Fellowship of Animal Behaviour Clinicians

Q & A Session for the Veterinary team – Neutering and behaviour in companion animals - 22nd September 2021

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(Please note some of the questions have been re-worded to summarise them and additions have been made to a few of the answers. Where it was felt inappropriate or difficult to answer particular questions in an open forum, the questioners have been contacted individually and offered relevant help and advice.)

Q. I have a Romanian Rescue dog who came to us at 5 months old. He is intact. Many people tell me that due to his extreme anxiety around main roads, strangers and noise that if we neuter him, he will stay at this high level of anxiety. However, he is displaying roaming behaviours, can be very excitable at times and some others say that having him neutered will help calm him and make him easier to train to help combat the anxiety. Please can I have your thoughts on this.

A. CW and LN: My answer depends on how old your dog is currently and whether the roaming behaviours and excitability are likely to be influenced by testosterone or not. As discussed in the presentation there is some evidence that neutering can be associated with increased fearfulness and anxiety. If he were showing no problem behaviours likely to be associated with testosterone, from a behavioural perspective it would probably be best to leave him entire.

If he is roaming in search of bitches, then this is very likely to be a testosterone-influenced behaviour. If he is escaping to go hunting or for other reasons, this will not be testosterone related. If he is generally excitable and still fairly young (adolescent), this is very unlikely to be testosterone influenced, and very unlikely to improve with castration. However if he is becoming excitable in response to encountering or smelling in-season bitches, this may improve with castration.

I would strongly recommend that you get a good behavioural assessment to determine whether or not any of these behaviour problems are likely to be testosterone related. If they are not then it would be best to work with the behaviourist to address the various problem behaviours and particularly the dog's anxiety, and leave him entire.

If some of these behaviours do seem to be testosterone-influenced, it would still be worth doing some behavioural work with them, as well as his fear and anxiety-related issues, to see if they will respond to management and training alone. A deslorelin (Suprelorin) implant would also allow you to assess what effect if any castration is likely to have on his behaviour without doing anything permanent and irreversible. If your dog seems more anxious or fearful after the implant this would suggest that castration would not be beneficial for him. However, if his behaviour improves significantly from 4-6 weeks after having the implant, this suggests that castration might be beneficial from a behavioural point of view. However, the process of neutering him will need to be handled with great care, to ensure that this does not itself

increase his fearfulness. If he is still quite young, ideally wait until the end of the adolescent period before having him neutered. Also, consider using situational medication if he is likely to be scared of coming into the surgery or being handled.

Q. There was always a popular belief that neutering should be done as a matter of course in dog ownership. However I believe there is more evidence to show this is not always the case and yet many rescues still insist on neutering, writing it into their contracts. My question is two fold….
1. Should a male dog be neutered if they show signs of anxiety? and 2. Should a certain amount of trust be put in the owner to make the right decision after all they are the one with the dog all the time not the rescue!

A. LN: A major concern for rescue centres is reducing the numbers of unwanted dogs, and neutering is an important part of this. However, some of the larger rescue organisations including the RSPCA and Dogs Trust have changed their approach to neutering male dogs, particularly those showing signs of fear and distress whilst in the rescue centre. Instead of just going ahead and neutering these dogs anyway, dogs that are fearful, anxious or distressed will be referred to a behaviourist and decisions regarding neutering will be made on a case-by-case basis. In most cases neutering will be delayed until a dog has received behavioural support and is less fearful and anxious. On occasions, at the RSPCA at least. male dogs will be adopted out entire, but with specific behavioural recommendations for the owners to follow. Hopefully other charities are or will start to show a more individual approach to neutering, particularly for fearful male dogs.

Q. Do you think the fear behaviour we see post neutering operations could be related to the stress of having elective surgery where this is the first time most pets have been handled by strangers away from their owners in a very strange and stressful environment? and not due to the hormones being removed? also poor peri operative analgesia? I would like to encourage pets to go for a half day stay in the vets kennels where all they get is TLC before they go for an elective op so they get a positive experience?

A. CW: Yes, I absolutely agree that negative experiences during the process of being neutered and/or poor perioperative analgesia are very likely to contribute to animals becoming fearful after neutering. I also think the idea of arranging for animals to have a positive experience in the vet's kennels before elective surgery is an excellent one!

