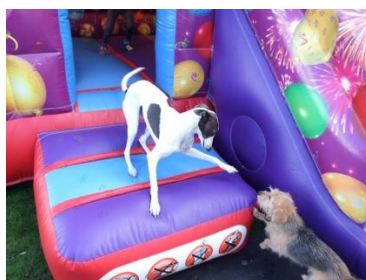




# **Puppies and Behaviour: Helping Owners to get it Right Mini Series**

## **Session Three: Canine Adolescence and Case Studies**

**Clare Wilson MA VetMB CCAB MRCVS PGDipCABC**



**CPD Solutions Puppies Session 3**  
**Delegate Notes**  
**Canine Adolescence and Case Studies**

**Adolescent brain and behavioural changes**

As our imaging capabilities are becoming increasingly advanced, we are learning more and more about brain development in adolescent humans. Many social mammals show similar behavioural changes to humans during adolescence and, given their similar brain anatomy, it can be inferred that they are likely to be experiencing similar structural brain changes. During adolescence in humans there is a notable decrease in grey matter through 'pruning' of un-used neural connections and an increase in white matter through myelination. These changes are associated with significant effects on behaviour in human adolescents that are also seen in nearly all social animals:

- Increased risk taking
- Increased novelty seeking
- More susceptible to peer influence
- Social affiliation shift towards peer interactions
- Impulse control one of the later functions to develop

Although associated with danger these changes are evolutionary advantageous as they encourage separation from the dependence on the family group to reduce the risks of in-breeding.

**What is the adolescent period?**

Sexual and social maturity are different, with sexual maturity in dogs usually being reached by around 9-12 months of age and social maturity at around 2-3 years of age. The adolescent period refers to the time between sexual maturity and social maturity so in dogs this is around 12 months of age until they are about 2-3 years old. Hormonal and structural brain changes associated with social and sexual maturity result in changes in behaviour.

**Changes in response to fear.**

During the adolescent period it is common to see a change in strategy in how dogs respond in fearful situations. A worried puppy is likely to respond with displacement behaviours (normal behaviours done out of context such as sniffing the ground or scratching behind their ears), excessive appeasement behaviour or avoidance/hiding. As dogs mature they are more likely to show defensive aggression if avoidance is not easily available. Often owners are unaware of their puppy feeling anxious in certain contexts, such as meeting unfamiliar people, but on discussing observed behaviours it becomes clear that the puppy was anxious and has started to show defensive aggression as he has matured. Puppy appeasement responses to fear are often misinterpreted by owners as the puppy being over-excited rather than anxious. Owner must be educated about body language and the more subtle signals that the puppy is feeling stressed or under threat so they can recognise when socialisation experiences are being successful and when they are at risk of causing harm.

Dogs with a really sound temperament may well continue to show the puppy responses, rather than aggression, even as adults when they are worried but we still need to be recognising and respecting their emotional state. During adolescence we also start to see the manifestation of territorial responses such as barking to alert the arrival of a visitor.

### High risk of relinquishment during adolescence.

The highest risk time for relinquishment of dogs is during adolescence. Proactive advice and support for owners during this difficult period can be invaluable. This table below is from a paper published by Hazel in 2018 showing the high proportion of adolescent and young adult dogs that were advertised for rehoming on Gumtree in Australia in 2016.

Age Range	N (%)
Up to 16 weeks	20 (0.8)
16 weeks to 6 months	131 (5)
6 months to 1 year	680 (26.1)
1 to 2 years	832 (32)
2 to 5 years	679 (26.1)
>5 years	260 (10)
Total	2602 (100)

Due to the relatively sudden changes in behaviour during adolescence, owners are often left worrying they have done something wrong or believing their dog to be deliberately disobedient. If owners understand that their dog is passing through a normal developmental phase and supplied with appropriate information and advice they are more likely to have a successful long term relationship with their dog.

### Expectations to give to owners

Education of owners via puppy pre-school should include some expectations of how behaviour may change during adolescence.

- A lack of coordination between the timing of maturation in different areas of the brain results in a time of increased emotional arousal and reactivity. Maturation of the emotional circuits is complete before maturation of the prefrontal cortex, 'thinking', circuits. Examples of how this may change behaviour include excessive expressions of emotion such as really exuberant greeting behaviour or excessive excitement during play.
- The value of positive and negative information may be exaggerated, impairing decision making and increasing the chances of the adolescent dog engaging in risky behaviour.
- Changes in the dopamine system lead to an increased responsiveness to incentives. Combined with immature emotional control, instant gratification is often chosen over delayed reward.

