Breeding, Choice of Stock and Care

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Why Breed

People breed for different reasons, for some it is an obsession, for others, a hobby and some people breed for economic reasons. The aim of any breeding program should be with the intent of “maintaining and/or improving the standard of the breed” (RNSWCC, Code of Ethics).

Regardless of your primary reason for breeding, it is the welfare of your breeding stock and the pups that you sell that must always be your primary consideration. You are obliged by law to sell sound pups; you are obliged ethically to place these pups in good homes.

- You need to know your breed standard and critically evaluate your dog or bitch before electing to breed.
- You need to know what hereditary diseases exist within your breed “Members, who are breeders, shall strive to eliminate hereditary diseases within their breed” (RNSWCC, Code of ethics).

The majority of pups sold by breeders go to pet homes

- Temperament of breeding stock must be a primary consideration in any breeding program
- There must be a viable market for the pups that you breed.

Selection of a stud dog

Dogs winning in the show ring does not necessarily equate with either soundness or good temperament. There are numerous examples where top winning show dogs have been responsible for the dissemination of heritable diseases.

- Critically look at your bitch for both her good and bad points (Know your breed standard).
- Select a dog that will improve on the quality of the bitch
- Where possible look at pups from this dog to assess the quality and temperament that he is producing.

Talk to other experienced breeders as to what lines will complement your bitch. Follow up the pups you breed to determine if you have produced quality pups of good temperament.

The Stud Dog

Puberty in the male is reached at an average of 9 months with a normal variation of 6 to 12 months. The smaller breed dogs reach sexual maturity at an earlier age than

the large and giant breeds. (Some dogs can be fertile as early as 5 months; larger breeds may not be sexually active till 15 - 18 months).

It is advisable for dogs to have their first stud in late puberty or early adulthood but there is no specific time as recommendations vary between breeds, but less than 12 months is acceptable. The most important rule is to put an untried male to a steady matron (in oestrus) and that this mating should be supervised. Not necessarily to help the dog but to protect him and to accustom the dog to human presence.

How often should a dog be mated. During the learning process how often depends on outcome. If successful, the more the better to the one bitch while she is in season. If unsuccessful, try to prevent frustration and possibly wait until another bitch comes in season some months on. The question sometimes asked is that if a maiden dog can not achieve a physical mating, can an AI be done. I don't have a problem with this. I don't believe it will affect his future stud work and in a number of cases the dog has gone home and achieved a mating.
The frequency of mating of a young dog depends on the dog's success and the bitch temperament. Overwork when young may lead to later disinterest or timidity.

THERE ARE NO SPECIFIC RULES GOVERNING THE FREQUENCY OF USE OF THE MALE
Mating a dog every day will reduce sperm counts, mating a dog every second day does not.
Consideration must be given to:
1. Health of the dog.
2. Difficulty of stud work.
3. Libido.
4. Daily temperature.

Recommendations that do exist;
K. Hedberg: Dogs 12-18 months of Age: - one bitch per week. Over 2 years of age: - two to three bitches per week is a reasonable maximum.
H. Spira: Rapidly maturing toy breeds aside, young dogs should not be introduced to full stud work until approximately 18 months of age. Thereafter one bitch per fortnight.

As General rules.
1. A dog used frequently must be sexually rested.
2. A dog used infrequently or an older dog should have more than two matings to a bitch as often the first ejaculate will contain a high number of dead sperm.
3. Except under special circumstances males should not run with a bitch coming into oestrus.
4. Individual dogs vary in their ability to tolerate frequent use.

The Brood Bitch

The bitch is classified as seasonally monocyclic or seasonally monoestrus and has no noticeable link with climatic factors (Jones and Joshua 1982). There is no

significant seasonal influence on the onset of oestrus, except in those breeds such as the Basenji, Dingo and wolf/dog crosses which cycle annually.

The average interoestrus interval is approximately 7 months with a normal range of 5-8 months. An interoestrus interval of less than 4 months is considered abnormal and may contribute to infertility.

PUBERTY

-The bitch enters puberty between 6 and 24 months of age with the average of 10 -12 months.

-A bitch not having her first season by 24 months of age is considered as abnormal.

Reproductive Cycle

1. Proestrus: The follicular stage of the cycle during which time serum oestrogen concentrations are rising. Peripheral serum oestrogens start to increase 3-4 weeks prior to the onset of proestrus; oestrogen rises rapidly during proestrus and peaks at the end of proestrus.