Q. With the large female breeds of dogs we are trying to follow the study done by Hart, B.L., Hart, L.A., Thigpen, A.P. and Willits, N.H., 2020. Assisting decision-making on age of neutering for 35 breeds of dogs: associated joint disorders, cancers, and urinary incontinence. Frontiers in Veterinary Science, 7, p.388. which would mean they have more than one season. Owners are reluctant to go through more than one season with their dogs - what do you think about this study? We always advised neutering after the first season before this study.

A. CW: This study is very interesting, and certainly suggests that there are genetic influences on the risk of dogs developing particular types of health problems such as different types of neoplasia, and also the likelihood of this risk being altered by neutering. However, some of the breeds are represented by fairly low numbers of dogs and in those cases I am not sure how representative the findings are for the general population of dogs of that breed. The study is

also based on retrospective records, so there is no way of knowing why some dogs were neutered and others left entire, which could also influence the findings.

However, this study and the other study they did looking at cross-breed dogs of varying weight categories (Hart et al, 2020b in the reference list at the end of the slides) appear to clearly demonstrate there is an increased risk in neutering larger dogs earlier, particularly with regard to developing joint disorders such as hip dysplasia, elbow dysplasia and cranial cruciate ligament rupture in both dogs and bitches, and also urinary incontinence in bitches.

The study looking at crossbreed dogs (Hart et al 2020b) suggests that for bitches weighing 20 kg or more it is sensible to wait until they are over a year old before they are spayed, which for most larger bitches would mean they will only have one season before they are spayed. However, one of the proposed reasons for an increased risk of joint problems is that early neutering, before the skeleton is fully mature, delays closure of the growth plates in the long bones, resulting in bones growing longer and potentially causing changes in joint alignment that increase the risk of joint problems.

Bearing this in mind, it would be sensible to delay spaying until a bitch is fully skeletally mature and all the growth plates likely to have closed. Geiger et al 2016 (doi: 10.1186/s40851-016-0055-2) suggest most breeds (apart from chondrodysplastic dogs such as Dachshunds) reach skeletal maturity between 10-11 months of age. However other studies suggest that growth plate closure may occur later in larger breeds, and that giant breeds may not be fully grown until around 15 months of age (e.g. Hawthorne et al, 2014 DOI:10.1093/jn/134.8.2027S). If neutering is delayed until after then, the bitch may well have more than one season before she is spayed. This needs to be included in the discussion with owners about the risks and benefits of neutering. If the owners can manage the seasons safely it is probably sensible to delay neutering until the bitch is skeletally mature and the growth plates have closed to reduce the risk of her developing joint problems as she gets older.

Q. A 2017 paper (Maclean et al, 2017 https://www.frontiersin.org/articles/10.3389/fpsyg.2017.01613/full) mentions that although, testosterone is positively associated with aggression in many species, studies of androgens and aggression in dogs have been largely inconclusive. Moreover, oxytocin and arginine vasopressin also play major roles in the inhibition and facilitation of aggressive behaviours. With that in mind, would it be reasonable to recommend castration if an owner is requesting for it based on behavioural reasons? Would you also be concerned that castrating the dog could potentially exacerbate the aggression if it was nervous/fear-based aggression?

A. CW: I agree that there are conflicting findings with regard to the likely effect of castration on aggressive behaviour in male dogs, with some studies suggesting that castration can reduce aggressive behaviour, some that it may increase it and some suggesting that it does not have any effect either way. It is likely that some of these discrepancies are due to the fact that aggressive behaviours can have very differing motivations, and some of these are more likely to be directly influenced by testosterone than others. Also, as discussed during the presentation, behaviour is a product of a number of different factors including genetic and environmental influences and learning, and the presence or absence of sex hormones is only one factor amongst many. That said, I think it would be reasonable to recommend castration as part of the

treatment plan for a dog showing problem behaviours that are highly likely to be directly influenced by testosterone such as mounting, urine marking, roaming in search of bitches and potentially in cases where dogs are becoming frustrated around entire bitches or showing aggressive behaviour to other male dogs. This should be supported by behaviour modification to address any learned aspects of the behaviour.

