a simple intervention that may help reduce the frequency of this disease," said Dr. Anne Avery, Associate Professor, Department of Microbiology, Immunology and Pathology at Colorado State University. "We were also a little surprised to discover that defective genes that lead to another, seemingly unrelated disorder - hypothyroidism - are more common in dogs that do not develop T-zone lymphoma."

The team studied detailed health history questionnaires and blood or biological samples from more than 350 golden retrievers. The golden retrievers were split into a group of dogs that had TZL, and a control group of dogs that were at least 9 years old and did not have the disease.

The questionnaires covered a variety of topics, such as vaccination history, potential exposures to toxins and living situations. In the blood samples, researchers tried to identify areas in the dogs' chromosomes that were associated with having or not having the disease.

"This is a fascinating study that not only indicates one actionable measure, but also opens multiple other avenues of research," said Dr. Janet Patterson-Kane, Morris Animal Foundation Chief Scientific Officer. "There are many questions we can investigate to ultimately try and prevent this disease from taking dogs from their owners."

T-zone lymphoma is a slowly progressive form of the cancer that usually develops in older dogs, comprising about 12 percent of canine lymphoma cases. It is far more prevalent in golden retrievers than any other breed, accounting for a third of all cases. While the study focused on golden retrievers, Dr. Avery believes the underlying causes of the tumor are shared across breeds.

Researchers recruited dogs from Morris Animal Foundation's Canine Lifetime Health Project, a registry of dogs whose owners are interested in participating in clinical trials and other studies to improve canine health.

The CSU team performed diagnostic testing on a select set of dogs in the Canine Lifetime Health Project Registry to establish a group from dogs within it that were diagnosed with T-zone lymphoma. The researchers drew their control group dogs from the registry. Many of the dogs were entered into the registry to be enrolled into the Morris Animal Foundation Golden Retriever Lifetime Study, but were too old to participate in the Study at the time of their enrollment.

LAST CHLAMYDIA-FREE KOALA POPULATION MAY SAFEGUARD FUTURE OF SPECIES

The last, large, isolated, healthy chlamydia-free population of koalas in Australia may have been identified on Kangaroo Island, said Morris Animal Foundation-funded researchers at the University of Adelaide.

Chlamydia is a serious threat to the species, contributing to dramatic population declines, and the team hopes the Kangaroo Island koalas can provide a safeguard against further losses and even extinction. The team published their findings in the Nature journal Scientific Reports.

“This is a very important finding because chlamydial disease is so prevalent and efforts to fight it have so far been unsuccessful,” said Dr. Natasha Speight, koala researcher and lecturer at the University of Adelaide’s School of Animal and Veterinary Sciences. “These koalas could potentially be used as a disease-free breeding colony in the future.”

Chlamydia pecorum is a bacterial infection of koalas that is mainly transmitted sexually, but also can be spread by close contact, including from mothers to joeys. It develops as conjunctivitis, which can lead to blindness, and urinary tract infections that can ascend to the kidneys and reproductive tract, causing infertility. Chlamydia is common in koalas and ultimately fatal.

“The impact of Chlamydia on populations of koalas in parts of Australia is devastating, with high levels of severe disease and death, and common infertility,” says lead author Jessica Fabijan, from the University of Adelaide. “This last Chlamydia-free population holds significant importance as insurance for the future of the species. We may need our Kangaroo Island koalas to re-populate other declining populations.”

The Morris Animal Foundation-funded study sought to determine the prevalence of C. pecorum in wild-ranging koalas. Based on previous evidence that found low or no infection rates, the study focused on wild koalas in the Mount Lofty Ranges, a mountain range just east of Adelaide, and Kangaroo Island (KI), Australia’s third largest island, 70 miles southwest of Adelaide.

The team worked in conjunction with the South Australian Government Department for Environment and Water (DEW) and the University of the Sunshine Coast. They captured and released 75 koalas from the Mount Lofty Ranges and 170 koalas from KI. Veterinarians checked each koala and collected swab samples to test for C. pecorum DNA. Researchers also examined more than 13,000 historical veterinary records of KI koalas from over a 22 year period for accounts of the disease.

They found that nearly half of the Mount Lofty Ranges koalas were positive for C. pecorum DNA, but showed no signs of disease, except for three koalas. The koalas at KI, however, were all C. pecorum negative and no disease was observed.

There were also no definitive records of the disease in the island’s historical records. The team used the results in a statistical model that showed, with 95% confidence, that Kangaroo Island is C. pecorum-free.

“This could be the break we need to finally turn the tide on this infection and improve conservation efforts,” said Dr. Janet Patterson-Kane, Morris Animal Foundation Chief Scientific Officer. “We’re proud to support this work to save one of the world’s most unique and beloved animals.”

Morris Animal Foundation is one of the largest nonprofit animal health research organizations in the world, funding more than $126 million in studies across a broad range of species since 1948.

The Foundation is one of the only organizations funding health research particularly for endangered and at-risk wildlife species, including the koala. The Foundation has funded numerous studies in koalas, including another devastating infection, koala retrovirus.

Chlamydia was first discovered in koalas in northern Australia in the 1970s. Populations there are declining, due to the disease and other threats, such as habitat destruction and road deaths.

Koalas are classified as vulnerable by the International Union for Conservation of Nature’s Red List of threatened species.

Their populations in southern Australia are considered stable, thought to be partly due to a lower prevalence and severity of the disease.

Journal Reference:

Jessica Fabijan, Charles Caraguel, Martina Jelocnik, Adam Polkinghorne, Wayne S. J. Boardman, Elisa Nishimoto, Greg Johnsson, Robyn Molsher, Lucy Woolford, Peter Timms, Greg Simmons, Farhid Hemmatzadeh, Darren J. Trott, Natasha Speight. Chlamydia pecorum prevalence in South Australian koala (Phascolarctos cinereus) populations: Identification and modelling of a population free from infection. Scientific Reports, 2019; 9 (1) DOI: 10.1038/s41598-019-42702-z

BABY BLUE-TONGUES ARE BORN SMART

Young Australian eastern blue-tongue lizards (Tiliqua scincoides) are every bit as clever as adults, researchers have found.

Life is hard for baby blue-tongues. As soon as they are born, they are on their own, with neither parental support nor protection. Adults of the species can grow to 600 millimetres long and enjoy the benefits of thick scales and a powerful bite, but the young are much smaller and thus more vulnerable to predation. And that means they have to box clever if they are to survive.

To establish just how smart baby blueys are, researchers Birgit Szabo and Martin Whiting from Australia’s Macquarie University, together with colleagues from the Australian National University, the University of New South Wales, and St Andrews University in Scotland, put wild-caught adult and juvenile lizards through a series of tasks designed to test their cognitive abilities.

A dozen adults, all over two years old, took part in the tests, along with 16 captive-born juveniles, all aged between 23 and 56 days.

“In all the tests, the young lizards performed every bit as well as the adults,” said Szabo. “This indicates that the young learn at adult levels from a very early age.”

The study, published in the journal Animal Behaviour, is the first to directly compare adult and juvenile flexible learning in a reptile species.

Journal Reference: Birgit Szabo, Daniel W.A. Noble, Richard W. Byrne, David S. Tait, Martin J. Whiting. Precocial juvenile lizards show adult level learning and behavioural flexibility. Animal Behaviour, 2019; 154: 75 DOI: 10.1016/j.anbehav.2019.06.003

JUVENILE DENTISTRY AND DECIDUOUS TEETH IN THE PUPPY DOG

DR DAVID E CLARKE REGISTERED SPECIALIST, VETERINARY DENTISTRY AND ORAL SURGERY

JUVENILE DENTISTRY DEALS WITH THE DIAGNOSIS AND TREATMENT OF DEVELOPMENTAL, GENETIC AND IATROGENIC FACTORS THAT MAY LEAD TO MISSING TEETH, TOOTH AND JAW FRACTURES, ROOT OR ENAMEL DYSPLASIA AND DENTAL MALOCCLUSIONS. WHILE IN SOME INDIVIDUALS, TEETH MAY EXPERIENCE UNUSUAL JUVENILE SYNDROMES, PERIODONTAL DISEASE IS TYPICALLY NOT A PROBLEM IN YOUNG ANIMALS. WHEN THE YOUNG ANIMAL HAS EMPHASIS PLACED ON ACCURATE DIAGNOSIS AND TREATMENT OF EARLY DENTAL CONDITIONS, A HEALTHY OCCLUSION IS ACHIEVABLE.

ERUPTION DATES

Puppies are born edentulous. The deciduous teeth begin to erupt at two to four weeks of age. The canine teeth have usually erupted by four weeks of age and all deciduous teeth should be in place by six weeks of age. The deciduous teeth number 28 in total. Exfoliation of the deciduous teeth begins and the first permanent maxillary central incisor teeth erupt at about 14 weeks of age. By the end of the sixth month, all the permanent teeth have erupted and are in functional occlusion. The permanent teeth number 42 in total.

NOMENCLATURE

A common terminology is to give the type of tooth a letter from the alphabet, such as I for incisor, C for canine, P for premolar and M for molar. The permanent teeth are designated by only the capital letter and the deciduous teeth are designated a lower case 'd' to follow the capital letter. This is termed anatomical nomenclature. The tooth is then assigned a number that corresponds to its position from the midline. The number and letter are written so the number is positioned adjacent to the letter, in a relationship, which corresponds to the arcade the tooth is positioned in. The number is placed above or below and on the right or left of the letter, eg upper right canine is designated C1, the lower left third premolar is designated 3P. An alternative numbering system, termed the Modified Triadan system assigns each jaw quadrant a number: 1 = right maxilla, 2 = left maxilla, 3 = left mandible and 4 = right mandible in the adult dog, and numbers 5 thru 8 in the puppy. The teeth are then number from the front to the back. Therefore the right maxillary adult first incisor tooth is numbered 101, whereas the right maxillary deciduous first incisor tooth is numbered 501. Importantly, all of the canine teeth end in a 4, so 104 thru 404 in adult and 504 thru 804 in a puppy and all 1st molar teeth end in a 9, so 109 thru 409.