- There is a serosanginous vaginal discharge and vulvar swelling. The bitch is attractive to males but usually won't stand.
- During proestrus the epithelial cells of the smear change from predominantly noncornified (parabasal and intermediate cells) to predominantly cornified. Cornification is complete about 2 days prior to the oestrogen peak and about 4 days prior to the onset of standing heat.
- Progesterone levels are below 2ng/ml.

The average duration of proestrus is 9 days with a normal range of 3 - 17 days. External signs may also vary. The degree of vulvar swelling as well as the amount and duration of bleeding.

Oestrus

Oestrus is the period during which the bitch accepts mating by the dog.

-Ova appear to be shed simultaneously or nearly so within 24 - 72 hours following the LH peak (a surge in the production of luteinising hormone) There appears to be a mechanism to synchronise ovum development so that puppies born will not differ in developmental age. (When pups of different weight and development are whelped it is usually due to nutrition within the uterus).

-Serum progesterone rises to more than 2ng/ml on the day of the LH surge (2.1-2.9ng/ml), which proceeds ovulation by two days. Progesterone levels on the day of ovulation (4.0-8.0ng/ml)

-Following ovulation, the ova undergo 2 days capacitation (time required for oocytes to undergo maturation in the oviducts: ova are released as primary oocytes, and therefore must resume meiosis and mature before fertilisation

and cleavage can occur. The oocytes release the first polar body and can be fertilised 2-3 days after ovulation in the distal segment of the oviduct).

The average duration of oestrus is 9 days with a normal variation of 3 to 21 days. In normal bitches, first receptivity to mating may occur as early as 11 days before or as late as 3 days after ovulation.

It is only when the bitch is in season for more than 40 days that it is considered abnormal (ovarian cyst/tumour).

-Spermatozoa may rapidly reach the oviduct after mating (25 seconds); the sperm primarily responsible for fertilisation arrive in the oviduct 4-8 hours after mating. The average lifespan of dog sperm in the female reproductive tract is 7 days (Up to 11 days reported).

Dioestrus (Metoestrus)

-The day of ovulation can be determined retrospectively. The first day of dioestrus (characterised by influx of noncornified cells and neutrophils on vaginal cytology) occurs 6 days after ovulation.

-Duration of dioestrus is approximately 57 days. When the bitches reproductive organs are under the influence of progesterone.

-Dioestrus ends with whelping, if the bitch is pregnant and with signs of false pregnancy (pseudopregnancy) if not pregnant and coincides with a progesterone fall to below 2ng/ml.

Anoestrus

The duration of anoestrus is approximately 4½ months and is the stage of reproductive quiescence.

The greatest cause of non-pregnancy is the incorrect time of mating.
Previous reproductive history, behaviour, external clinical changes and vaginal smears are all used as aids to grossly characterise an individual bitches cycle.
THE MEASUREMENT OF SERUM PROGESTERONE LEVELS, IDENTIFICATION OF THE DAY OF OVULATION (4-8ng/ml) AND TIMING OF MATINGS (OR ARTIFICAL INSEMINATION) 2 TO 4 DAYS AFTER OVULATION MAXIMISES THE CHANCES OF PREGNANCY

* It is important that a bitch with problems be checked for pregnancy at three and then 4 weeks after mating.
If embryonic death occurs before 25 days there is usually complete resorption of the conceptus. Resorption may occur for a number of reasons including infection. A common presentation is isolated spontaneous embryonic resorption with continuation of the pregnancy.

- a number of bitches are pregnant at 3 weeks and not at 4.
- a number of bitches are multiple pregnant at 4 weeks and may carry none or 1 pup through to whelping. There are often no clinical signs to indicate that the bitch is reabsorbing the pups. The problem with this type of bitch is not fertility but maintenance.

Frequency of Breeding (RNSSCC Code of ethics)
"A bitch shall not be bred from unless it has reached adequate maturity and is in good health (no matings before 9 months for toys and brachycephalic breeds, 12 months for others except giant breeds, where a minimum of 18 months is to apply for matings)"
If bred from twice in 12 months then under no circumstances will another litter be registered for that bitch for a period of 12 months after a second litter.

Most breeders usually mate bitches for the first time between one and 4 years of age. The frequency of breeding must be guided by the health of the bitch during pregnancy, the ease of whelping, how well the pups were reared and the bitch's body condition and recovery post weaning.

