

‘From Conception to Weaning’

The Annual Lecture of the Norfolk Terrier Club of Great Britain

Speaker: Dr Angelika von Heimendahl

A report by Andre Hess MRCVS

Middleton-Cheney again provided the destination for an enthusiastic crowd of Norfolk Terrier and other breed enthusiasts. Among them were a couple of veterinary surgeons as well as veterinary students. All looked forward to a thrilling lecture full of useful advice from Dr Angelika von Heimendahl. We witnessed a very good Powerpoint presentation using the Club’s movie-screen and new projector, with many photographs and diagrams. The speaker invited questions during her talk as well as after, which resulted in a very interesting and lively lecture.

As a young vet I was handed the ‘fertility and obstetrics’ division of a large practice, and even though I did that for more than 5 years, and had seen most things that can happen, I left the Lecture having had many things confirmed and a few juicy bits of research added to my knowledge. The veterinary students attending reported that the Lecture was much more comprehensive and practical than the ones they had received at their universities.

This report will necessarily be in a very synoptic form, otherwise it may end up very long and potentially boring. So, if you are missing my usual prose, I ask that you forgive me.

Puberty

- The onset of puberty (the first heat/oestrus) can occur anytime between 5 and 10 months, but can be delayed until 24 months of age.
- Dr von Heimendahl reminded us that the Kennel Club will accept litter registrations only from bitches over 12 months of age.

Season

- The bitch is mono-oestrus (one cycle of 28 days at a time followed by a period with no cycles) and the season does not coincide with the seasons of the year.

- A season occurs approximately every 7 months in the average bitch.
- The bitch is di-oestrus, that is, around 2 seasons are produced each year regardless of whether she has had a pregnancy or not.
- Progesterone hormone can be produced at sufficient levels to cause false-pregnancy. This causes, as we know maternal behaviour in the bitch at around the time she would have had puppies.
- A false-pregnancy can result in a delay in the onset of the subsequent season.
- False pregnancy is natural, and has been reported in the wolf. In the wolf, in fact, all the non-pregnant females will/may produce milk and show maternal behaviour.
- The first season in a young bitch can be anovulatory – that is, she does not ovulate at all. Often a normal season will follow on in four months or even less.
- We must always be suspicious of bitches going into season repeatedly in less than four months. These bitches need to be seen by the vet.
- 1% of bitches are anovulatory – that is, they never go into season. Such bitches, however, stand a very good chance of developing pyometra, and must be spayed

The Physiology of Reproduction Cycles

- Bitches are spontaneous ovulators, unlike in other species, like the cat, which has to be mated before ovulating. This means, that the bitch's cycle proceeds independent of whether she has been mated or not.
- Ovulation occurs over a period of 48 – 72 hours, and all the eggs meant to be expelled by the ovary will be expelled in that time, in the normal bitch.
- During this period, the egg will undergo one more division (meiosis) before fertilisation can take place.
- After ovulation, the egg has to undergo a maturation period of 2 – 3 days before it is rendered fertile. This process is unique to the bitch.
- This means that the egg is ready for the sperm only 2 – 3 days after ovulation! In other words, if mated on the day of first ovulating, the sperm has to wait up to 3 days before the egg allows fertilisation.
- In the light of this, it is reasonable to say that the optimum time for mating is FOUR days after ovulation.
- Signs of pro-oestrus are generated by a rise in the levels of oestrogen in the bloodstream. This phase lasts for 7 or 8 days. When you notice the presence of blood for the first time that must be counted as day 2 of the cycle.

- This is followed by a rise in the level of Luteinising Hormone (LH), which results in ovulation. It would have been very useful if we had a test for this particular hormone, but measuring it is very tricky.
- At this point, progesterone (the hormone of pregnancy) makes its appearance and will remain high for a full 60 days in the pregnant bitch. Failure of progesterone to rise or remain high will result in loss of pregnancies.
- At this point Dr von Heimendahl reminded us that the Premate test will remain positive throughout the 60 days, so is not at all useful once ovulation has already taken place. For this reason it is wise to start testing when the bitch is clearly still in pro-oestrus (and therefore negative on the Premate test), and re-test every couple of days so that you can pinpoint the day of ovulation more accurately. A positive test after she has already ovulated offers no information about the stage of heat at all, nor when to mate her.
- It is good to have a Premate test that is negative before going for a mating – you know then that you are not too late.
- Practical advice: do a Premate test a few days after noticing your bitch is in season. Do another test at day 7: you should at that point get a result that says ‘ovulation imminent’ or ‘positive’.
- The bitch has a ‘fertile period’ of 10 days starting on day 7 of the season (she may allow mating at any point during this phase). This is not the same as the ‘fertilisation period’ of 3 days in which the eggs are available for fertilisation.
- The sperm survival time inside the bitch is 7 days.
- All you have to do to guarantee fertilisation is to have the bitch’s ‘fertilisation period’ of 3 days overlap with the dog’s ‘sperm survival period’ of 7 days.