Puppy Occlusion

On each side of the mouth the puppy has three deciduous incisors in the front of the maxilla and three incisors in the front of the mandible (Figure 1), followed by one maxillary canine tooth and one mandibular canine tooth (Figure 2), followed by three premolars in both jaws (Figure 3 and 4), making a total of 28 deciduous teeth.

In the adult dog, on each side of the mouth there are three incisor teeth in the front of the maxilla and three incisors in the front of the mandible, followed by one maxillary canine tooth and one mandibular canine tooth, followed by four premolars in both jaws, followed by two molar teeth in the maxilla and three molar teeth in the mandible, making a total of 42 permanent teeth.

Figure 1. On each side of the mouth the puppy has three incisor teeth in the maxilla and three incisor teeth in the mandible.

Figure 2. On each side of the mouth the puppy has one canine in the maxilla and one canine in the mandible. The mandibular canine tooth is positioned between the maxillary canine and 3rd incisor teeth when the mouth is closed.

Figure 3. On each side of the mouth the puppy has three premolar teeth in the maxilla. The canine tooth can be seen on the left of the picture.

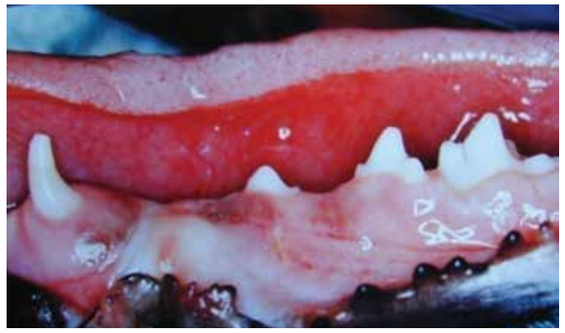


Figure 4. On each side of the mouth the puppy has three premolar teeth in the mandible. The canine tooth can be seen on the left of the picture.

CONDITIONS AND PATHOLOGY

Causal Factors

During the development of deciduous teeth, various factors can greatly alter normal crown and root formation. Systemic and local inflammation or infection, sometimes accompanied with fever, at the time of tooth bud maturation can commonly alter the appearance and structure of the enamel and root.

Trauma, whether accidental or iatrogenic, during extraction of deciduous teeth, can also cause deciduous root fractures, as well as, significant pathology to the developing permanent tooth. The position of the permanent tooth bud lingual to most of the deciduous teeth, except the maxillary canines which are mesial, makes it extremely susceptible to stimuli from its predecessor.

Missing Deciduous Teeth

Missing deciduous teeth in itself does not present a serious physical problem, but may be an indication of missing permanent analogs. By eight to 12 weeks of age, radiographs can be taken to confirm the presence or absence of permanent tooth buds. A single missing tooth typically does not indicate a major abnormality, but multiple missing teeth, especially bilaterally, may increase the probability of genetic predisposition.

Fractured Deciduous Teeth

The deciduous teeth have very thin walls (Figure 5) and may be fractured during play or trauma (Figure 6). Fractured deciduous teeth should generally be extracted, as endodontic therapy is typically unwarranted. Infection may gain access through the open pulp canal and any potential source of infection to nearby permanent tooth buds and alveolar bone should be removed. Once fractured, infection/inflammation or both increase the temperature of the surrounding tissues, potentially affecting the ameloblast, resulting in enamel hypoplasia or hypomineralisation of the developing permanent tooth crown. Because the root of a deciduous tooth is thin, it can easily fracture on extraction, so the tooth needs to be luxated until it is loose before forceps are used to remove it.

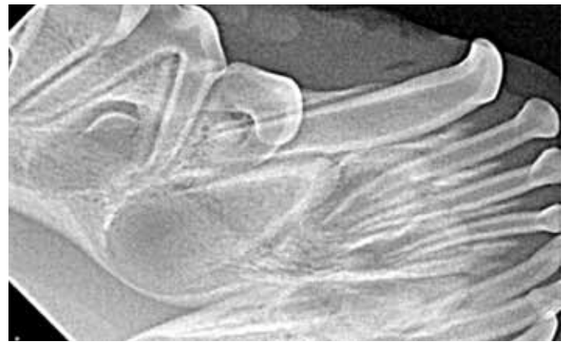


Figure 5. Radiograph of the right rostral mandible demonstrating the thin walls and wide pulp canal of the deciduous teeth.

Figure 6. Right deciduous maxillary canine tooth demonstrating a crown-root fracture exposing the pulp tissue.

Technique for extraction of the deciduous canine teeth. The epithelial attachment of the canine teeth is initially severed using a Molt 2/4 periosteal elevator (Figure 7) and curved deciduous elevator (Figure 8). The Molt 2/4 elevator is advanced apically on the lingual/palatal and buccal canine tooth root surfaces to approximately 75% of the length of the root to sever the periodontal ligament with firm but controlled force. The curved deciduous elevator is introduced into the gingival sulcus to sever the mesial and distal periodontal ligament using the concave surface against the mesial root and convex surface against the distal root to approximately 50% of the length of the root. Once the tooth is mobile, the Molt is reintroduced along each surface. Once the tooth is mobile, it is grasped with the small animal extraction forceps and gently removed from the socket with gentle rotation. The tooth should be examined to ensure complete removal, which is also confirmed visually and by radiography.

Figure 7. Molt 2/4 periosteal elevator.

Figure 8. Curved deciduous elevator.

CASE STUDY

The case study can be viewed at: https://www.vdec.com.au/wp-content/uploads/2018/07/Malocclusion-and-Extraction-of-Mandibular-Deciduous-Canine-and-Incisor-Teeth-may18.pdf

Malocclusions

Dental and skeletal malocclusions are considered to be multi-variant conditions due to many factors and the exact aetiology has not been definitively confirmed. Regulation of bone growth and bite anatomy is a complex phenomenon dependent on genetic factors, development of the teeth, size and movement of different muscle and soft tissues (lips, cheeks, tongue and masticatory muscles), shape of the jaws, constant pressure from external objects, trauma to the teeth or to the bone, persistent deciduous teeth and nutritional factors. There may be a breed predisposition, though the specific gene or genes as in the DNA responsible has not been confirmed nor determined. There are no definitive tests or procedures that can be used to determine jaw growth and tooth position.

Deciduous teeth may be extracted in cases of early malocclusions. If the primary dentition shows abnormal positioning, such as base narrow or lingually displaced mandibular canine teeth, retention of these canine teeth may not only cause a detrimental interlock of teeth into the hard palate (Figure 9), resulting in ulceration and interfering with mandibular growth, but they may also influence their permanent counterparts to erupt even further lingually, except the maxillary canines which erupt mesially.

Since maturation of each jaw quadrant (right and left mandibulae and maxillae) is relatively independent of each other, slight variations in growth may also cause a malevolent interlock of deciduous incisors and canines, again potentially influencing jaw growth, in an otherwise genetically normal individual. In these cases, selective extraction of deciduous teeth may be attempted, termed interceptive orthodontics, realising that extractions of this kind will not be effective if malocclusion is of genetic origin. One simple rule is to extract the canines and/or incisors of the shorter jaw to prevent further interference. It should be remembered, however, that interlocks are occasionally advantageous, especially when the lower canines are tight against the upper lateral incisors in an animal experiencing a mandibular growth spurt.

Figure 9. Malocclusion demonstrating a short mandible with the deciduous canine and incisor tooth positioned caudal to its normal position causing a dental interlock.

The practice of interceptive orthodontics should ideally be performed between six to eight weeks of age, after which time the permanent teeth eruptions are imminent, and often take the abnormal place of their predecessors. The actual process of exodontia should be carried out with extreme caution to minimise potential damage to the permanent tooth bud under the gingival surface. If the crown breaks off, attempts should be made to completely retrieve the remaining roots, but again with care. If necessary, a moderate gingival flap and alveoloplasty may be performed to expose the root tip. If infection is present, oral antibiotics should be continued post-operatively.

Persistent Deciduous Teeth

One area where primary exodontia is the only choice is in the case of persistent deciduous teeth. Exfoliation can be influenced by many factors, such as nutrition, inflammation, trauma, endocrine disorders such as hypothyroidism and ankylosis of the tooth to alveolar bone. Once the adult tooth starts eruption, unless its way is unimpeded, it will be deflected away from its normal position, lingually for most teeth, except for the maxillary canines, which are displaced mesially. Persistent deciduous teeth may commonly cause malocclusion such as base narrow or lingually displaced mandibular canines, where the lower canine teeth erupt lingually to the deciduous canine teeth, or anterior cross bite, where one or more of the maxillary incisors are positioned lingual to the mandibular incisors. While specific dental malocclusions caused by persistent deciduous teeth have not been proven to be genetic, any orthodontic adjustment should be thoroughly discussed, including breeding counselling.

Figure 10. Persistent deciduous right maxillary canine tooth present with the start of eruption of its permanent counterpart.

Development And Genetic Defects

Other developmental and genetic defects in young animals may be seen associated with the soft tissues and bony structures of the head. Primary (cleft lip) and secondary (cleft palate) defects can lead to serious complications if not managed correctly.

Fractured Jaws

Puppies are both adventurous and foolish, so common traumatic conditions seen in small animal practice such as being struck by an object like a bat, automobile, and bites from other animals commonly result in mandible fractures (Figure 11). Treatment involves assessing the type of fracture, use of minimal hardware in order to avoid damage to permanent tooth buds (Figure 12), and ensuring normal occlusion is maintained during healing. The use of inter-dental wiring and acrylic splints is preferable to pins, plates and external fixation. A soft tape muzzle can also be used to stabilise the bones, followed by a soft diet. As the jaws are in their rapid growth phase, any solid fixation should be removed after 3-4 weeks, once radiographic confirmation of healing is obtained. If the fracture site is open, antibiotics should be prescribed, and in all fractures, analgesia using a combination of opioids and NSAIDs is a must.