Consideration should be given to the time of year for both pregnancy and rearing pups (try to keep away from Jan, Feb, March).

Mating

It is generally recommended that matings be supervised and that stud dogs do not run with bitches in season.
Because of the variability of the normal oestrus cycle close observation of the bitches behaviour is necessary to determine where she is in her cycle (some bitches are ovulating as early as 3 days or as late as day 28-30)
If in doubt contact your veterinarian for either vaginal smears and/or progesterone determinations.
Introduce the dog to the bitch

- is she standing and flagging
- is he interested
- (Behaviour of both bitches and dogs can be very variable. Some bitches hate male dogs and won't stand others stand throughout and after the oestrus cycle. Some dogs will mate anything that stands still or can be very selective)
- a tied mating varies from 5-45 minutes
- a slip mating may be fertile

Semen

The ejaculate consists of 3 fractions
-First fraction (presperm) consists of a few drops to 2 mls, clear water like

-Second fraction (sperm rich) is collected during the most vigorous pelvic thrusting. (This can however occur up to some minutes after the dog has ceased thrusting) The volume varies from 0.1 to 3 mls of pearl white fluid

-Third fraction (prostatic fraction). Ureteral pulsations and anal contractions occur. The dog will usually want to turn. Volume varies from 1 - 20 mls.

Semen Collection

Semen collection: Use a female teaser

: The male should urinate before collection

: Semen is collected by masturbation of the penis

If collecting for semen evaluation, chilled or frozen semen you want sperm rich fraction only.

If collecting for fresh insemination enough prostatic fluid is collected to bring the volume to 4-6 mls.

If the dog has not been used before or not for a long time a second ejaculate should be collected 1-3 days later.

PREGNANCY

The Pregnant Bitch

Vaccination, heartworm prevention and worming should be up to date prior to mating.

A large number of stud owners require vaginal culture and sensitivities prior to mating. The necessity and value of a vaginal culture and sensitivity is questionable however refusal to do a vaginal swab compromises the bitch owner. A number of breeders request routine dispensing of antibiotics for a bitch in season. Spend the time educating them as to the inappropriateness of this request, rather than simply refusing them without explanation. Similarly a number of breeders request antibiotics for the bitch post whelping. This pressure arises from non-professional American reports on the Internet.

Bitches with histories of infertility/ abortions etc should be checked for infection, however bear in mind a vaginal infection does not necessarily indicate a uterine infection.

Bitches should be in good body condition before mating. Show condition does not necessarily correlate with breeding condition especially in the speciality German Shepherds.

Bitches should be wormed during pregnancy 5-6 weeks

It is generally recommended that it is in the last trimester of pregnancy that bitches should be fed at least twice daily. I recommend starting earlier as some bitches go off their food late in pregnancy and loss of body condition can be dramatic.

The easiest way to feed a pregnant bitch is using a good quality puppy dry food formula. Many bitches become fussy eaters in the last trimester and breeders are forced to feed what the bitch will eat, often palatable high protein diets. It is important not only to increase the protein content but also carbohydrate.

Pregnancy Diagnosis

With practice a pregnancy can be palpated at 3 weeks. At 4 weeks pregnancy diagnosis by both palpation and ultrasound is much more reliable.

The exceptions to palpation at 4 weeks are bitches built like Bull Terriers. The exception to ultrasound at 4 weeks is fat bitches particularly Labradors and Golden Retrievers.

AGEN Relaxin Pregnancy Test:
: Specificity :100%
: Sensitivity 61% at day 23 post ovulation
100% at day 26 post ovulation
Immunoreactive levels of relaxin is detected in pregnant bitches reaching peak concentrations 2-3 weeks before parturition, declining somewhat before parturition and persisting for 4-9 weeks after parturition. Immunoreactive relaxin levels can be detected in the plasma of pregnant bitches by the 3rd or 4th week.

Radiographic diagnosis of pregnancy 45-48 days.