However as there is evidence that castration can be associated with increased fearfulness, I would not suggest castrating a fearful dog that was not showing any problem behaviours likely to be directly influenced by testosterone. This would also apply to dogs showing fear-related aggressive behaviours: it would be sensible to do a thorough behavioural assessment and focus on reducing the dog's fearfulness both generally and in the problem situations. If it appears that the dog's behaviour is being exacerbated by testosterone, or if there are risks of unwanted mating etc, castration may need to be considered. In this case it would be sensible to try a delmadinone (Suprelorin) implant first, in order to assess the effect of reducing testosterone without doing anything permanent, just in case reducing testosterone has a significant detrimental effect on the dog's behaviour.

Q. Testosterone have been demonstrated to have a pivotal role in bone and muscle development, cognitive and potentially cardiovascular health. Neutering has also shown to predispose a dog to osteosarcoma, hemangiosarcoma and prostate cancers (All of which are relatively common compared to testicular related diseases). I would agree that castration should be recommended for population control but in the context that the owner is responsible enough and able to ensure that it does not mate with entire bitches would you still recommend castration to the owner?

A. CW: the evidence we have at present seems to suggest that, from a health-related perspective, the potential risks associated with castration may very slightly outweigh the benefits for male dogs, and that if they are reliably prevented from mating and showing no undesirable testosterone influenced behaviour they may benefit from remaining entire. However, the risks and benefits may vary from one dog to another, and I think we need better quality evidence from large scale longitudinal studies such as Generation Pup before we can be confident we can make the best decisions for individual dogs. There may also be other reasons why an owner might want to have a male dog castrated, for example because they need to go into day-care or kennels, and they won't accept entire males. Rather than recommending castration I would outline the potential risks and benefits as well as I could and then allow the owner to decide whether or not to have their dog castrated.

Q. What are your thoughts on testosterone replacement therapy (Not supraphysiological doses but within the efficacious range) especially for neutered (and maybe entire?) dogs with nervous/fear-based aggression?

A. CW: the evidence we have at present seems to suggest that, from a health-related perspective, the potential risks associated with castration may very slightly outweigh the benefits for male dogs, and that if they are reliably prevented from mating and showing no undesirable testosterone influenced behaviour they may benefit from remaining entire. However, the risks and benefits may vary from one dog to another and I think we need better quality evidence from large scale longitudinal studies such as Generation Pup before we can be confident we can make the best decisions for individual dogs. There may also be other reasons why an

owner might want to have a male dog castrated, for example because they need to go into day-care or kennels, and they won't accept entire males. Rather than recommending castration I would outline the potential risks and benefits as well as I could and then allow the owner to decide whether or not to have their dog castrated.

Q. What's the stance on dachshunds and IVDD risk? I've read a mix of literature. Is there an age you'd recommend for neutering this breed?

A: CW Dachshunds are particularly prone to IVDD because they are chondrodysplastic, which predisposes them to early intravertebral disc degeneration and potentially herniation. There are many factors believed to contribute to the risk of IVDD including genetics, lifestyle, diet, obesity etc. as explored by Packer et al (2015) https://doi.org/10.1186/s40575-016-0039-8 They also found that the risk of IVDD was higher in neutered dogs compared to entire

Dorn & Seath (2018) https://doi.org/10.1186/s40575-018-0067-7 suggests that neutering is associated with an increased risk of IVDD in female dachshunds, and that this risk is further increased if spayed before a year of age. Bitches spayed before a year of age had 2 x risk of IVDD compared to entire bitches. There was a slightly smaller increased risk of IVDD in males neutered before 12 months compared to entire males but the difference between males neutered older than 12 months and entire males was not significant.

Based on this study, in order to reduce the risk of IVDD it would seem to be sensible to delay neutering both male and female dachshunds until they are at least a year of age, and potentially to consider not spaying females at all. However, this study did not distinguish between different varieties of Dachshunds, which may differ in their age-related susceptibilities to the effects of neutering on the incidence of IVDD, and it does not take into consideration the likelihood of unwanted mating or the potential risks from other diseases prevalent in entire bitches such as pyometra or mammary tumours. We also don't know how much of the increased risk associated with neutering is related to increased obesity, and if so whether weight control and environmental management could help to counter some of the adverse effects of neutering. Again we need to wait for the information from long-term longitudinal studies such as Generation Pup before we can be confident that we are making the most effective decisions regarding when and whether to neuter individual Dachshunds.

Q. Is it correct that neutering bitches too young can cause nervousness? And if they have nervous traits should the neutering be delayed such like we would with a male dog?