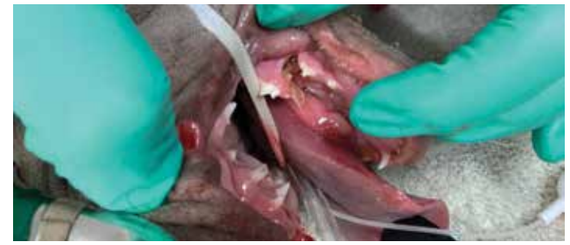


Figure 11. A complicated fracture of the mandible in a 10 week old puppy due to a bite from the neighbour's dog.

Figure 12. Radiograph demonstrating the close proximity of the permanent tooth buds and developing tooth crowns to the fracture site.

VACCINATION OF HORSES IS THE MOST EFFECTIVE WAY TO MANAGE HENDRA VIRUS

With the latest horse death from the Hendra virus, the Australian Veterinary Association (AVA) is reminding horse owners of the importance of Hendra virus vaccination to help prevent this deadly virus in their horses.

President of AVA's Equine Veterinarians Australia group, Dr Cristy Secombe, said that this latest death is extremely alarming, with it being the furthest south that a Hendra case has been recorded in Australia, near Scone, Australia's Horse capital, in the upper Hunter Valley of New South Wales.

"Hendra virus is a deadly virus. For the benefit of horses and their owners, it is essential that horses located in, around or travelling to high-risk Hendra areas along the east coast, are vaccinated against Hendra virus," she said.

From 1994, when the virus was identified, to now there have over 60 known Hendra incidents in Queensland and New South Wales, resulting in the death of over 100 horses.

"Every one of these horses that has died because of Hendra represents one more compelling reason for horse owners to vaccinate their horses."

"The risk this disease poses to human health is also very real with seven confirmed cases in people leading to four deaths. So, it's important that the horse community remains vigilant in protecting both horses and people from Hendra," she said.

Dr Secombe said that the vaccine, introduced in 2012, remains the most effective way to help manage the Hendra virus and is fully registered with the Australian Pesticides and Veterinary Medicines Authority.

"Vaccination of horses provides a public health and workplace health and safety benefit by reducing the risk of Hendra virus transmission to humans and other susceptible animals and helps to ensure high standards of animal health and welfare."

Horse owners should contact their local veterinarian immediately for more information about Hendra virus vaccination which is a very important part of their horse health and welfare strategy.

MUSCLE DISEASE MUTATION COMMON IN QUARTER HORSES

The mutation responsible for the sometimes-fatal muscle condition immune-mediated myositis (or IMM) is just as common, or more so, than at least two other well-known genetic diseases in Quarter Horses: HERDA and HYPP, researchers say.

Last year, researchers discovered the genetic mutation responsible for a sometimes-fatal muscle condition-immune-mediated myositis (IMM)-in Quarter Horses. Now, they're back with an update: It turns out that mutation-the MYH1 E321G variant - is prevalent in horses of some disciplines within the breed.

"The MYH1 E321G variant is just as common, or more so, than at least two already well-known genetic diseases in Quarter Horses: hereditary equine regional dermal asthenia (HERDA) and hyperkalemic periodic paralysis (HYPP)," said Carrie Finno, DVM, PhD, Dipl. ACVIM, associate professor of veterinary genetics and director of the University of California, Davis (UC Davis) Center for Equine Health.

"The genetic diseases included on the five-panel test of the American Quarter Horse Association (AQHA), which includes HERDA and HYPP, have been on the radar of Quarter Horse owners, breeders, and veterinarians for years," she said. "Knowing that the MYH1 variant is more pervasive in the Quarter Horse population than some of the disease alleles on the five-panel test will help owners and breeders decide whether they feel it would be worth their while to test for this variant, especially in breeding stock."

Fast-contracting muscle cells express the myosin protein to enable muscle contractions and MYH1 is one of several genes that encode forms of myosin. Occasionally, MYH1 is passed down to offspring in a mutated form, and it's this mutation researchers linked to IMM development.

Horses with IMM experience rapid, widespread atrophy (wasting) of the gluteal and epaxial muscles (the latter run along either side of the spine). They also demonstrate generalized muscle stiffness and lethargy. Most of the time, these issues arise suddenly following certain kinds of infection (especially strangles) or vaccinations. If affected horses survive the episode, they usually regain their muscular bulk and strength over several months. Unfortunately, however, IMM can relapse.

Finno and colleagues-including Stephanie J. Valberg, DVM, PhD, Dipl. ACVIM, ACVSMR, of the Michigan State University College of Veterinary Medicine's Department of Large Animal Clinical Sciences, in East Lansing, and third-year UC Davis veterinary student Giuliana Gianino-analyzed the genomes of 307 elite American Quarter Horse Association (AQHA) horses performing in the barrel racing, cutting, halter, racing, reining, Western pleasure, and working cow disciplines. They also tested 146 non-elite AQHA-registered without a particular performance discipline.

The variant's occurrence rate was highest among reiners, with 24% of the elite reining horses carrying at least one copy of the mutant allele, Finno said. The allele appeared in 17% of working cow horses and 16% of halter horses. That rate was around 8% in cutting horses and 4% in Western pleasure horses. They did not identify the variant in barrel racers or racing Quarter Horses, however.

The mutant allele showed up in 7% of all the horses tested.

The high prevalence in certain disciplines doesn't necessarily mean the mutation is related to performance, Finno added. It's probably just coincidental.

"While it is tempting to try to draw a connection between a muscle mutation and athletic ability, in a previous study our team was able to show that in health (so, not during an episode of diseases like IMM) the proportion and arrangement of Type 2X muscles fibers (those in which MYH1 is expressed) in skeletal muscle is not different between horses with or without any copies of the E321G variant," she said.

"It could be that a few popular sires in these breeds carried these mutations by chance and, through their popularity, increased the incidence in the breed," Finno said, or other more complex biological processes.

Overall, the team's research has the potential to significantly reduce the chances of horses inheriting the IMM mutation, Gianino said.

"We're very excited to share our recent findings on the prevalence of this variant in Quarter Horses, provide a genetic test to readily diagnose myosin heavy chain 1 myopathies, including IMM and nonexertional rhabdomyolysis, and to provide owners with a test that they could choose to use to impact the incidence of the allele in this breed," she said.

Valberg added, "Practically, equine veterinarians can now use this test to accurately diagnose and treat horses with (the disorder), improving the outcomes for individual horses affected by this disease. On a broader scale, Quarter Horse owners and breeders can use this test to identify carriers of the E321G variant in their herds and developing breeding plans that minimize the chances of producing foals at risk of developing (the disorder)."

The study, "Prevalence of the E321G MYH1 variant for immune-mediated myositis and nonexertional rhabdomyolysis in performance subgroups of American Quarter Horses," was published in the Journal of Veterinary Internal Medicine.

TICKED OFF WITH PARASITE TREATMENT SALES? TAKE YOUR TOO HARD BASKET TO THE CHECKOUT BELOW!

If you're losing interest in selling flea and tick preventatives in your clinic, you're not alone! Many clinics sight competition from online & "big box" retail, reduced margins and fear of appearing expensive as reasons for abandoning their sales of anti-parasitics (AP's).

Is this wise? Ex-manufacturer sales of companion animal AP's are approx $300m per annum in Australia. Surveys consistently suggest the average pet receives between 4 & 5 monthly treatments per year giving a potential market of close to $1 billion! Vet share of this market is estimated at 30% and falling.

So, is waving the white flag the way to go?
Whilst margins have certainly fallen there are still some compelling reasons to fight your corner in this market.

AP sales bring footfall and footfall brings revenue - clients don't visit to window shop!

When the largest buying group in the UK subsidised an SMS treatment reminder system for AP's in 10% of their 450 members, the overall purchases of these clinics grew at twice the rate of non-participating members i.e. clinic purchases of everything from consumables to pharmaceuticals.

Being competitive doesn't mean being the cheapest. By the same token you can't afford to indulge in "ambush selling" i.e. one off sales generally to puppy and kitten owners at high margins knowing they are unlikely to purchase from you again.

Clinics have said they couldn't understand why their new clients didn't become repeat customers when they were only $20-30 more expensive per pack than Petbarn...

Apart from no repeat business, this approach creates the perception that everything you do is expensive.

So how do you compete with online retail who can appear to sell cheaper than you think you can buy? Nothing worthwhile is necessarily easy or at least effort free. Consider some if not all of the points below when creating your sales plan.