Pregnancy Toxaemia

Possibly one of the most common problems we see in at or near term bitches but the least described is pregnancy toxaemia (hepatic lipidosis, hypoglycaemia and ketosis). Pregnancy toxaemia is potentially life threatening to the bitch and pups. Pregnancy toxaemia usually develops during late gestation in bitches on inadequate nutrition or in those who can not eat enough carbohydrates. This is primarily a problem in the small breeds but occasionally larger breeds. Historically they go off their food and are often polydipsic with or without vomiting. Some bitches collapse and convulsions or coma may occur. High levels of ketones (in the absence of urine glucose) are present in the urine. Treatment involves IV dextrose therapy. Caesarean section is usually indicated

PARTURITION

Parturition occurs over a narrow spread of 3 days in relation to the time of ovulation that is the actual length of pregnancy is 63 +/- 1 day. The apparent length of pregnancy can vary from 58-72 days from mating to parturition. This can be explained by either the matings being either too early or too late. Matings that occur before ovulation produce an apparently long pregnancy length. After ovulation,

oocytes are not immediately fertilizable and must undergo further maturation, which takes 2 days. Oocytes may then remain fertilizable for an additional 3 days. A late mating, for example on the last day that eggs are fertile (5 days after ovulation) produces an apparently short pregnancy length. (England et al 1998).
Normal parturition in any animal is an array of dendrochronological changes. During the last 5 - 10 days of gestation the foetal pituitary is induced (possibly by stress or hypoxia) to release ACTH which acts of the foetal adrenal gland to cause the release of corticosteroids (primarily cortisol). Cortisol acts on the placenta to cause decreased production of progesterone (in those species such as the cat with placental progesterone) and increased production of oestrogen. This occurs in the last 12-48 hours. Maternal cortisol rises to a peak on the day prior to parturition. Oestrogen sensitises the uterus to oxytocin, increasing myometrial contractibility, and also affects synthesis and release of prostaglandin F2α, to further decrease peripheral progesterone. Prostaglandin F2α also increases myometrial contractibility. The cervix probably dilates in response to the presence of oestrogen, PG F2α, uterine contractions and the pressure of the foetal head. Stretching of the cervix stimulates a nervous impulse (Ferguson's reflex) to the spinal cord and hypothalamus, leading to the secretion and release of the peptide, oxytocin, which reinforces and maintains the ecbolic effect of prostaglandins. Oxytocin release may regulate labour, and the bitch can voluntarily inhibit its release if she is frightened or stressed (Johnston 1988).
Puppies will not be delivered until peripheral progesterone drops below 2ng/ml.

Indicators of imminent whelping
- Temperature drop: > 37.0 - 37.5 18-24 hours prior to parturition and 10-14 hours after the fall in plasma progesterone. The prepartum rectal temperature drop in the bitch can usually be detected if temperature is taken 2-3 times daily. After the drop occurs, temperature will increase prior to delivery of the pups. If the temperature is not taken regularly, this temperature drop may not be noted. I have found that this is not a consistent finding.
- Mammary gland development and milk production (unpredictable)
- passing of the cervical plug (clear to cream coloured discharge) Bloody or green discharge before the beginning of labour is abnormal and indicates placental separation.
- relaxation of vulva/ vagina/ perineum

First Stage Labour
- Characterised by uterine contractions (not abdominal) which are not visible externally and cervical dilation. Clinically the abdomen is tenser and pup movements are difficult to palpate.
The bitch may appear may exhibit nesting behaviour and appear restless, nervous, and anorexic and may occasionally vomit. She may pace at the beginning of this stage and seek seclusion and nest towards the end.
this behaviour usually lasts an average of 6-12 hours. However, especially in maiden bitches this apparent behaviour may last a couple of days. If the bitch is bright, alert, eating and no discoloured vaginal discharge is present then I wait.

Second Stage Labour

Normal stage two labour in the bitch has been described by various authors.

- Jones and Joshua (1982) state that the first pup is usually born within one hour of the onset of meaningful straining, but often appears within as little as 20 minutes; up to 2 hours need not to cause anxiety. By six hours placental separation is occurring and the life of the presenting puppy may be in jeopardy, thus six hours should be regarded as the maximal period permissible without investigation; even after two hours some separation may exist.

Subsequent pups: The interval between births comprises two parts - resting and straining. Rest periods vary from 5 minutes to 3 hours and occasionally even longer, although it is arguable if 4 hours rest falls within normal limits. Provided vigorous straining without progress does not occur the longer intervals do not call for urgent attention. A common pattern is for a bitch to produce two or three puppies at short intervals, e.g. ten to 30 minutes and then go into a rest phase of one to three hours before repeating the process. The birth of a large litter may occupy 24 hours or so but if there is no excessive effort needed for each birth the dam should not become unduly tired.

From a veterinary standpoint one of the most difficult clinical decisions is when does normal labour end and abnormal begin.