Optimum Mating Time

- This is the part of the lecture we had all come to hear!
- It is incorrect to assume that when a bitch stands and appears receptive that this is the correct time. It has been proven that this observation is not always reliable.
- It is incorrect to assume that the dog ‘knows’ when the right time is. Only some dogs get it right.
- Research has shown that the best time to mate is on day 11 and day 13. Remember, the sperm can wait for 7 days for the eggs to arrive and mature.
- A reliable sign is the decrease in vulva swelling and the change in colour of the bitch’s discharge from bloody to straw-coloured. These two changes coincide with the drop in oestrogen and the rise in progesterone that causes the ovulation.
- The optimum mating age in the bitch is 18 months to 24 months. They are at their most fertile and whelping is easier.

- A bitch that is mated young appears to look better, and reach their optimal show conformation sooner.
- A bitch may go 'stale' when not mated, and each season that goes by (and she is not mated) means that the endometrium (the lining of the uterus) deteriorates. A healthy young endometrium is essential for the maintenance of pregnancy.

The best way of measuring Optimum Mating Time

- Vaginal Cytology (popularly known as the 'cornflake test').
- Blood Progesterone (Premate is the best)
- Ultrasound (expensive; needs experience practitioner)
- Endoscopy (invasive; can be painful; unreliable; needs expensive equipment)
- Saliva tests may work, but is difficult to do.
- Dr von Heimendahl does not like the commercially available test that involves the vaginal probe. It is unreliable.

Vaginal Cytology

- Is the most reliable but only in the hands of a qualified and experienced person using the right equipment and stains.
- Vaginal Cytology is not difficult to do, but it has to be done correctly otherwise results are unreliable
- Is non invasive and safe
- Is inexpensive
- Not as accurate as Premate done at the correct time and frequency.
- There may be individual variation in bitches and in the estimates of the persons doing the test.
- Diff-Quick is the stain of choice for vaginal cytology.
- During pro-oestrus the lining of the vagina produces nucleated parabasal cells and large intermediate cells with a collection of red blood cells, white blood cells, and bacteria.
- As soon as the oestrogen drops and the bitch enters oestrus proper, the cells on the vaginal cytology smear appear cornified: they have no nucleus and they do indeed resemble cornflakes when viewed through a microscope. What the experienced viewer does is estimate the ratio of non-nucleated cells to nucleated cells; examine the number of bacteria, red blood

cells, and white blood cells; then makes a pronouncement on whether the bitch is about to ovulate or not, or whether he/she feels that bitch has already ovulated.

- As soon as the bitch has 'gone over', the nucleated cells, white cells, and even bacteria reappear. This can resemble pro-oestrus! If the person doing the test does not question you about your own observations of the bitch, the result cannot be trusted.
- Dr von Heimendahl advises that Premate and Vaginal Cytology used together is the ideal situation.
- It is best to do the first smear on day 5 or 6, then do it daily or every couple of days thereafter.
- It is possible to teach a lay-person to do Vaginal Cytology.
- Do the first mating when cornification is noticed. Remember, the sperm will wait for up to 7 days for the 'fertilisation period' (when the eggs have arrived and have matured).

The Premate test

- Is a measure of the amount of progesterone present in the bloodstream. Progesterone is the hormone responsible for ovulation and the maintenance of pregnancy.
- Before setting off for a mating, wait till the Premate test shows that ovulation has occurred because the optimal time for fertilisation is 2 days after ovulation.
- Advice: if Premate shows 'has ovulated', do the mating a day later and two days after that (that is roughly day 11 and day 13 of season)
- It is best that the same person does the test each time because it is a judgement based on a colour change in a very small well of fluid.
- The hormone that is measured rises suddenly and the test window is small.
- The test can be affected by the room temperature, so is not utterly accurate.
- Dr Heimendahl is of the view that Premate is the best of the blood tests available. On its own, however, it is not completely reliable.
- The test can be used to find out whether a pregnancy has come to the/an end or not. When a bitch is ready to whelp, or the pregnancy has been lost, the progesterone disappears and this can be measured with a Premate test. It is something that can be done if you suspect you may be electing to go for a caesarean too soon.
- The 'C' and 'E' parts of the test can be frozen for a longer shelf life.

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Infections present during the bitch's season

- The bacteria found on Vaginal Cytology usually present as a moderate mixed culture of Staphylococcus, Streptococcus, and E. coli.
- Dr von Heimendahl is of the view that if these bacteria are suspected of causing failure of pregnancy then two days of high dose penicillin will be sufficient.
- Pseudomonas (a bacterium) is the only bad one that definitely needs antibiotics. A relatively pure growth of one particular bacterium may also be an indication for using antibiotics.
- There are no true venereal diseases in dogs in the United Kingdom.

Using a professional laboratory for measuring Progesterone

- Can be used to predict ovulation
- Can confirm ovulation
- Can detect silent heats.
- Can predict when whelping is due.
- If the measurement is 10 – 15 nmol/l then ovulation has commenced; when the measurement is 20 – 60 nmol/l the bitch has entered the 'fertile period'.
- Once progesterone starts to rise, it doubles every 2 days.
- The lab will require a blood sample every 48 to 72 hours.
- Most labs don't work on weekends, so always collect a blood sample on the Thursday, so that it gets to the lab on Friday. This will enable you to organise a mating for the Sunday if necessary.
- Collect the first blood sample on day 5 – 8, then every 2- 3 days thereafter; test every second day once progesterone starts to rise.