Prices sourced 10/07/2019	Size	Pack	Ex W/s inc GST	Budget Pet	Avalailble Margin	Petbarn Website	Avalailble Margin
Nexgard Green	10-25kg	3	$39.37	$47.65	17%	$63.99	38%
Nexgard Green	10-25kg	6	$67.22	$80.72	17%	$104.99	36%
Bravecto Chew	10-20kg	1	$38,48	$45.07	15%	$68.99	44%
Bravecto Spot-on	10-20kg	1	$65.58	$78.00	16%	$82.99	21%
Nexgard Spectra	15-30kg	3	$54.56	$67.31	19%	$81.99	33%
Nexgard Spectra	15-30kg	6	$92.82	$98.99	6%	$109.99	16%

- Clients need these products; they are not a luxury. Meeting their needs is not selling (oft a dirty word in our profession). Despite the best efforts of the brand leaders to make these products "sexy", buying them is confusing for most and about as exciting as paying their power bill.
- Decide on your clinic protocols and ruthlessly delete products you don't support i.e. minimise the SKU's (stock keeping units), you hold. Make sure your protocols are communicated to all staff and they are on board.
- Know your buying price! A product well bought is half sold! Talk to your wholesaler. Strip out the fluff of points etc and get to a true net buying price. Contract it and task somebody on staff to check you are receiving it every month.
- Talk to and be nice to your chosen reps. **Manufacturers may not care where the public buy their products, but they want your recommendation, as most people buy what the vet told them to or what they bought the last time.** A good relationship with your rep will pay dividends and ensure you are always aware of special offers.
- Set your price. Do a little bit of research online. The table above took 10m to research and shows the margins available if you price match. Never assume big box retail are cheap!
- Differentiate your offer. Only you know the pet's name, it's age, the owners name, email and mobile. Send them SMS & email treatment reminders (not just re-purchase reminders). Clients love the service and realise it will stop if they don't repurchase from you. (One word of caution, make sure the service you use can consolidate multi-pet households/treatments into one message otherwise your biggest clients can feel "spammed" by multiple messages).
- Send out timely seasonal reminders to all clients e.g. paralysis tick campaigns combined with a free nurse consult for AP's.
- Consider offering care plans which include AP treatments.
- Remember, if no-one challenges your pricing you are too cheap!

In this day and age, the margins above are not to be sniffed at, never mind the potential additional business the footfall brings. Every dog and cat on your books need these products! Clients need your help to cut through the confusing messages/bewildering array of products and claims. Make it easy for them and most of them will keep coming back!

One company iRecall®, is allowing clinics the chance to try their market leading, fully automated reminder system, free for 3 months.

GOATS CAN DISTINGUISH EMOTIONS FROM THE CALLS OF OTHER GOATS

Goats can probably distinguish subtle emotional changes in the calls of other goats, according to a new study led by Queen Mary University of London.

The researchers measured behavioural and physiological changes in goats to determine if they can differentiate between calls linked to positive and negative emotions.

They found that when the emotion of a call changed, the likeliness of the goats to look towards the source of the sound also changed suggesting that they can distinguish the emotional content of calls of another goat.

The study, published in the journal Frontiers in Zoology, also shows that the goats' heart-rate variability - the variation in time between each heartbeat - was greater when positive calls were played compared to when negative calls were played.

Together, these results provide the first strong evidence that goats are not only able to distinguish call variants based on the emotion that they convey, but also that their own emotions are potentially affected.

The study was carried out in collaboration with the University of Roehampton, ETH Zurich and University of Turin.

Luigi Baciadonna, lead author of the study from Queen Mary University of London, said "Despite its evolutionary importance, social communication of emotions in non-human animals is still not well understood. Our results suggest that non-human animals are not only attentive, but might also be sensitive to the emotional states of other individuals."

Many social animals live under environmental conditions where individuals are not always in visual contact with one another during the day or night, and therefore, could acquire an evolutionary advantage through the discrimination of the emotional content of the calls of others from their species.

Elodie Briefer, co-corresponding author of the study, who was based at ETH Zurich during the research and is now at the University of Copenhagen, said "Expressing emotions using vocalisations and being able to detect and share the emotional state of another animal from the same species may facilitate coordination among the individuals in a group and strengthen social bonds and group cohesion."

Dr Alan McElligott who led the study at Queen Mary University of London and is now based at the University of Roehampton, added: "Perceiving the emotional state of another individual through its vocalisations and being affected by those vocalisations has important implications for how we care for domestic animals, and in particular livestock species."

In the study, the researchers recorded calls of goats which conveyed either positive or negative emotions. They then played one of these calls through a loudspeaker to another goat. They subsequently exposed that goat to a variant of the same call type associated with the opposite emotion. This was followed by a final call which was randomly selected.

The researchers also controlled variables often neglected in this field of research by assessing the emotional state of both the caller and the receiver. In addition, only contact calls were used so that the reaction of the receiver would be purely dependent on the encoded emotions, rather than the function of vocalisations.

Livio Favaro, another author of the study from University of Turin, said "These findings can contribute to our understanding of the evolution of emotion perception in non-human animals."

Journal Reference:

Luigi Baciadonna, Elodie F. Briefer, Livio Favaro, Alan G. McElligott. Goats distinguish between positive and negative emotion-linked vocalisations. Frontiers in Zoology, 2019; 16 (1) DOI: 10.1186/s12983-019-0323-z

AN AI TECHNOLOGY TO REVEAL THE CHARACTERISTICS OF ANIMAL BEHAVIOUR ONLY FROM THE TRAJECTORY

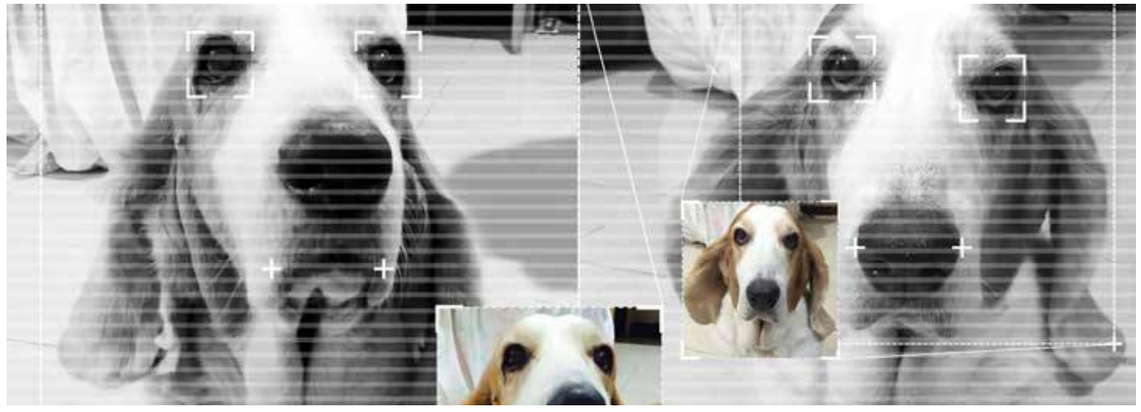
Recording the movements of people and animals (including birds and insects) has become very easy because of the development of small and inexpensive GPS devices and video cameras. However, it is still difficult to infer what triggers such movements (for example, external stimuli and/or their mental processes) from the behavioural records.

In this study, Shuhei Yamazaki and colleagues have developed an artificial intelligence (AI) technology, first, to estimate an animal's behavioural state, such as "resting," "feeding," or "traveling," without human classification, and, next, to explore the characteristics of each behavioural state by comparing responses under different conditions, such as before and after experiencing a certain stimulus.

This method, termed STEFTR (state estimation and feature extraction of animal behaviour), enabled the researchers to estimate the behavioural states of roundworms and penguins that move approximately 1 cm in 10 min in a petri dish and several kilometers in 1 day or more in the Antarctic Ocean, respectively, by analyzing them in exactly the same way. Notably, they achieved > 90% accuracy using only tens of animal trajectories, although traditionally researchers used prior knowledge of specialists about the animal's movement and/or millions of video images of animal behaviour to train AI.

In the feature extraction, Yamazaki et al. revealed experience-dependent (i.e., "learning"-dependent) changes in specific behavioural aspects in worms and bats, and sexual pheromone-dependent changes in fruit flies. Moreover, they revealed changes in nerve activity that is linked to behavioural change in worms.

In conclusion, the STEFTR method may make it easy to infer "important places" for animal behaviour, such as nests and feeding places that are usually difficult to find, using only trajectory data of wild animals. In addition, it may help discover important brain activities related to animal behaviour, thereby contributing to the progress of basic brain science.



Journal Reference:

Shuhei J. Yamazaki, Kazuya Ohara, Kentaro Ito, Nobuo Kokubun, Takuma Kitanishi, Daisuke Takaichi, Yasufumi Yamada, Yosuke Ikejiri, Fumie Hiramatsu, Kosuke Fujita, Yuki Tanimoto, Akiko Yamazoe-Umemoto, Koichi Hashimoto, Katsufumi Sato, Ken Yoda, Akinori Takahashi, Yuki Ishikawa, Azusa Kamikouchi, Shizuko Hiryu, Takuya Maekawa, Koutarou D. Kimura. STEFTR: A Hybrid Versatile Method for State Estimation and Feature Extraction From the Trajectory of Animal Behavior . Frontiers in Neuroscience, 2019; 13 DOI: 10.3389/fnins.2019.00626

TIMING OF SPAY, NEUTER TIED TO HIGHER RISK OF OBESITY AND ORTHOPEDIC INJURIES IN DOGS

Spaying or neutering large-breed dogs can put them at a higher risk for obesity and, if done when the dog is young, nontraumatic orthopedic injuries, reports a new study based on data from the Morris Animal Foundation Golden Retriever Lifetime Study. The spay/neuter study was published recently in the journal PLOS ONE.

"For years, we've been taught that spaying or neutering your dog is part of being a responsible pet owner, but there really are advantages and disadvantages to consider when making that decision," said Dr. Missy Simpson, Morris Animal Foundation epidemiologist and lead author on the paper. "Our study results give dog owners and veterinarians new information to consider when deciding on when to spay or neuter their dog, especially when considering the long-term health of their pet."

In the general canine population, estimates are that one-third to one-half of all large-breed dogs are either overweight or obese. Roughly 2% of the same population suffer nontraumatic orthopedic injuries, such as cruciate ligament ruptures.

Dr. Simpson studied health data, collected over six years, from the entire Golden Retriever Lifetime Study cohort of more than 3,000 golden retrievers. Approximately one-half had undergone spay or neuter surgery.

She found that dogs that were spayed or neutered were 50% to 100% more likely to become overweight or obese, and the risk didn't appear to be affected by the dog's age at the time of surgery. Whether the dog had the procedure at 6 months or 6 years, the risk of weight gain remained relatively constant.