### **Advice for coping with adolescent behaviours.**

Do make sure to reassure owners that this is not their fault and explain the hormonal and brain changes that underlie these changes in behaviour. Explain to owners that this is a developmental phase which, if managed appropriately, just as with the early sensitive periods, is a short term situation.

Get back to basics:

- Basics of learning theory - understanding of how undesirable responses may be being reinforced.
  - Behaviours that gain a desired outcome will be reinforced
  - Behaviours that result in a neutral or negative outcome will reduce
- Management to avoid practising undesirable responses – set the dog up to succeed in practising desirable responses and put management in place to prevent undesirable responses.
- Discuss with the owner what the problems are and look at underlying motivations and reinforcers to determine appropriate management.
- Determine whether you are looking at expected adolescent behaviour or whether this is actually a case that warrants referral.
- Reinforce previous obedience training. However well learned a behaviour becomes, it needs continued reinforcement throughout life to ensure the dog remains reliably responsive
- Remind owners of the risks of using punishment. If an owner's perception is that their dog has become 'unruly' and 'stubborn' they are more at risk of using aversive responses. If instead they understand that the dog is naturally becoming more independent and they need to focus on building a trusting relationship they will see the risks of using aversive techniques.
- Remind them about reading body language, particularly in relation to changes in strategy in responses to fear inducing stimuli. If a dog has started to show fearful reactions manifested as defensive aggression it is particularly important for owners to learn to recognise lower level signals that indicate fear so as to avoid escalation of responses.

### **Exercise and energy levels.**

Many adolescent dogs show excessive arousal and over-excitement, leading owners to make the mistake of over-stimulating the dog rather than teaching them to settle and rest. Providing a predictable routine of stimulation and rest is beneficial. Some adolescents may need help in learning to switch off and settle. With this in mind, consider the type of exercise that clients are providing for their dog. Providing ample or even excessive physical exercise may fail to fully address the requirement for mental stimulation. Avoid continuous ball throwing and consider walks without toys where the dog is free just to explore the environment, hiding toys in search games or involving obedience training within games so as to keep arousal levels at a more sensible level.

Castration is not the answer to the over-excited exuberant 12 month old Labrador! Many owners and veterinary professionals are still of the incorrect belief that neutering might calm an adolescent animal down. Although there are obviously sexual hormonal changes occurring at this time the vast majority of behaviour change is due to structural changes in the maturing brain which are not going to be affected by neutering.

### **Reinforcers**

During adolescence with all the changes this entails the value of reinforcers may need to be raised to ensure good compliance with general obedience and remind the dog about previously learned responses. Once the dog is through the adolescent phase these rewards can be phased out and lowered in value again. The way in which reinforcers are being used should also be discussed, so for example are they being timed appropriately in terms of learning theory rather than being used as bribes or distractions.

Consider what the individual dog is most focussed on and use that to the owner's advantage.

Whatever the most salient stimuli in the environment for that dog, the owner needs to work out ways to turn the situation around back to their advantage. So for example with a dog who really wants to greet unfamiliar people, the owner can use the principles of operant conditioning to allow the dog to greet people under a given set of criteria. Look at what the dog wants and how we can engineer situations to ensure they are set up to behave as we want them to but still gain their desired outcome. If a dog is struggling with impulse control use operant conditioning as discussed in session 2. These types of responses are applicable to all sorts of different situations once you understand the underlying principles of operant conditioning and can recognise the standard adolescent issues with difficulty in controlling arousal level and emotional responses and lack of impulse control.