The breeder or veterinarian is dependant upon the clinical events surrounding the whelping to make an indirect assessment of foetal wellbeing during the whelping. While some cases of dystocia or abnormal labour are easily identified, eg foetal disproportion, other assessments rely upon clinical judgement, for example, anticipated day of whelping relative to mating dates, normal or acceptable interpup whelping intervals, frequency and strength of contractions etc.

CRITERIA FOR DIAGNOSING CANINE DYSTOCIA

Without a means of assessing foetal distress the veterinarian has little direct clinical evidence of when intervention is necessary and indirect assessments of time constraints, bitch health, age and breed, litter size, clinical examination, pup value and what the breeder wants must all be considered.

Dystocia is defined as a difficult birth or inability to expel the foetus from the birth canal at the time of parturition (Macintire 1994).

Johnston et al (2001) defines the diagnosis of dystocia as dependant on demonstrating -

1. Failure to start labour on due date (use knowledge of ovulation date, rectal temperature drop). Gestation length timed from day of ovulation is 63 +/- 1 day. Apparent gestation lengths can vary from 58 to 72 days. Clinically if the bitch is bright and alert, there is no vulvar discharge (other than a clear to mucoid cervical plug), the pups are alive and moving and no pup can be palpated per vagina then I usually wait.
2. Failure to progress normally in labour

- Strong and frequent stage II abdominal straining that fails to produce a pup within 30 minutes (This suggests the possibility of an obstructive pup)

- Weak or intermittent Stage II abdominal straining that fails to produce a pup within 3 hours (first pup) or 2 hours (between pups)
(These bitches frequently respond to medical management)
3. Partial delivery of a puppy
Once a foetus is visible in the vulvar cleft there should be immediate delivery.
4. Presence of vulvar discharge.
The presence of lochia or uteroverdin (greenish-blackish vulvar discharge) in a term bitch indicates that placental separation has occurred for at least 1 pup and usually signifies that whelping should begin within 1-2 hours, and failure to do so signifies a potential dystocia

THIRD STAGE LABOUR
This is the stage of expulsion of the foetal membranes

POST WHELPING

I generally recommend checking both the bitch and pups post whelping
1. Make sure that she has finished. The uterus should be fairly hard and palpable in the caudal abdomen. If not I usually recommend oxytocin as I feel that this failure to contract contributes to metritis.
2. Check mammary glands for milk, mastitis etc.
3. Check all pups individually re congenital defects, health especially chest, hydration etc.
4. Adequacy of management: where and what type of box, human intervention, children, noise and is the bitch settled.

I do recognise a condition that I call uterine cramping. When pups suckle, it causes an oxytocin release and uterine contraction. Often these bitches have a history of being uncomfortable or restless, refusing to nurse the pups, leaving the whelping box or even growling at the pups when they try to nurse. I use Buscopan tablets (10mg 3 to 4 times daily usually only for a few days).

CARE OF THE WHELPING BITCH AND PUPS
When working with a bitch and pups always do so within the limits of tolerance of the bitch.

The Whelping Bitch
The area where you intend a bitch to whelp should be prepared well in advance of the anticipated whelping date. Ideally this should be where the bitch sleeps in the week before whelping.

The whelping bitch requires privacy, protection and warmth.

The ideal whelping box should be twice the size of the bitch when she lies down with inside bars to protect the pups from being squashed. The requirement for heating depends upon the season as well as the mothering ability and pup numbers. Where heating is provided care must be taken not to make it too hot for the bitch. An ideal

whelping arrangement that I have seen and like is to put the whelping box under a table and cover the table with a dark blanket. This provides a den like arrangement and no alternative heating is required.

When whelping newspaper flooring is adequate and easily changed. Once the bitch has finished whelping I change the flooring to a short pile carpet. The advantages of this are
1. Have a number of pieces cut to size so the carpet can be changed and washed at least daily.
2. It does not roll up so there is minimal chance of a pup getting caught under the carpet.
3. The surface is rough and allows the pups to move around the box easily.

There are various other surfaces available which are more than adequate, but should meet the above three criteria.