However, age at surgery does appear to be a significant factor regarding nontraumatic orthopedic injuries. Dr. Simpson found that dogs spayed or neutered before 6 months of age were at a 300% greater risk of sustaining those injuries.

While the paper focused on golden retrievers, Dr. Simpson noted the results likely can be applied to other breeds particularly other large - and giant-breed dogs.

"Different owners have different concerns for their dogs and the decision to spay or neuter your dog is a very complex one," said Dr. Janet Patterson-Kane, Morris Animal Foundation Chief Scientific Officer. "It's a balance in managing the risks of neutering or not neutering for owners committed to their dog's health."

The Morris Animal Foundation Golden Retriever Lifetime Study is the most extensive, prospective study ever undertaken in veterinary medicine. Launched in 2012, and reaching full enrollment in 2015, it gathers information on more than 3,000 golden retrievers from around the United States, throughout their lives, to identify the nutritional, environmental, lifestyle and genetic risk factors for cancer and other diseases in dogs.

Owners and veterinarians complete yearly online questionnaires about the health status and lifestyle of the dogs. Biological samples also are collected, and each dog has a physical study examination annually.

IT'S DOG EAT DOG ON THE CANINE SOCIAL LADDER

Climbing the social ladder is a ruff business for dogs, new research shows.

Top dogs in a pack are known to assert their dominance, but scientists studied a group of free-roaming mongrels and found high levels of aggression in the middle of the dominance hierarchy. Most theories predict more aggression higher up the ladder. However, the researchers say the difficulty of working out the pecking order in the crowded middle leads to aggression.

The research was carried out by the University of Exeter (UK) and by the Veterinary Service of the Local Health Unit Rome 3 (Italy).

"Our results reveal the unavoidable costs of climbing a dominance hierarchy," said Dr Matthew Silk, of the Environment and Sustainability Institute on the University of Exeter's Penryn Campus in Cornwall. "In the middle of the hierarchy - where it's harder to predict which animal should be dominant - we see lots of aggression."

Professor Robbie McDonald said "Fighting over food and mates uses energy and time and can lead to injuries, so hierarchies play an important role because animals know their place without needing to fight."

The year-long study examined a pack of 27 mongrel dogs that roamed freely in the suburbs of Rome. The dogs did not live with humans, although they relied on humans for food.

Their hierarchy was based on age and sex, with adults dominant over younger dogs and males dominant over females of the same age group.

"Although fights within a social group of free-roaming dogs are usually characterised by low-intensity aggression, the middle of the hierarchy is occupied by young males of similar size and age, among whom nothing is definitive and for whom the challenge is to gain rank," said Dr Simona Cafazzo, of the University of Veterinary Medicine, Vienna.

"Our results confirm that these dogs have an age-graded dominance hierarchy similar to that of wolves," added Dr Eugenia Natoli, of the Veterinary Service of the Local Health Unit Rome 3.

Dominant behaviour included a stiff, upright body, holding the head and tail high and laying a paw on another dog's back.

Submissive behaviour included avoiding eye contact, holding the head and ears low and lying down with the chest and stomach exposed.

Journal Reference:

Matthew J. Silk, Michael A. Cant, Simona Cafazzo, Eugenia Natoli, Robbie A. McDonald. Elevated aggression is associated with uncertainty in a network of dog dominance interactions. Proceedings of the Royal Society B: Biological Sciences, 2019; 286 (1906): 20190536 DOI: 10.1098/rspb.2019.0536

SENIOR PET WELLNESS

Due to improved Veterinarian care and dietary habits, pets are now living longer than they ever have before. One consequence of this is that pets, along with their owners and veterinarians, are faced with a new set of age-related conditions. In recent years there has been extensive research on the problems facing older pets and how their owners and veterinarians can best handle their special needs.

Behavioural changes in a pet can serve as the first indicators of aging. These changes might be due to discomfort or pain (arthritis, etc.) or worsening sight or hearing, but they may also be due to the normal aging process. Some behaviour changes in older pets may be due to cognitive dysfunction, which is similar to senility in people. It is important for veterinarians to look for opportunities to educate senior pet owners on what they should be looking for and how they can be proactive in minimizing the impact of potential disease or health issues.

Areas of consideration for veterinarians to start conversations with senior pet owners by encouraging them to have more frequent clinic visits so signs of illness or other problems can be detected early, and appropriate treatments recommended. Regular veterinary examinations can detect problems in older pets before they become advanced or life-threatening and improve the chances of a longer and healthier life of pets.

Arthritis is one of the most talked about diseases associated with senior pets and discussion topics in consult rooms. Arthritis is a conversation you as veterinarians need to have with clients in order to discuss proactive approaches to the management of this disease.

What starts off as a bit of stiffness can quickly turn into a reluctance to run, jump and play. Even worse, the patient may try to avoid all unnecessary movements and won't make it outside to go the bathroom. Fortunately, there are plenty of things that can be done to keep a dog comfortable when the temperature drops.

Natural joint health treatments, are a much sought-after option for pet owners and often a first step for veterinarians as well as their proctocois: Interpath's 4CYTE™ EPIITALIS® FORTE for Dogs is scientifically proven to reduce pain and repair damaged joints affected by age, injury and arthritis.

Introducing Senior Pet Examination Consults are a good way of engaging with the pet owner to educate them on areas such as:

- **Diet and nutrition** - Geriatric pets often need foods that are more readily digested, have different calorie levels and ingredients, as well as anti-aging nutrients.
- **Weight control** - Weight gain in geriatric dogs increases the risk of health problems, whereas weight loss is a bigger concern for geriatric cats.
- **Parasite control** - Older pets' immune systems are not as healthy as those of younger animals; as a result, they cannot fight off diseases or heal as fast as younger pets.
- **Maintaining mobility** - As with older people, keeping older pet's mobile through appropriate exercise helps them keep healthier and more mobile.
- **Vaccination** - A pet's vaccination needs may change with age. Veterinarians should routinely discuss vaccination programs available specifically for geriatric pets with pet owners.
- **Mental health** - Pets can show signs of senility. Stimulating them through interactions can help keep them mentally active. If an changes in a pet's behaviour are noticed, pet owners should consult their veterinarian.
- **Environmental considerations** - Older pets may need changes in their lifestyle, such as sleeping areas to avoid stairs, more time indoors, etc. Disabled pets have special needs which can be discussed during clinic visits.
- **Reproductive diseases** - Non-neutered/non-spayed geriatric pets are a higher risk of mammary, testicular, and prostrate cancers.

PARASITE NEEDS CHEMICAL (LIPID/NUTRIENT) IN CAT INTESTINES FOR SEX

Toxoplasma gondii is a microbial parasite that infects humans but needs cats to complete its full life cycle. Recently published research in the open-access journal PLOS Biology shows why the sexual phase of the parasite's life cycle requires linoleic acid, a nutrient/lipid found at uniquely high levels in the felines, because cats lack a key enzyme for breaking it down.

The finding, from Bruno Martorelli Di Genova and Laura Knoll of the University of Wisconsin-Madison and colleagues, is likely to help in the development of treatments to reduce spread of the parasite from cats to their human companions. It also presents an opportunity to avoid using cats for Toxoplasma research.

Toxoplasma can live asexually in any mammal, including humans. But it forms gametes (sexual cells) only in cats, a restriction that has long been recognized, but whose reason was not understood. The authors suspected something was missing when reproducing the infections in vitro and not observing sexual development.

It is known that fungi require linoleic acid for sexual development. To test Toxoplasma's requirement for the same lipid, they generated cat intestinal organoids - three-dimensional "test tube" models that share several essential properties with actual intestines - and showed that linoleic acid was required for sexual reproduction of the parasite. Cats lack an enzyme called delta-6-desaturase, which catalyses the conversion of linoleic acid to arachidonic acid, accounting for the peculiarly high levels of linoleic acid in the cat intestine, but not in other mammals.

When the authors supplemented the diet of mice with linoleic acid, and added a specific inhibitor of the enzyme, Toxoplasma could complete the sexual phase of its life cycle in the mouse intestine.

Toxoplasma is the leading cause of foodborne illness in the US, according to CDC. The most common route of infection for human is by consumption of contaminated raw or undercooked meat. Cat litter, after 24-48 of being cleaned, can also be a source of Toxoplasma infection. However, cats can only shed oocysts once in their life time.

Pregnant women are urged to avoid eating raw or undercooked meat, as well as avoiding cleaning the litterbox after 48 hours, to prevent Toxoplasma infection. Congenital toxoplasmosis can have potentially serious consequences for the unborn child.

An improved understanding of the parasite life cycle stemming from this study may lead to production of vaccines that could inhibit Toxoplasma's sexual reproduction or the transmission of Toxoplasma to livestock.

Journal Reference:

Bruno Martorelli Di Genova, Sarah K. Wilson, J. P. Dubey, Laura J. Knoll. Intestinal delta-6-desaturase activity determines host range for Toxoplasma sexual reproduction. PLOS Biology, 2019; 17 (8): e3000364 DOI: 10.1371/journal.pbio.3000364

VETS WARN AGAINST LAY PRACTITIONERS AND ANAESTHESIA-FREE DENTISTRY

The Australian Veterinary Association (AVA) is warning pet owners of the health risks posed by lay dental practitioners offering "anaesthesia-free dentistry". An increasing number of non-veterinary companies are offering cleaning and scaling on conscious pets, but the AVA say the practice does not provide adequate dental care and can be harmful to the animals.

Anaesthesia-free dentistry involves the fully conscious pet being physically restrained so dental instruments, and sometimes power scalers, can be used to remove calculus from the teeth.

Dr Tara Cashman, President of the Australian Veterinary Dental Society says that the term "anaesthesia-free dentistry" is misleading for pet owners as the procedure is purely cosmetic and fails to identify serious problems such as dental disease. Dental disease is common in Australian pets. If untreated, it can be painful and lead to chronic health concerns.