### **On-going socialisation is essential**

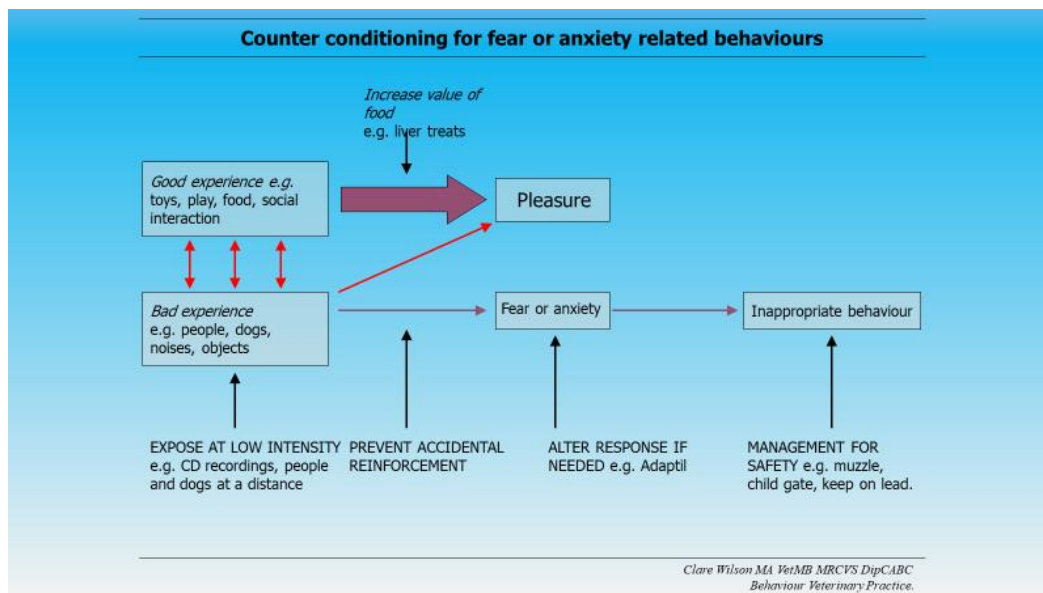
On-going socialisation during this period of dramatic changes in the brain is essential. Adolescence continues to be a very significant period of learning and owners should continue with on-going socialisation and training until dogs reach social maturity.

### **Adolescent fear period.**

This is a time of heightened sensitivity, usually occurring between 6 and 14 months of age, where it is not uncommon for dogs that appear to be really well adjusted and coping well to unexpectedly start to react fearfully. Ongoing socialisation up to the age of around 2 years is absolutely crucial in all breeds but some breeds, particularly those which have been bred to be alert and focussed on their environment, do seem to have a greater tendency to develop fear reactions to unfamiliar stimuli. The more effectively they have been socialised as young puppies, the less significant this period will be. This. It is crucial during this time, just as during the critical period of puppyhood, that all experiences are positive. As part of our tool box for helping puppy owners and providing advice for adolescence we do need to have an understanding of how to react if an aversive situation does arise.

## Counter-conditioning.

During this learning process we are aiming to counter some previous conditioning that has occurred which was undesirable and alter an emotional state and a behavioural manifestation of that emotional state into a desirable one. This can be used if a puppy has a bad experience and needs help in recovering from that. The implementation of this technique for complex problems requires a full diagnostic work up and an associated behaviour modification plan which should be designed by an appropriately qualified and experienced behaviourist. However for minor problems such as a puppy reacting adversely to being placed onto the weighing scales or a confident relaxed puppy having a one off incident being scared by a child rushing past on a scooter, this can be really helpful to explain to owners.



## Neutering and behaviour.

Unfortunately there is as yet no consensus of advice with regards to behavioural effects of neutering because the research is too sparse and we are primarily limited to relying on anecdotal evidence or extrapolating from other species. Routine advice to neuter dogs and bitches was historically based on medical factors however even this has been changing over recent years with potential higher risks of osteosarcomas and other issues in some breeds of neutered animals. At the current time, with the knowledge we have, neutering recommendations must be done on a case by case basis rather than having a practice policy or blanket advice for all patients. In terms of individual factors we need to be considering, we need to look at the temperament, the breed, whether they have any pre-existing behaviour problems and relevant environmental factors such as other dogs in the same household. In addition to determining whether or not to neuter an individual we also need to be considering the most appropriate timing in terms of social maturity in both sexes and in terms of oestrus cycle in bitches.

## **Temperament.**

### **Concerns over castrating nervous individuals:**

There is limited canine research in this area unfortunately and the research that is available has conflicting findings. Males may be at risk of experiencing a drop in confidence when castrated and therefore this may exacerbate underlying anxiety or fear related issues. There is some evidence from other species that confidence is affected by castration. Vandenheede and Bouissou (1996) looked at two groups of three month old male lambs, one group being castrated and the other group remaining entire. At 14 months of age they were tested in three fear-inducing scenarios and the castrated males were found to be more fearful than the entire males. Previous studies have suggested that male sheep were less fearful than female sheep and these and other similar experiments have led to the belief that androgens, notably testosterone, are likely to be playing a role in this difference in confidence. When looking at dogs unfortunately there are no controlled experiments to look at this and when looking at real life cases there are too many confounding factors. One major confounding factor is that at the time male dogs are generally castrated, they may also be experiencing an adolescent fear period.