A. CW: There is evidence that neutering can be associated with increased fearfulness in both dogs and bitches, and several studies suggest that the risk of fear-related problem behaviours is increased in bitches that are neutered at a younger age. However unlike with male dogs, for bitches the health risks associated with remaining entire appear to be greater than those associated with being neutered, at least based on the information we have at present. So yes it would be sensible to delay neutering a nervous bitch, ideally until after the end of adolescence, both to reduce the risk of increasing her fearfulness as much as possible but also to give more time to work on reducing her fearfulness, both generally and also building her confidence in any specific problem situations before she is spayed. However, owners must be very careful to ensure there is no risk of her being mated when she comes into season. When she is spayed,

this must be handled very carefully to ensure the process of being spayed does not further increase her fearfulness, as outlined for fearful male dogs above.

Q. Does being an entire male dog potentially cause them to become a target to other male dogs in public

A. LN: I have never seen this.
CW: I have come across this a few times, where an entire male dog has appeared to be the target of aggressive behaviour from other, often neutered, male dogs. As far as the dog's owner is aware their dog has not actually done anything to cause the other dogs to feel threatened. I am not sure why this happens. It could possibly be a learned negative association from previous encounters with entire male dogs on the other dogs' parts? Or possibly something about the dog's pheromones that causes the other dogs to find him threatening? It is very difficult to advise owners of these dogs because it is the behaviour of the other dogs that is problematic. I am aware of a couple of cases where the owners have had their dogs castrated and found that they were less likely to be targeted by other male dogs afterwards, but this is very anecdotal.

Q: Do you know if neutering can affect reactive dog behaviour? My dog was neutered at 4 months old by a rescue and now is really nervous reactive to other dogs and people.

A. CW: There is some evidence that neutering when young can be associated with an increased risk of fearfulness, and potentially also aggressive behaviours directed towards unfamiliar people and dogs (McGreevey et al, 2018; Starling et al, 2019). However, your dog's behaviour will be influenced by many other factors including genes, early experiences, environmental factors, health etc. And given his history of being in a rescue centre at such a young age he may well have had negative experiences associated with people and other dogs that have also contributed to his problem behaviours. Therefore, it is very difficult to know how big a part early neutering has played in the development of his behaviour. It would be sensible to focus on reducing his fearfulness, ideally with some good behavioural support and behaviourally-active medication if appropriate, and to ensure there are no health-related problems that might be contributing to his behaviour. Also, see answer to the question above regarding the potential pros and cons of testosterone replacement therapy in castrated male dogs.

Q. Was the increased risk of fearfulness in the studies by McGreevey et al 2018 and Starling et al, 2019 found to be related to a specific fear (e.g. sound sensitivity) or general fearfulness?

A. CW: These studies looked at fearfulness in a range of different contexts, grouped as:

- fear of unfamiliar situations and objects
- noise-related fear
- fear associated with handling and grooming including clipping nails and being examined by a vet
- fear of being approached by unfamiliar dogs and children

Q. A lot of vets decide to not neuter males if they are fearful and recommend the implant. Could you expand on that and the benefit from that?

A. CW: A deslorelin (Suprelorin) implant is currently the most reliable way of assessing the behavioural effect of reducing testosterone in a male dog without doing anything permanent such as surgical castration. This is particularly useful if there is a possibility that castration will

have a detrimental effect on a dog's behaviour, for example if they are already fearful and there is a possibility that this will become worse when testosterone is reduced.

Deslorelin is a GnRH agonist, and it works by increasing Luteinising Hormone (LH) and testosterone initially, then the LH receptors down-regulate so LH and testosterone both reduce. By 4-6 weeks after the implant is inserted testosterone will fall to post-castration levels and remain at this level for about 4-6 months if the 4.7 mg implant is given, or up to a year if the 9.4 mg implant is used. Its licensed use is to temporarily reduce fertility in male dogs. When used for behavioural reasons it is being used off license.

It is generally accepted that if a dog's behaviour improves from 4-6 weeks after the implant is inserted then castration is likely to have the same effect. If castration is being considered then it is sensible to do this before the effect of the implant wears off.

There are a few potential issues associated with the use of deslorelin.