"Cleaning the visible surface above the gum line makes the teeth look superficially clean but will not detect dental disease present below the gum line, and thus provides no medical benefit," said Dr Cashman.

Dr Cashman says that it is impossible to complete a thorough oral examination including checking every single tooth especially sub-gingivally (below the gum line), the tongue, palate and oropharynx (back of the throat) in a conscious animal.

"It is impossible to do X-rays and adequately examine all surfaces of your pet's oral cavity while awake. Radiographs and a veterinary oral health evaluation are vital in detecting problems early while they are relatively easy and thus less expensive to treat," said Dr Cashman.

Anaesthesia-free dentistry also fails to identify another serious dental condition in pets. Occurring below gum level, periodontal disease is an infection that destroys the periodontal ligament anchoring the tooth to the socket. More infection means deeper probing pockets and bone loss. Removing calculus from the crown of the tooth does not address the site of disease formation and is merely window dressing.

"Most lay operators have no animal handling qualifications and are certainly not licensed to diagnose, medicate or radiograph any pet. They may have the best intentions, along with the pet owner to care for the pet's oral health but anaesthesia-free dentistry is not best practice for the animal," said Dr Cashman.

But it's not just dental health that should be concerning pet owners, restraining an animal and forcing it to undergo an uncomfortable procedure over an extended period of time can increase anxiety and make it more difficult for future examinations to occur.

"The animal must be physically restrained, which can lead to significant anxiety. As the animal is conscious, it will be fully aware of any pain involved in the procedure and this can lead to longer-term anxiety and aversion to being touched around the face and muzzle," said Dr Cashman.

Dental instruments need to be very sharp to debride calculus and plaque from the teeth and could easily injure a handler or patient as the patient moves. Fractious animals may scratch or bite also. There is no way to protect the airway from aerosolised bacteria or fluids including blood, saliva and scaler coolants further endangering the patient.

Veterinarians can properly examine, diagnose and treat dental disease in pets with a professional veterinary dental cleaning. They will use a general anaesthetic because dental disease occurs above and below the gum line and it ensures they can complete a systematic inspection of every single tooth, probe the pockets surrounding the tooth and check for underlying disease.

The anaesthetic ensures the experience is a positive one for your pet because it is unaware of the pain during the procedure and doesn't need to be physically restrained.

The Australian Veterinary Dental Society (AVDS) is the special interest group of the Australian Veterinary Association (AVA).

HOW MAMMALS' BRAINS EVOLVED TO DISTINGUISH ODOURS IS NOTHING TO SNIFF AT

The world is filled with millions upon millions of distinct smells, but how mammals' brains evolved to tell them apart is something of a mystery.

Now, two neuroscientists from the Salk Institute and University of California, San Diego have discovered that at least six types of mammals - from mice to cats - distinguish odours in roughly the same way, using circuitry in the brain that's evolutionarily preserved across species.

"The study yields insights into organizational principles underpinning brain circuitry for olfaction in mammals that may be applied to other parts of the brain and other species," says Charles Stevens, distinguished professor emeritus in Salk's Neurobiology Laboratory and coauthor of the research published in the July 18, 2019 issue of Current Biology.

In brief, the study reveals that the size of each of the three components of the neural network for olfaction scales about the same for each species, starting with receptors in the nose that transmit signals to a cluster of neurons in the front of the brain called the olfactory bulb which, in turn, relays the signals to a "higher functioning" region for odour identification called the piriform cortex.

"These three stages scale with each other, with the relationship of the number of neurons in each stage the same across species," says Shyam Srinivasan, assistant project scientist with UC San Diego's Kavli Institute for Brain and Mind, and the paper's coauthor. "So, if you told me the number of neurons in the nose, I could predict the number in the piriform cortex or the bulb."

The current study builds on research by the same duo, published in 2018, which described how mouse brains process and distinguish odours using what's known as "distributed circuits." Unlike the visual system, for example, where information is transmitted in an orderly manner to specific parts of the visual cortex, the researchers discovered that the olfactory system in mice relies on a combination of connections distributed across the piriform cortex.

Following that paper, Stevens and Srinivasan sought to determine if the distributed neural circuitry revealed in mice is similar in other mammals. For the current work, the researchers analyzed mammal brains of varying sizes and types. Their calculations, plus previous studies over the past few years, were used to estimate brain volumes. Stevens and Srinivasan used a variety of microscopy techniques that let them visualize different types of neurons that form synapses (connections) in the olfactory circuitry.

"We couldn't count every neuron, so we did a survey," says Srinivasan. "The idea is that you take samples from different represented areas, so any irregularities are caught."

The new study revealed that the average number of synapses connecting each functional unit of the olfactory bulb (a glomerulus) to neurons in the piriform cortex is invariant across species.

"It was remarkable to see how these were conserved," says Stevens.

Specifically, identification of individual odours is linked to the strength and combination of firing neurons in the circuit that can be likened to music from a piano whose notes spring from the depression of multiple keys to create chords, or the arrangement of letters that form the words on this page.

"The discrimination of odours is based on the firing rate, the electric pulse that travels down the neuron's axon," says Srinivasan. "One odour, say for coffee, may elicit a slow response in a neuron while the same neuron may respond to chocolate at a faster rate."

This code used for olfaction is different than other parts of the brain.

"We showed that the connectivity parameters and the relationship between different stages of the olfactory circuit are conserved across mammals, suggesting that evolution has used the same design for the circuit across species, but just changed the size to fit the animals' environmental niche," says Stevens.

In the future, Stevens plans to examine other regions of the brain in search of other distributed circuits whose function is based on similar coding found in this study.

Srinivasan says he will focus on how noise or variability in odour coding determines the balance between discrimination and learning, explaining that the variability the duo is finding in their work might be a mechanism for distinguishing odours, which could be applied to making better machine learning or AI systems.

TIPS FOR YOUR CLIENTS TO KEEP THEIR DOG SAFE FROM RATS AND FATAL TOXINS

UNIVERSITY OF SYDNEY EXPERTS ARE WARNING ALL DOG OWNERS IN THE INNER CITY AND THE INNER WEST TO HAVE THEIR DOG VACCINATED AGAINST LEPTOSPIROSIS AND TO STAY AWAY FROM RAT BAITS.

1. Get your dog vaccinated

The current recommendation is for all dog owners in inner Sydney and the inner west to have their dog vaccinated at their local vet. The specific suburbs where leptospirosis has been reported are Surry Hills, Glebe and Darlinghurst. Call your vet for advice as some dogs should not be vaccinated.

2. Avoid rat baits in your home

Avoid putting rat baits in the home or backyard without veterinary advice. The last thing you want is your dog coming across a bait and mistaking it for a treat or toy.

3. Keep your dog away from rat baits

The City of Sydney plans to double the number of rat baits in the inner city and inner west. Rat baits are toxic to dogs. “Thousands of dogs in NSW are affected by rat bait ingestion every year and this can be fatal,” said Dr Anne Fawcett, in the School of Veterinary Science. “If you see your dog eat rat bait seek veterinary attention immediately, as your vet may be able to induce vomiting. Keep your dog on a lead in the vicinity of rat baits. Some dogs are incredibly persistent with chewing and getting things out of containers. It is very important to exercise caution. Do not walk a dog off-leash in affected areas or in the vicinity of rat baits.”

5. Aim to reduce rats around the home and garden

Make sure you don’t leave food outside, including pet food. Remember that rats can chew and eat anything. Secure all rubbish in bins with a tightly-fitted lid and restrict access to compost. “Pest control works best when neighbours join in to control over a big area,” says conservation biologist Professor Peter Banks, from the School of Life and Environmental Sciences. “The other issue is BBQs. Rats can get in and access the fat trays. Keeping your outdoor BBQ clean is a good idea. Having pets makes no difference. Rats are not deterred by cats or dogs.”