One argument against castrating males early in life is that they need sex hormones for brain maturation and that if they are castrated before puberty they remain juvenile in their behaviour. Anecdotally, despite the majority of UK dogs being castrated, most dogs do appear to mature in the expected manner and we need more studies looking at canine brain development and hormonal changes to be able to determine the accuracy of these suggestions.

### **Recent research on castration and behaviour**

- In 2018 Paul McGreevy and colleagues published some worrying findings based on data collected via the Canine Behavioural Assessment and Research Questionnaire (C-BARQ) set up by James Serpell. This really interesting and thought provoking paper is an open access paper available on Plos one so please do look it up.
  - 6235 male dogs
  - Castrated prior to 520 weeks of age for reasons other than behaviour management
  - Indoor urine marking more likely if castrated later
  - If castrated later much reduced reporting of 8 behaviours related to fearfulness and 7 behaviours related to aggression

From the point of view of us routinely castrating dogs of a young age without thinking about potential behavioural consequences, we need to seriously consider that dogs who were castrated earlier were far more likely to show several undesirable behaviours related to fear and/or aggression. It is not clear from this research what the causes of this might be and further work needs to be done with the aim of identifying causal factors.

- Duffy and Serpell did a study testing two different samples, one of 1,552 dogs and the other of 3,593 dogs.

- Farhooody tested 10,839 dogs.
- All three of the above studies found an increase in aggression in neutered dogs compared to entire dogs, in both sexes. Age of castration did not seem to have an effect but early spaying did seem to put bitches more at risk of developing aggressive responses.

### **Reactivity in spayed bitches:**

Reports of increased reactivity in spayed bitches do exist but are generally based on fairly small sample sizes and also look specifically at individual breeds rather than the wider population. One of these papers had a sample of just 14 German Shepherd Dogs in the Korean Airforce who were ranging in age from 5 to 10 months. This was a very small sample and within the sample there was a large variation in age so these findings need to be considered as interesting rather than significant. There are a few other studies demonstrating increased reactivity after spaying but generally suggest that it may be breed specific. One paper suggests that alterations in oxytocin levels may be responsible for these changes hopefully this is a field where more research will be done.

Masculinisation of bitches has also been suggested as an underlying factor of increased reactivity after spaying, with these bitches being at greater risk. Masculinised bitches show behaviours such as increased urine marking, raised leg urination and sometimes show confident aggression. If these signs are seen in bitches it is advisable, although not backed up by reliable evidence, to allow them to have at least one season prior to spaying to try and reduce the chances of increased reactivity.

### **Sex steroids and structural brain changes**

During puberty there is significant brain reorganisation and the proportions of grey matter and white matter are altered. White matter increases and this is indicative of new neural connections being made. It is thought that the surges of sex steroids during puberty may be the trigger for this neural reorganisation but this is still an area of active research in humans with no evidence available in our canine patients as yet.

So unfortunately there is not yet an answer as to when is the best time to neuter or if to even neuter at all. However based on the knowledge we do currently have we need to be able to advise clients and we still need to be considering the major reason for neutering for population control and we need to consider based on hormonal effects on behaviour which behaviours are likely to be affected by neutering.

### **Effects of testosterone on behaviour**

So in order to predict what might happen as a result of castration, we need to look at what changes we might expect to see when we remove the main source of testosterone. Testosterone modulates behaviour and causes an increased likelihood of the following behaviours:

- Urine marking
- Confident aggressive responses to other male dogs
- Mounting of other dogs, people and objects



- Roaming – primarily with the motivation of finding bitches in season
- It may increase risk taking behaviour, but remember this change is occurring in both male and female adolescents.
- It may influence arousal levels in situations of conflict with entire males being more at risk of being highly aroused.
- It may affect general confidence (i.e. not just in relation to choosing aggressive responses), with entire males showing higher levels of confidence than castrated males.
- Entire males may be more distracted by other dogs in relation to getting them to focus for training.

### **Considering behaviour and castration.**

We need to consider whether we are likely to influence the presenting behaviours through castration.