- the needle is quite large so injections can potentially be painful. This can make the experience unpleasant, which is a concern if dogs are already worried about being handled or injected in the veterinary surgery. It may be necessary to use situational medication before the injection is given to reduce the risk of the dog becoming more fearful. ? Could also consider using EMLA cream on injection site although this needs to be applied at least 30 mins ahead of time.
- the implant works by causing an initial increase in LH and testosterone in the first couple of weeks after insertion, before the levels start to fall. This can cause a temporary increase in any problem behaviours that are directly influenced by testosterone. Owners need to be aware of this possibility and of the importance of avoiding potential problem situations if they can.
- Although deslorelin is currently the most accurate way of assessing behaviour post castration, it does not totally replicate the effect of castration because castration is followed by an increase in LH (due to loss of negative feedback from testosterone) while deslorelin reduces LH as well as testosterone. This has not been considered to be a problem in the past, but there is increasing recognition that increased LH can have adverse effects on physical health and possibly behaviour as well, so it is possible that deslorelin does not mimic the effects of castration as accurately as was previously thought.

Q. Are there any female equivalents of suprelorin?

A. Suprelorin has been used (off license) to influence fertility in bitches as well as in male dogs. It works in a similar way, initially increasing GnRH, which increases FSH and LH production from the anterior pituitary, which will generally trigger the bitch to ovulate and come into season, generally within a couple of weeks. The FSH and LH receptors then down-regulate and the bitch will enter an anoestrus period which can last for around a year. There are good summaries of the uses of deslorelin in dogs of both sexes as well as other species including cats and ferrets in Lucas, 2014 https://doi.org/10.1111/rda.12388 , and of its effects on behaviour and fertility in dogs and cats in Goericke-Pesch, 2016 https://doi.org/10.1111/rda.12898

Q. Is Tardak still available? I thought it was gone now

A. CW That is a good question, and I'm sorry I can't answer it. I have heard from various people that Tardak has become difficult to get hold of, but I can't find any official information to say it has been withdrawn from the market. I am not sure if this is a supply-related problem or a permanent issue.

Q. Pseudopregnancy - if needing to treat / resolve before able to spay - 2 or 3 weeks course of Cabergoline? How about if there is STILL milk in mamm. glands after a 3 weeks course? Galastop is so expensive... and we've seen a few bitches that seem to never ' dry up' prior to being spayed.... if we DO cause a persistent pseudopregnancy by accidentally spaying when having a false preg - what can we do about it??

A. CW: If a bitch has a pseudopregnancy that is not associated with any problematic physical or behavioural signs it may be fine to leave it to run its course without any treatment. However, if there are problematic physical or behavioural signs, or if there are other reasons that it needs to be resolved quickly, cabergoline is the most common anti-prolactin drug used. If the pseudopregnancy does not seem to be resolving after a 3 week course of cabergoline it is worth checking that there is no other reason for this such as hypothyroidism for example. For excessive milk production it is also important to check that the bitch is not stimulating further milk production by licking herself, and if she is it may be necessary to use some sort of comfy collar/doughnut-type collar to prevent this, alongside plenty of enrichment and activities to keep her occupied. It can take a while for everything to settle down, and it is important to delay the spay operation until you are sure the physical and behavioural signs of pseudopregnancy have gone. If the pseudopregnancy persists despite everything it might be worth trying a different prolactin-reducing drug such as bromocriptine or metergoline instead?

For bitches that are not obviously pseudopregnant, waiting as long as possible, i.e. 3-4 months after the end of the season before spaying, should reduce the risk of triggering a post-spay pseudopregnancy although this is not totally guaranteed.

If a post-spay pseudopregnancy is triggered, treatment will involve the use of anti-prolactin drugs as above. Anecdotally slightly longer courses of drugs may need to be used to completely resolve the clinical signs but in my experience the physical and behavioural signs do usually resolve eventually.

Q. What are the current stats for mammary tumours when neutering? Before first season, after first, after second etc?

A. CW: Beauvais et al, 2012 did a systematic review of the existing studies looking at the effect of age of neutering on the incidence of mammary tumours and found that the evidence for any effect of age of spaying on the incidence of mammary tumours in bitches was fairly weak. Since then, there have been various other studies that have looked at risk of development of mammary tumours amongst other health problems in bitches but again these studies are not that strong because they have all been retrospective and many have not included sufficient numbers of elderly bitches, that would be most likely to develop mammary tumours. There also appear to be strong genetic influences on the likelihood of dogs developing mammary tumours, as for other types of neoplasia. So again, we really need to wait for the results of large-scale longitudinal studies such as Generation Pup to give us a clearer picture of how neutering and age of neutering affects the risk of development of mammary tumours in bitches.