5. Know the early signs of illness

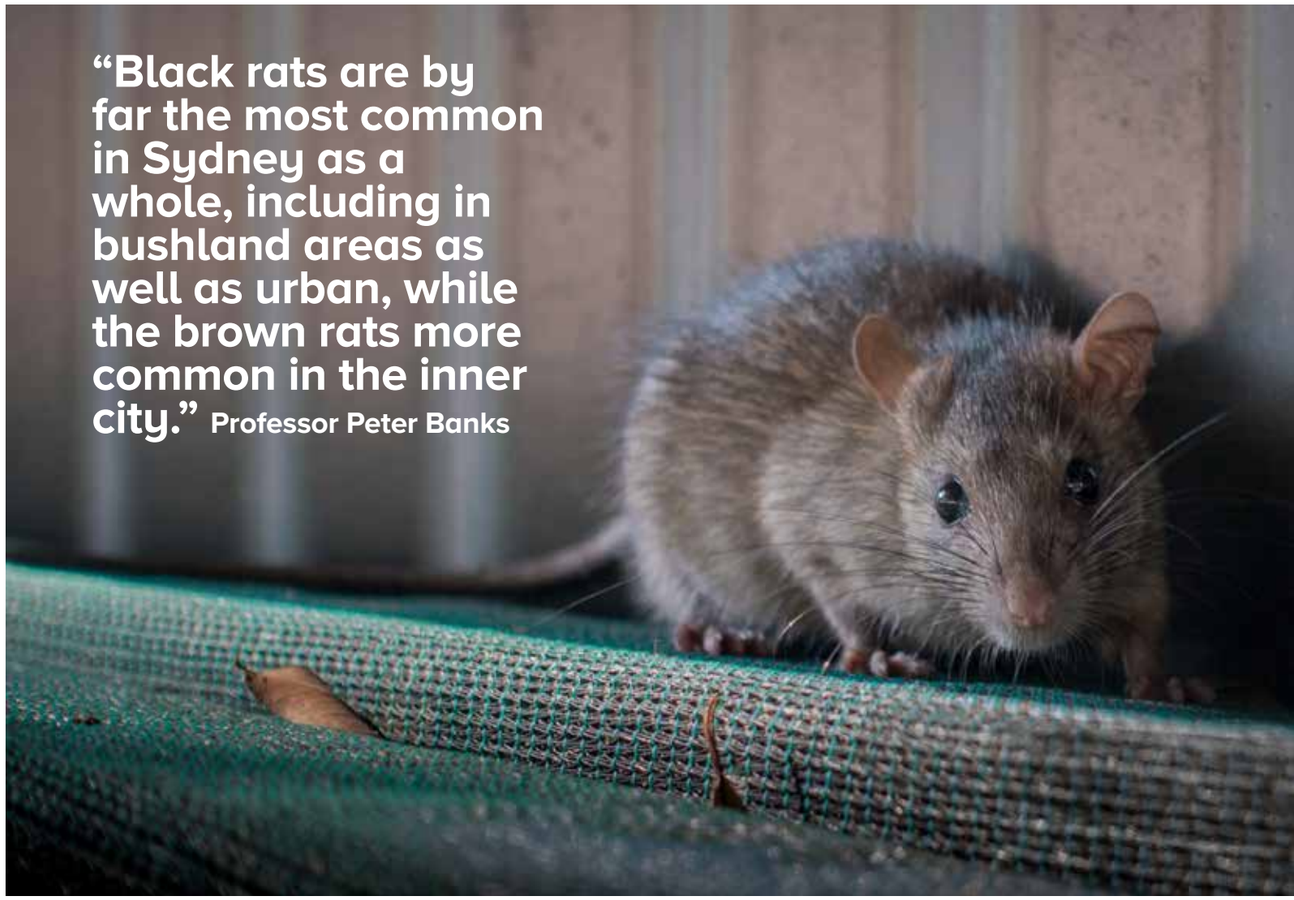
Leptospirosis is a bacterial infection that can cause acute kidney failure and liver disease in dogs. The early signs can be vague – look for fever, lethargy, loss of appetite, vomiting, diarrhea, or a soft cough. If you are worried, go to the vet early.

6. Know the early signs of rat bait poisoning

“If you see your dog eat rat bait seek veterinary attention immediately, as your vet may be able to induce vomiting,” says Dr Fawcett. “Signs of rat bait toxicity include weakness, fatigue, pale gums, bruising and coughing. There is an antidote which is most effective if given early.”

7. Keep your dog on a lead

“We are advising dog owners to walk their dog on a lead in the affected areas,” said Dr Anne Fawcett, from the School of Veterinary Science. “The fatal bacterial infection is spread by rats and other rodents. Dogs can become infected by direct contact (from a rat bite or from eating a rat) and indirect contact (drinking urine-contaminated water or licking contaminated soil).”



Rats in the garden

Brown rats in inner city Sydney. Residents can make their yard less attractive to rats by securing all rubbish in closed bins, keeping a lid on compost and avoid leaving pet food out at night.

Rat problem in Sydney

Six confirmed cases of leptospirosis in the inner west have been reported. All the dogs died or were euthanased. While it is thought that the recent outbreak could be due to major construction occurring in Sydney and therefore increased exposure to rats and contamination of subterranean water, the current source of infection and the strain of bacteria involved is unknown.

The City of Sydney has confirmed it will double the number of rat bait stations in public areas and increase rat monitoring after the outbreak of leptospirosis, which can be fatal for dogs. However, University of Sydney experts are warning rat baits can also be toxic to dogs.

What rat is that?

Conservation biologist Professor Peter Banks, from the School of Life and Environmental Sciences, said there are two main species of rat in Sydney: the brown rat, Rattus norvegicus, also known as the Norway rat and the black rat Rattus rattus, also known as the ship rat or roof rat.

“Both have global distributions, spread by European explorers on ships. Black rats are by far the most common in Sydney as a whole, including in bushland areas as well as urban, while the brown rats more common in the inner city.”

Professor Banks is concerned that rat baits also kill our native Australian rats. “We have more than 60 species of native rat in Australia,” Professor Banks said.

“This includes the water rat or Rakali (indigenous name) Hydromys chrysogaster which can be up to one kilogram and is in Sydney harbour and foreshore areas. Unfortunately, they can also be killed by baiting campaigns - so care should be taken when considering pest rat control near to waterways to protect this species.”

Studying outbreaks

Dr Christine Griebsch, Senior Lecturer in Small Animal Medicine, from the School of Veterinary Science, has issued an alert to all vets to contact their clients in the area to encourage them to bring their dogs in for leptospirosis vaccination. If you are concerned contact your local vet.

Subject to ethics approval, the University of Sydney plans to undertake a study to determine which strains of bacteria are involved and if there is any specific source of infection which can be identified.

“The recent outbreak of leptospirosis poses not only a risk to unvaccinated dogs but also to their owners,” Dr Griebsch said. “This research project will enable us to identify the causative bacterial strain and begin to investigate the epidemiology of this outbreak which is essential for an effective preventative plan.”

RESEARCHERS TRACK HOW CATS' WEIGHTS CHANGE OVER TIME

Are cats getting fatter? Until now, pet owners and veterinarians didn't know for sure. Now University of Guelph researchers have become the first to access data on more than 19 million cats to get a picture of typical weight gain and loss over their lifetimes.

The researchers at University of Guelph's Ontario Veterinary College (OVC) discovered most cats continue to put on weight as they age, and their average weight is on the rise.

The findings, published in the Journal of the American Veterinary Medical Association, reveal that even after cats mature from the kitten phase, their weight still creeps up until they are, on average, eight years old.

This research - the first of its kind to use such a large data pool - provides important baseline information for vets and pet owners about cat weight changes, said Prof. Theresa Bernardo, the IDEXX Chair in Emerging Technologies and Bond-Centered Animal Healthcare.

"As humans, we know we need to strive to maintain a healthy weight, but for cats, there has not been a clear definition of what that is. We simply didn't have the data," said Bernardo. "Establishing the pattern of cat weights over their lifetimes provides us with important clues about their health."

Lead author Dr. Adam Campigotto, along with Bernardo and colleague Dr. Zvonimir Poljak, analyzed 54 million weight measurements taken at vets' offices on 19 million cats as part of his PhD research. The research team broke down the data to stratify any differences over gender, neutering status and breed.

They found male cats tended to reach higher weight peaks than females and spayed or neutered cats tended to be heavier than unaltered cats. Among the four most common purebred breeds (Siamese, Persian, Himalayan and Maine Coon), the mean weight peaked between six and 10 years of age. Among common domestic cats, it peaked at eight years.

As well, the team noted that the mean weight of neutered, eight-year-old domestic cats increased between 1995 and 2005 but remained steady between 2005 and 2015.

"We do have concerns with obesity in middle age, because we know that can lead to diseases for cats, such as diabetes, heart disease, osteoarthritis and cancer," said Campigotto.

"Now that we have this data, we can see that cat weights tend to follow a curve. We don't yet know the ideal weight trajectory, but it's at least a starting point to begin further studies."

The team noted that 52 per cent of the cats among the study group had only one body weight measurement on file, which may suggest their owners did not bring the animals back in for regular vet checkups or took them to a different veterinary clinic.

Bernardo said just as humans need to be aware of maintaining a healthy weight as they age, it's important to monitor weight changes in cats.

"Cats tend to be overlooked because they hide their health problems and they don't see a vet as often as dogs do. So one of our goals is to understand this so that we can see if there are interventions that can provide more years of healthy life to cats."

Discussions about body weight throughout a pet's lifetime could be a useful gateway for veterinarians to engage more cat owners in the health of their pets, she added.

"The monitoring of body weight is an important indicator of health in both humans and animals. It's a data point that is commonly collected at each medical appointment, is simple to monitor at home and is an easy point of entry into data-driven animal wellness."

For owners concerned about their cat's health or weight gain, Campigotto advises buying a scale and getting in the habit of weighing their pet.

"If your cat is gaining or losing weight, it may be an indicator of an underlying problem," he said.

The research team plans to study ways of reducing cat obesity including looking at the use of automated feeders that could dispense the appropriate amount of food for a cat. These feeders could even be equipped with built-in scales.

"We are ultimately changing the emphasis to cat health rather than solely focusing on disease," said Campigotto.

"As we investigate the data and create new knowledge, it will enable veterinarians to offer clients evidence-based wellness plans, allow for earlier identification and treatment of disease and an enhanced quality of life for their animals."

Journal Reference:

Adam J. Campigotto, Zvonimir Poljak, Elizabeth A. Stone, Deborah Stacey, Theresa M. Bernardo. Investigation of relationships between body weight and age among domestic cats stratified by breed and sex. Journal of the American Veterinary Medical Association, 2019; 255 (2): 205 DOI: 10.2460/javma.255.2.205

DO NEWLY DISCOVERED MATING HABITS OF FEMALE TASMANIAN DEVILS HELP OR HURT THE SPECIES?

Wild female Tasmanian devils have mating habits that could pose a challenge for conservationists trying to maintain genetic diversity in species recovery programs, found Morris Animal Foundation-funded researchers at the University of Sydney.

The research team discovered that Tasmanian devil females can be polyandrous, or have multiple mating partners, and their male partners can be younger than once thought. The team published their findings in the Biological Journal of the Linnean Society.

Devil facial tumor disease 1 (DFT1) and the recently discovered devil facial tumor 2 (DFT2) have decimated wild Tasmanian devil populations. Save the Tasmanian Devil Program, an initiative by the Tasmanian and Australian governments, was established to maintain an enduring, ecologically functional population of Tasmanian devils in the wild with a captive, insurance population of animals free from DFT1 and DFT2.

“The good news is that these devils may be changing their life history to adapt to life with the disease in their midst,” said Dr. Tracey Russell, biologist at the University of Sydney and lead author of the paper.