- Is the behaviour influenced by testosterone?
- What are the learning influences related to the presenting behaviour?
  - How much has it been learned through associative learning?
  - How much is it continuing to be influenced by sexual hormones?
- A reduction in the escaping and roaming behaviour of dogs who are in search of bitches in season is likely. However do consider aspects of learning associated with this behaviour.
  - What experiences might the dog have had in relation to this behaviour?
  - What reinforcement has occurred that makes the behaviour likely to be repeated?
  - Is there a motivational component to this behaviour that is still going to exist despite castration?
- Indoor urine marking is often quite simply resolved by castration provided it is done promptly before it has become a habit. However a high frequency of indoor marking is often motivated by anxiety castration may inadvertently exacerbate that underlying anxiety.
- Confident aggression specifically towards other male dogs is likely to respond well to castration.
  - If the dog shows general reactivity towards other dogs this is likely to be motivated either by fear or by frustration and not being influenced by sexual hormones.
- Excessive mounting behaviour falls into a similar category to indoor urine marking in that it will often respond very well to castration but it can also be motivated by frustration or emotional conflict in which case addressing the underlying causes is key to resolving this problem.
- Aggressive behaviours where the underlying motivation is NOT fear may be reduced with castration because entire males are more likely to choose aggression as a strategy than castrated males. However there will almost certainly be factors other than testosterone playing a role in such cases and behavioural intervention is most likely warranted in addition to castration.

### **Considering behaviour and spaying.**

As with dogs, we need to take a similar approach in terms of considering the role played by female sex hormones and the behaviours that might be influenced by those. Removal of the ovaries removes the primary source of oestrogen and progesterone. Spaying will therefore affect behaviours that are associated with the oestrus cycle and is unlikely to benefit any other behavioural presentations. This leads to a much narrower range of behaviours than with males and the primary problem associated with the oestrus cycle is aggressive behaviour. This can occur before, during or after a season and tends to be particularly observed in relation to the guarding of important resources such as food and resting places. Bitches who are experiencing a pseudopregnancy may also show resource guarding of toys. Some bitches may show other significant behavioural changes during pseudopregnancy such as heightened anxiety and reactivity or inappetence. There is unlikely to be any benefit to spaying bitches who are showing aggressive responses or reactivity at all times throughout the year and mentioned above there is a potential risk of increasing reactivity in these individuals.

### **Pre-existing behaviour problems and neutering.**

Aside from the behavioural influences of the sex hormones, there are many pre-existing behaviour problems where neutering is contra-indicated. Examples of these are listed below but this list is not exhaustive. A dog or a bitch showing any of these signs is likely to have an aversive experience in the hospital situation which could result in long term detrimental effects to their behavioural well-being and they should see a behaviourist before considering whether to neuter.

- Generalised anxiety or fear responses – multitude of stimuli at the surgery – risk of being over stimulated and sensitised.
- Fear of unfamiliar people – may generalise to other unfamiliar people and will struggle to cope with the required handling.
- Separation related problems – may not cope in the hospital and this can aggravate a pre-existing issue at home.
- Reactivity to other dogs.
- Puppies who do not have experience of being crate train at home may find this a scary or a frustrating experience. Teaching them to cope with confinement prior to neutering is well worth the effort.
- Puppies who show anxiety in novel environments may struggle with being in the surgery for a day without familiar people or environmental stimuli around them to help them to feel safe.
- Dogs that have issues with being handled are likely to have a counter-productive experience if neutered. Teaching restraint and handling must be a pre-requisite for these patients.

### **Other comments for thought on neutering decisions**

- If sex steroids significant influence the structural organisation of the brain during puberty then theoretically should we wait for social maturity before neutering?