The breeder should be present at the whelping and be prepared to assist when necessary.
The breeder should have handy at the whelping
- the veterinarians phone or pager number.
- dry towels. If the bitch does not clean and dry the pup then it may be necessary for the breeder to do so.
- Hot water bottle. Some bitches are either excessively restless or clumsy during whelping and it may be necessary to remove the pups while she is whelping. It is important if you do this to keep the pups warm.
- Calcium Sandos Liquid. Calcium increases the sensitivity of the uterus to oxytocin and the use of oral calcium during the whelping, especially when she is tiring, often helps in the successful natural delivery of the pups.
- A small pair of artery forceps or similar device. If the bitch chews the cord too short and it bleeds excessively then it may be necessary to clamp and tie the cord. Cotton or dental floss are adequate for tying the cord.
- Brandy (or similar stimulant). A small drop of brandy on the tongue of a pup with irregular breathing or poor muscle tone is often helpful in reviving the pups.
- glucose powder and stomach tube. A pup that has to be revived or an ill pup is usually low in blood glucose. Stomach tubing the pup with a warm glucose solution is often life saving.

Pup Assessment

A human system of neonatal assessment called the Apgar Score can be adopted for the canine neonate; however there are a number of obvious restrictions that may limit its application. These are breeder compliance and ability, temperament of the bitch, rate of pup delivery and identification of individual pups.

1. There must be minimal interference with the pups as excessive handling may unduly distress the bitch, or even induce aggressiveness.

2. Pups born in quick succession, for example, during a caesarean section or with only a few minutes between delivery make it difficult for a breeder to accurately assess a pup.
3. Pup identification. In some breeds individual pups are easily identified due to coat colour or markings. In other breeds for example German Shepherds, Rottweilers and Dobermans all pups appear identical except for sex and possibly birth weight. I suggest that the coat of the pup is clipped eg. Neck: first male, right chest; second male etc.

The assessment I recommend to breeders is:

When the pup is born it is scored from one to three
1. Very good: Crying and good strong leg movements.
2. Reasonable: Regular breathing, some leg movements.
3: Poor: Gasping or no respiration, no leg movements.

Any pups that score one are not handled again until the bitch has finished whelping. Pups scoring two or three are usually taken by the breeder, dried, often shaken and rubbed to clear the airways and sometimes given combinations of glucose, Calcium Sandos or brandy in an attempt to resuscitate it.

When the bitch has finished whelping, she is taken out of the whelping area and cleaned. The whelping box is cleaned and all pups examined. At this stage each pup is weighed, checked for the presence of congenital abnormalities and the chest auscultated. The chest can be auscultated by simply putting the pup to your ear. Within half an hour after birth clear lung sounds should be detected. Moist rales, crackling or absence of sounds suggests lung pathology. The most frequent clinical complaint associated with respiratory disease is an inability to suckle from the bitch and weight loss. The most frequent clinical condition missed by breeders is respiratory distress. Pups appear to breathe more rapidly, rather than with increased respiratory effort, and respiratory disease can only be detected by thoracic auscultation.

Thereafter the breeder must weigh the pups daily and observe pup and bitch behaviour in the whelping box and suckling time.

<u>The Clinical Course of the Hypoxic Canine Neonate</u>

Some pups fail to respond to resuscitative efforts of the breeder and usually die within hours of birth. Often they fail to regain normal muscle tone and respiratory patterns. Occasional pups have been reported as crying continuously and are often euthanased because of the distress the crying causes either the bitch or breeder.

The clinical behaviour of a resuscitated canine neonate has been described to me by a number of astute breeders. The most recognisable problem is an inability to suckle from the bitch, and often the pup also has difficulty suckling from a bottle as well. Whether this inability is coincident with respiratory problems or due to a neurological deficit is unknown. Most breeders will tube feed these pups as inhalation pneumonia

is often a complicating factor. Breeders also describe these pups as having difficulty finding the teat and staying on the teat or they are easily knocked off by a stronger pup.

Sometimes the pups are observed to be disoriented in the box, crawling behind or away from the bitch and becoming chilled. Often it is the resuscitated pup that the bitch has buried in the corner of the whelping box. The terminal stage is weight loss, dehydration and hypothermia.

Treatment of these pups is
1. Supply adequate nutrition. Tube feeding is preferable to bottle feeding as inhalation pneumonia is common. For the first one or two feeds use a warm glucose solution. If the pup appears better put it on the bitch to feed and protect it from the other pups while it is feeding. Whether the pup is left with the bitch depends upon the bitch's temperament. Some will mother them, others will discard them and bury them in the whelping box, while others become distressed with having a sick pup and may mismother all of the pups. Once the pup is strong bottle feeding can be used if necessary.