Q. Thoughts on performing a vasectomy instead of castration for population control in dogs?

A. CW I think vasectomy is a very good way of preventing unwanted breeding without increasing the risk of any of the adverse health-related effects associated with lowered testosterone. One potential problem is that it will not reduce problem behaviours associated with testosterone, such as desire to seek out and mate with bitches. Owners will still need to be very careful to manage their dog to prevent them roaming, and the dog may still become frustrated if he can smell bitches in season and not get to them. However, if this proves to be problematic there is still the option to castrate, or to use chemical castration such as Tardak (assuming it is still available!) at particular problem times. The other potential problem is that I am not sure how comfortable most vets are with doing this procedure: it may be difficult for owners to find a vet that is prepared to do it and proficient with the surgical technique.

Q. Any thoughts on ovario-sparing spays (as long as the dog is not showing pseudo pregnancy or season dependant aggression etc)

A. CW: As with vasectomy, an ovary-sparing spay (removing the uterus including the cervix but leaving the ovaries intact) will prevent unwanted breeding, but will not prevent any undesirable behaviours associated with seasons or potentially pseudopregnancies. The bitch is also likely to be attractive to male dogs when she has a season, even though she will not produce a discharge. There are also some potential health risks associated with Ovary-sparing spays such as stump-pyometra if any part of the cervix is left behind. I am afraid I don't know how the overall risks of health problems after an ovary-sparing spay compare with those after a conventional ovariohysterectomy or those in entire bitches. It would also be interesting to look at this after laparoscopic spays (ovariectomy only), as anecdotally bitches seem to recover much quicker after these. Also, as with vasectomy, it may not be easy to find vets that are comfortable and proficient to perform ovary sparing spays.

Q. When is the best time to put rabbits together after they have been neutered (both of opposite sex and wounds healed). I hear conflicting information sometimes?

A. CW As mentioned during the talk, ideally it would be best not to separate them at all, but instead have them both in the surgery together, and just separate them during their surgery and post-surgical recovery. If they are separated for longer it can sometimes be difficult to reintroduce them, especially if one or both smells different after being hospitalised. However, owners need to be aware to watch them carefully and if one is bothering the other (e.g. the male attempting to mate with the female) they may need to be separated temporarily, ideally using a mesh barrier that keeps them apart physically but allows them to smell and sit near each other. One reason often given for keeping male and female rabbits separate after neutering is if a male rabbit is castrated after puberty he can remain fertile for about 3-4 weeks afterwards. This is only likely to be a problem if he is being put back in with an entire female, or if he is being introduced to other unfamiliar rabbits. In either case it is best to wait 30 days before introducing or re-introducing him.

Q. Can you discuss the orthopaedic conditions associated with early neutering?

A. CW The studies that have looked at the effect of early neutering on orthopaedic problems suggest that early neutering is associated with an increased risk of problems associated with a number of conditions including hip dysplasia, elbow dysplasia and cranial cruciate ligament

rupture. There are references to many of the more recent studies at the end of the slides, and it is well worth reading them. Hart et al, 2020 a outlines one potential reason for this increased risk, associated with delayed closure of long bone growth plates in pups neutered before puberty. There may also be other potential contributing factors such as loss of bone density and reduced muscle and ligament strength associated with reduced levels of sex hormones in both males and females. Some of these are outlined in the paper by Kutzler, 2020. There also seems to be an increased risk of IVDD in dachshunds neutered before a year of age, as outlined in the Dorn & Seath paper mentioned above (Dorn & Seath, 2018) https://doi.org/10.1186/s40575-018-0067-7

Finally, a note regarding Generation Pup, the longitudinal study being run by Dogs Trust and University of Bristol. (I must apologise for saying RVC instead of University of Bristol during the presentation!) Thank you Caroline for mentioning 'Generation Pup'. Just a note to everyone, we are still recruiting puppies and so if any vet practices want recruitment material please email us on generationpup@dogstrust.org.uk or visit our website generationpup.ac.uk. Thank you.