- Is puberty needed for full social maturation? We do not know the answer to this question. This must be considered on an individual basis depending on the personality of the individual dog. Perhaps dogs that are still behaving in an immature manner would benefit from delaying neutering?
- Appropriate timing of spaying is not in question. The complex effects that the oestrus cycle can have on behaviour, and in particular aggressive responses, mean that it is crucial bitches are neutered during anoestrus. This means either spaying well before they are expected to have their first season or waiting at least three months after a season to ensure there is no lasting effect of an underlying pseudopregnancy. If a bitch is showing and behaviour signs of pseudopregnancy such as nesting, inappetence, resource guarding or any other changes in behaviour that are associated with her season spaying should be delayed or she should have a course of cabergoline to ensure all signs have resolved before surgery.
- Consider the presence of other animals in the household. Aggression between bitches in the same household is one of the most challenging behavioural presentations to manage or resolve. There is a higher risk of aggression between bitches during a season and therefore if there is already another bitch in the household it is recommended to spay the puppy before a first season to reduce the risks of bitch-bitch competitive aggression.
- What about males? Little is known yet with regards to timing castration but the recent McGreevy paper suggests that we should consider castrating later on once dogs have reached social maturity. Always consider individual circumstances and the behaviour of that dog. If he is showing behaviours which are modulated by testosterone and these are causing a problem for the owner then earlier castration may well be warranted.
- Do not forget the adolescent fear period! The negative effects of handling and hospitalization may affect the puppy's long term behaviour at the surgery and in relation to interactions with unfamiliar people. Puppies must be protected from aversive experiences during this sensitive developmental period and if they are showing signs of fear this must be addressed first, either by waiting for them to pass through the fear period or by pro-active behaviour modification if that is warranted.

REMEMBER TO TREAT EACH DOG AS AN INDIVIDUAL!

### **Litter Mates.**

Having litter mates or two puppies of the same age and similar size is a high risk situation for the development of problem behaviours. The puppies tend to become highly bonded to each other in preference to owner which causes problems with obedience training and building a successful puppy-owner relationship. Very often their personalities are not compatible and one more boisterous and confident puppy may bully the less confident one. When two puppies are left unchecked to play vigorously this may negatively affect their social compatibility with other dogs because they learn inappropriate expectations of how to interact with conspecifics.

If owners do go down the route of having two puppies they must understand that this is more than twice the work of having one puppy and must treat each as an individual with regards to tailored socialisation, obedience training separately and together and teaching them to cope with being alone. Another big risk is fighting with each other they when reach sexual maturity due to the dogs being so similar that it makes it difficult for them to decide without aggression who is the more likely to win a fight. For this reason it is advisable to neuter litter mates before puberty to avoid the influences of sex hormones on aggressive behaviour.

### **Obvious signs of fear or anxiety in young puppies.**

Puppies showing any sign of apprehension must be treated with special care and owners provided with advice as soon as you become aware of their abnormalities. In young puppies it is normal to show slight hesitation in a new situation or a startle response to unexpected sudden stimulation but the normal puppy should quickly adapt and recover. If this does not occur the puppy may show avoidance behaviour, excessive appeasement behaviour or in rare cases defensive aggression. Any of these abnormal responses must be treated seriously and prompt referral should be considered. Never be afraid to refer early – early intervention will have hugely beneficial effects on the long term prognosis.

### **Who to refer to?**

At the current time, the behaviour profession is unregulated and there are many individuals offering behavioural advice who are not appropriately qualified or experienced. As veterinary professionals we need to remember our professional responsibility to refer appropriately and ensure that individuals we recommend are able to offer suitable advice. Behaviour referrals should be treated the same as referrals to any other field of veterinary medicine in terms of it being a pro-active process where the veterinary surgeon actively contacts and refers a client to their recommended behaviour professional. Hopefully over the next few years regulation may change as there are current discussions within the RCVS considering behaviour and training under their scheme to accredit paraprofessionals. This will make it easier for us to be sure we are referring appropriately. Please do keep an eye out in the veterinary press for updates. For the time-being these are the appropriate registers to seek clinical animal behaviourists through:

- RCVS Registered Specialist in Behavioural Medicine <https://findavet.rcvs.org.uk/find-a-vet-surgeon/by-specialist/behavioural-medicine/>
- Association for the Study of Animal Behaviour (ASAB) certificated clinical animal behaviourist. This is the gold standard independent certification for non-veterinary clinical animal behaviourists. <https://www.asab.org/ccab-register>
- RCVS Advanced Practitioners in Companion Animal Behaviour <https://findavet.rcvs.org.uk/find-a-vet-surgeon/by-advanced-practitioner/companion-animal-behaviour/>

There are also the Animal Behaviour Training Council (ABTC) Clinical Animal Behaviourist or Veterinary Behaviourist registers. However, the ABTC itself does not assess individuals to place them on the register but it instead assesses organisations and if an organisation is accepted then they can place their members onto the register. At the current time the Association of Pet Behaviour Counsellors (APBC) is the only organisation at Clinical Animal Behaviourist level. This means that only practitioners who choose to become a member of APBC can be placed on the register so there are many names missing from this list so using the RCVS and ASAB lists are more complete and more useful.