2. If you have to keep a pup away from the bitch, the temperature requirements of the pup are
- Newborn and first 4 days: 29 - 32.2 degrees F (85-90)
- Decrease to 26.2 (80) by day 7 to 10

3. The initial use of a glucose solution in preference to a milk product because: a. Colostrum absorption occurs in the first 15 hours after birth. Glucose will not interfere with this absorption, but milk will.
b. Most sick or chilled pups have a low blood glucose and supply of oral glucose is more important than nutrition at this stage.
c. A chilled pup can not digest milk, but glucose will be absorbed.
If a pup is found chilled, warm it and stomach tube with warm glucose solution. Milk should only be started when body temperature has returned.

The stomach capacity of a new born pup is 50mls/kilo
ie. 10mls/200grams body weight.

4. If a pup has not received colostrum it can be supplied by collection blood from the bitch (or other healthy dog in your yard), the red blood cells allowed to settle and serum collected. The recommended volume of serum is 10mls.
a. If the pup is less than 15 hours old and has not been fed a milk supplement this serum can be tube fed.
B. If the pup is older than 15 hours, or has had a milk supplement, the serum can be administered subcutaneously.

5. Most pups that are distressed at birth have inhaled amniotic fluid and possibly meconium. It is highly probable that bacterial pneumonia may develop from this and in these pups I routinely use Septrin Elixir. This is chosen because it is broad

spectrum, bactericidal and less likely to disrupt normal gut bacterial development. Supplementary feeding with lactobacillus is recommended.

I do not recommend the indiscriminate use of antibiotics in pups and lactating bitches as it interferes with the development of normal gut bacteria and can lead to a large number of problems.

6. A drug that I have found useful is Nuelin which is a human asthmatic treatment. This is a bronchodilator and assists breathing.

Almost half of the pups that die are normal pups that are in trouble as a direct result of the whelping process. If these pups survive they usually go on a live a normal life and are worth the trouble of treatment.

The Caesarean
Pups born by caesarean section require extra care because of two reasons.
a. They may have been compromised by whatever necessitated the caesarean.
b. The bitch may be tired, clumsy especially if still groggy from the anaesthesia, may have poor or delayed milk let down and her maternal instincts may be poor.

All pups should be weighed at birth and daily for the first 7 days.
- A very good pup will double its birth weight in 7 days (eg. If its birth weight is 350gms a good daily gain is 50gms/day)
minimum adequate weight gain is 50% of birth weight over 7 days (eg. 25gms/day in a pup weighing 350grams at birth)
- Weight loss is not acceptable

If all pups fail to gain weight, the bitch should be checked for health and milk supply. More insidious causes such a lying on her chest (especially if she is cold) or deserting the whelping box when you leave the room can occur.

If one pup fails to gain weight, check it carefully for congenital defects especially for a cleft palate (a cleft can be present in the soft palate or hypoplasia of the soft palate can be difficult to see) and listen to its chest.

Diseases of the bitch

Metritis
The normal post whelping discharge is described as a port wine colour. The duration of discharge is variable but it should never have an offensive odour.
Maternal illness, offensive odour and temperature are all indicative of metritis and veterinary assistance necessary

Mastitis
Mammary glands should be monitored for any abnormal hardness, discolouration and colour of milk. Mastitis is common.
Usually antibiotics, stripping of the affected gland of milk (either by pups suckling on the gland or hand stripping) and cold compresses are the necessary treatment.

Very per acute necrotic mastitis sometimes occurs and bitches can die'

Milk fever
Usually in toy and small breeds with a large number of pups.
There is a sudden drop in blood calcium levels,
Clinically the bitch pants excessively and has muscle twitches which progresses to inability to get up, convulsions and death.
Milk fever develops quickly and a veterinarian must be contacted immediately/

Weaning

The timing of weaning is variable and depends on the milk supply of the bitch and the number of pups
Weaning can begin as early as 2.5 weeks up 5.5 weeks
There are numerous ways to wean pups
I find Pal Puppy chicken and turkey and progressing to soaked dry puppy food excellent
(Great care must be taken during the weaning to ensure that all pups are eating)
As the pups eat more I reduce access to the bitch's milk progressively, usually weaning them fully by 6 weeks.

- pups should be wormed at 2 and 4 weeks with a puppy syrup
- at 6 weeks with a Drontal tablet (includes tapeworm)
- nails should be clipped weekly
- Vaccination at 6 weeks
- Microchipping before change of owners