“There are benefits to multiple paternity, including increased genetic diversity of offspring, but this may be problematic in a captive situation, where females have access to more than one male, making the parentage of the offspring unknown and needing to be determined.”

Multiple paternity of litters has been recorded in numerous marsupial species but had not been reported in Tasmanian devils. Dr. Russell’s team studied a population of devils on the Forestier Peninsula, in southeast Tasmania. Researchers extracted DNA from samples of each individual and compared those of the pups to those of potential fathers to identify sires.

The researchers discovered four out of the nine litters tested showed multiple siring of offspring. Even more interestingly, some of the sires were yearlings. Devils are thought to be sexually mature at 2 years old. While females have been observed to breed as yearlings in disease-ravaged areas, this is the first record of males doing so.

As this is a newly discovered phenomenon, it’s not yet known if multiple paternity increases offspring survival in the wild. However, in many species, polyandry offers potential benefits, such as reduced risk of male infanticide of offspring and increased genetic diversity of offspring.

DFTD1 and DFT2 are highly unique forms of transmissible cancers that are passed from one devil to another through biting, a common behaviour that takes place during feeding and mating. Most infected Tasmanian devils die within three to six months of developing visible tumors. Primary tumors typically develop on the face or inside the mouth, and quickly grow into large tumors that metastasize to the internal organs.

When these cancers ravage a population, it is usually the older devils that succumb to the disease, since they tend to be the ones inflicting penetrating bites to each other. As the older devils die, younger devils are left without competition from larger males to breed with the females.

“This newly discovered potential adaptation is an important finding, in addition to efforts to find a cure for both diseases, as we seek to save the Tasmanian devil from extinction,” said Dr. Janet Patterson-Kane, Morris Animal Foundation Chief Scientific Officer. “The devils are in an evolutionary arms race with devil facial tumor disease and we continue to do all we can to increase their odds of success.”

Morris Animal Foundation is one of the largest nonprofit animal health research organizations in the world, funding more than $126 million in studies across a broad range of species since 1948. The Foundation is one of only a few organizations funding wildlife health research, particularly for endangered and at-risk wildlife species, including Tasmanian devils. The Foundation has funded numerous studies to understand and treat DFT1 and DFT2.

RESEARCHERS FIND LOW GENETIC DIVERSITY IN DOMESTIC FERRETS

University of Wyoming researchers studied inbred domestic ferrets and determined the mammals have low genetic diversity on a global scale, according to a paper recently published in Evolutionary Applications.

This type of domestication can result in only a few individuals contributing to the gene pool of the domestic species, followed by a further reduction in genetic diversity when animals are bred for human-desired traits. Without genetic diversity, animals are at risk of genetic disorders and disease.

“Low genetic diversity in ferrets has incredibly important implications, because the ferret is now a common pet, a laboratory model organism for diseases such as influenza and SARS, and ferrets that have become feral can negatively impact native species and ecosystems,” says Kyle Gustafson, a UW postdoctoral conservation geneticist.

“Previous studies have shown artificially breeding for specific ferret coat colours can be associated with genetically determined physical abnormalities. Additionally, the mechanism for increasing cancer rates in pet ferret populations is currently unknown.”

Gustafson, of Perham, Minn., was lead author of a paper, titled “Founder Events, Isolation and Inbreeding: Intercontinental Genetic Structure of the Domestic Ferret,” that appeared in the Oct. 23 online publication Evolutionary Applications, a fully peer-reviewed, open-access journal that publishes papers that utilize concepts from evolutionary biology to address biological questions of health, social and economic relevance.

Holly Ernest, a UW professor of wildlife genomics and disease ecology, and Wyoming Excellence Chair in Disease Ecology, was senior author of the paper. Other co-authors include Michelle Hawkins and Tracy Drazenovich, both from the School of Veterinary Medicine at the University of California-Davis; Susan Brown, a veterinarian from Rosehaven Exotic Animal Services in Batavia, Ill; and Robert Church of BCPhoto in Columbia, Mo.

Gustafson, Ernest and Drazenovich completed the genetic component of this study. Hawkins and Brown helped design the study along with Church, a ferret expert, who traveled around the globe collecting DNA from domestic ferrets.

The study genotyped 765 ferrets (from 11 countries) at 31 genetic markers.

“It (study) definitely applies to any breeding program, whether in zoos or domestic cattle in Wyoming or elsewhere,” Gustafson says.

Inbreeding is almost always a concern in zoos where animals are maintained at extremely low numbers. However, domestication events can result in similar losses of population genetic diversity. For example, pet ferrets, or Mustela putorius furo, were domesticated from wild European polecats and have been bred for specific traits, such as coat colour and temperament. These domestic ferrets were transported from Europe to multiple continents and are now dependent upon humans for their survival.

Domestic ferrets are different from wild North American black-footed ferrets (Mustela nigripes), which experienced catastrophic population losses resulting from disease.

Researchers reported that the domestic ferrets in North America and Australia had extremely low genetic diversity, whereas ferrets in Europe had higher genetic diversity, as periodic hybridization with wild polecats appears to occur.

However, all the countries sampled had ferrets with lower genetic diversity than their wild ancestors.

“If low genetic diversity is a contributor to certain diseases, as has been shown in other systems, ferrets in Australia, Canada, New Zealand and the United States could be most at risk,” Ernest says.

The majority of domestic ferrets contract cancer by age 5 or 6, but not all die at those ages, Gustafson says.

“Cancer in these ferrets was the underlying genetic issue that was the impetus for the study,” he says.

The researchers recommend that breeding programs would benefit by incorporating genetically diverse ferrets from other countries into their breeding programs, including ferrets from Europe, where genetic diversity is much higher. However, international importation and exportation laws limit the potential for introducing new genetic material in some countries, such as Australia and New Zealand.

Thus, breeders should actively minimize inbreeding among ferrets in these countries. Further breeding programs should be cautious to ensure diseases are not introduced through international transportation.

“Pet ferrets could pose a risk to wild polecat species by introducing their poor genetic material into wild polecat populations,” Ernest explains. “Any attempts to enhance the genetic diversity of ferrets by using wild polecats should be done ethically and legally, and should ensure that domestic ferrets do not breed into wild ferret or polecat populations.”

AUSTRALIA'S FIRST FAST-TRACKED EMERGENCY AND CRITICAL CARE PROGRAM LAUNCHED

Animal Emergency Service (AES) and Improve International have partnered to launch the AES Accelerated Emergency Program, a fast-tracked emergency and critical care program available to veterinarians in the APAC region from October 2019.

Delivered by leading veterinary educator, Improve International, the AES Accelerated Emergency Program is designed specifically for veterinarians, including recent graduates, who want to transition into emergency practice.

AES Accelerated consists of 15 online weekly modules, designed to update critical care knowledge quickly and more affordably than other Continuing Education (CE) programs.

The program provides participants with current best-practice diagnostic, treatment and management protocols of frequently seen emergency disorders. Unlike other programs, with limited one-on-one tutor time, participants will also have weekly virtual tutorials, facilitated by experienced AES veterinarians - both to review module material and discuss real-life cases.

The AES Accelerated Emergency Program was originally developed by AES, to allow new employees to find their feet in the fast-paced emergency room setting. The program empowers veterinarians to 'think' like an emergency clinician and to rapidly transition into work in busy critical care hospitals.

"Although the content is similar to a 12-month program, we needed to fast-track it because our vets couldn't work in our hospitals for a year waiting to cover some of the key decision-making processes," explains Dr Rob Webster, Co-Founder and Director of Animal Emergency Service and Accelerated Committee Member.

"By having all new employees complete this course it establishes a consistent approach to case management, despite very different backgrounds and experience," says Dr Webster.

"Thanks to our partnership with Improve International, we will now be able to share the AES Accelerated Emergency Program with veterinarians across not only Australia, but the whole APC region,"

AES veterinarian Dr Danielle Huston, an AES Accelerated Emergency Program facilitator, has been through the program herself and found as well as providing a knowledge in diagnostics - the course also builds confidence in the management of emergency cases.

"As a new graduate starting in emergency, the learning curve is very steep, and I found the AES Accelerated Emergency Program has built on the basic emergency medicine and surgery syllabus taught in university. After completing the program, I am far more confident in stabilising and treating critical patients".

PROGRAM DETAILS

Name: AES Accelerated Emergency Program
Time frame: 15-weeks
Delivery: Online
Qualifications: 75 CPD units, Certificate of Completion upon completion of elective exam

Cost: $3,450

Animal Emergency Service is an after-hours specialised veterinary clinic network providing urgent medical care to pets and wildlife. Established in 2005 there are now four clinics in Queensland, located in Underwood, Jindalee, Carrara and Tanawha. AES also owns the only privately-owned Pet ICU in Australia, located in Queensland.

Website: animalemergencyservice.com.au

Improve International was established as a veterinary education company 20 years ago by a dedicated group of veterinary surgeons in the UK. It has now expanded across the globe with offices in the UK, Europe, Australia and New Zealand. They provide the highest quality of continuing veterinary education to practicing veterinarians through year-long and fast-tacked courses.

Website: improveinternational.com.au

AES Accelerated Emergency Program Committee designed this course from the programs developed at each Animal Emergency Service clinics. Committee members:

- Dr Gerardo Poli BVSc (Hons) MANZCVS (ECC) MVS (Small Animal Practice)
- Dr Courtney Reddrup BSc (BBiol) Hons BVSc BVMS MANZCVS (ECC)
- Dr Ellie Leister BVSc (Hons) FANZCVS (ECC)
- Dr Rob Webster BVSc (Hons) FANZCVS (ECC)

The course moderator is Dr Philomena Kwong BVSc (Hons) MVS (Small Animal Practice)

For more information about the AES Accelerated Emergency Program visit improveinternational.com.au/courses/accelerate-emergency-program

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