## **Recall**

A key factor in resolving poor recall that develops during adolescence is addressing the attitude of the owner. If they have a misperception that the dog understands what is expected of them and is being deliberately disobedient, this has negative consequences for resolving the problem. If they can approach this problem with a clear understanding about the behavioural changes associated with adolescence, they are in a much better position to succeed.

Owners need to consider their own body language and how that might be perceived by the dog. When dogs approach each other in a friendly context they curve to meet sideways, usually avoiding direct eye contact on approach. A head-on approach and direct eye contact occurs during confrontation. An owner standing face on, shouting cue words, staring at the dog will naturally cause him to feel under threat. This will encourage him to show avoidance or appeasement responses and discourage approach to the owner. Addressing this inadvertently confrontational body language and behaviour of the owner can often result in the dog willingly approaching and recall dramatically improving.

Other factors to consider are:

- Use management so the dog does not gain self-reinforcement of this behaviour. They are likely to have a lot of fun whilst failing to recall and the more they practice that, the more difficult it will be to repair.
- Warn owners not to repeat an ignored cue over and over as this ensures that the value of that cue word is lost and the dog will never learn the association between the cue word and the behaviour of recalling.
- The cue word should only be used in two contexts
  - When the owner expects the dog to respond
  - If the dog is already showing the behaviour you want - use the cue to label that behaviour to reinforce the association between the cue word and the act of returning to you.
- Consider the salience of the rewards and whether they are appropriate to the context. Often with recall the most potent reward that can be used is more freedom.

## **Resource guarding.**

The ability of a dog to hold on to resources or to acquire resources is measured by 'resource-holding potential' or RHP. A resource can be anything that the dog wants or needs, the main ones being food, water, resting places, toys and attention. Whether dogs will fight over a resource is dependent on RHP, previous experience and how valuable that resource is to that individual. Litter mates are the same age, roughly the same size and usually also the same sex. This means there is very little obvious difference in terms of which dog is likely to win and they are far more at risk of ending up actually fighting to determine the outcome rather than making judgements based on predictions. The greater the difference between two dogs in a household in terms of age, sex, and size, they are more likely to be able to make sensible judgements without resorting to aggression. Resource guarding directed at humans is nearly always associated with the value of the resource and the behaviour of the human.

The behavioural presentation of resource guarding may be:

- Defensive aggression.
- Consumption of non-food items.
- Running off with items and avoidance of the owner.

Resource guarding often develops from puppy play behaviour with the puppy taking objects to play or to chew. The reaction of the owner at this time is key in determining the progression of this behaviour.

- Many puppies will learn to deliberately steal things in order to gain interaction with their owner and this is usually manifested by the puppy making eye contact before taking the object then parading around with it teasing the owner to entice them into a game.
- Owners often accidentally artificially raise the value of a stolen object through their own responses, which increases the likelihood of the puppy starting to show guarding behaviour. If the owner shows that the object is important to them, the puppy is likely to start to value it more highly.
- If owners become angry and discipline the puppy or forcibly remove objects from the puppy's mouth, this confrontational attitude results in puppies feeling under threat. As they mature, this puts them at risk of showing defensive aggression.
- Resource guarding also occurs with items that are genuinely valuable such as chews or bones, a favourite toy or a comfortable resting place.
- With resting places this is often accidentally started by owner responses such as lifting a puppy off the sofa to put him in his crate at bedtime rather than training him to come off himself for a reward. The puppy perceives this as confrontational behaviour and again as they mature they are at risk of showing defensive aggression at being forced to do something they are not keen on, i.e. losing access to a really comfortable resting place.

The most common underlying emotion behind resource guarding behaviour is fear-based defensive aggression where the puppy is feeling under threat. However some dogs resource guarding due to frustration and these dogs tend to lack impulse control. Frustration develops if the puppy does not gain expected or desired outcomes so if the puppy has a high desire and a high expectation of keeping hold of an important resource they may react aggressively if this expectation is not met.

### **Preventing resource guarding**

- Education of owners at puppy pre-school sessions and routine puppy visits to the surgery.
- Retrieving breeds and cocker spaniel crosses are particularly at risk. These owners must be advised to teach a relinquish cue very early on.
  - When puppies steal objects that they should not have rather than pursuing them and reprimanding them, owners should be encouraged to recall the puppy and teach them to relinquish the item for an alternative reward.
- Owners should learn the lower level signs of their puppy feeling under threat so that they do not risk escalating the situation.