Semen Evaluation

- Must be done by a trained person
- Must be done under professional conditions with modern equipment.
- The stain of choice is Eosin-Nigrosin

Artificial Insemination

- Very rarely done surgically, unlike in the human where it is done when a man has a tragically low sperm count.
- There are many ways of doing conventional artificial insemination using fresh or chilled semen (as opposed to frozen semen).

Artificial Insemination using frozen semen

- This method cannot be used legally if the dog is alive and well and living in the United Kingdom.
- Frozen semen has to travel on the dog's PETS passport.

Cryptorchidism

- Sometimes referred to incorrectly as monorchidism.
- Never breed with these dogs.
- Never breed with their sisters; they may carry the gene(s).
- Should be neutered but there is no urgency; the internal testicular tumour develops only when the dog is older.

Herpes Virus vaccination

- Dr von Heimendahl is of the view that it is a very good idea.
- On the matter of viruses and other infections, it is never a good idea to move a pregnant bitch to a new home. She and the pups have no immunity to infections in that environment. And never introduce new dogs into your kennel or home while your bitch is pregnant.

The newborn puppy

- The mortality rate in litters of all breeds in general is 10 – 20%. This is the case even in well-managed, well-supervised whelpings. This is very high.
- In almost any breed 1 or 2 pups are lost around the time of birth and during the first week.
- It is unusual to lose an entire litter.

- When caesarean surgery looks imminent it is best done early. Late caesareans often have poor results.
- The puppies must be kept at a temperature of 28 – 30 degrees Celcius. A cardboard box and a hot-water bottle or pad is best. This enables the bitch and the puppies to adjust their own temperatures. A heat lamp removes that choice.
- The body temperature in a normal puppy is 36 – 37 degrees Celcius. The bitch's temperature is around 38.0 degrees Celcius.
- The normal heart rate in the puppy is 200 – 250/minute.
- A newborn puppy should have a good coat covering, no discharges from any of the orifices, and a well-rounded soft belly. Always check for cleft palates and patent anuses (bums) as soon as you can.
- Hypothermia is a common cause of complications in the puppy. A puppy is hypothermic when the temperature is:

At birth <34 degrees Celcius

Day 1 – 3 <35.5 degrees Celcius

One week <37 degrees Celcius

The symptoms of hypothermia:

The puppy feels cold

The puppy moves less

The puppy may be noisy

The puppy may be very quiet

The membranes (mouth) appear dark red.

What do you do?

Because hypothermia reduces the gut movement, it is important that the puppy's temperature is returned to normal before attempting to feed. Never feed a cold puppy.

When warming up a puppy do it no faster than 2 degrees Celcius every 10 minutes. The best way to do this is to place the puppy under your clothes next to your skin.

Do not place the hypothermic puppy on a hotwater bottle. If you have to use one, it must be a 'cool' hotwater bottle. That is, just a little warmer than the puppy itself.

Do not use heating lamps.

Too rapid warming is dangerous to a cold puppy.

Puppy infections and immunity

- 90% of the puppy's immunity comes from the colostrum. For this reason it is crucial that the bitch's vaccinations are up to date. The colostrum provides the puppy with passive immunity.
- The gut will absorb colostrum only in the first 8 – 12 hours. Any colostrum fed after that is pointless. Commercially available 'colostrum' does not work.
- The passive immunity in the puppy lasts for 6 – 16 weeks.
- If the bitch dies, or cannot feed the puppies, a good source of passive immunity is serum drawn from any other dog in the household. This can be fed to the puppy.

Fading Puppy Syndrome

- Can happen anytime up to 14 days of age.
- The causes are complex and multifactorial (genetic, anatomical, infectious, etc.)
- Any attempt to treat must be immediate:

Get the puppies' temperature to what it should be (see above).

Administer fluids, not the bitch's milk or milk substitute. Drip fluid or Normal Saline is best. The static or slow gut cannot process milk, but can absorb fluids. The most common cause of death is dehydration.

Treat the whole litter with antibiotics.

Remove the fading puppy from the litter.

The fluid requirement of a puppy is 13 – 22 ml/100g puppy weight/day

- A quiet puppy is either well-fed or ill.
- A hungry puppy is noisy.
- A starving/hypoglycaemic puppy is very quiet or appears dead.
- A newborn puppy has stored energy reserves sufficient for 24 hours. It is not, therefore, a matter of life or death if the puppy does not suckle in the first 24 hours.
- Normal puppies feed every 2 – 4 hours and will suckle for 10 - 15 minutes at a time.
- Puppies sleep between feeds.
- Regularly check that the bellies are soft and round.
- Place a poor suckler onto a teat that has just been stimulated by a stronger puppy.

The Club would like to thank Dr Angelika von Heimendahl for a wonderful lecture, of which this report is a feeble reflection. It was deeply appreciated by all, even seasoned breeders and professionals. There is always much to be learned - and a good place to find it is at the Norfolk Terrier Club of Great Britain Annual Lecture.

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