Chapter 9

DYSTOCIA IN THE DOG AND CAT

Fortunately, the incidence of dystocia in small animals is quite low but when cases are encountered it is essential that decision making and management are based on a thorough background knowledge of normal and abnormal birth. The obstetric knowledge of the small animal owner is extremely variable. An inexperienced breeder may have never witnessed animal birth and literally have no idea of what is involved; an experienced breeder may have witnessed many more births than the attending veterinary surgeon. A great deal of information can be gained from some breeders but others will have serious and sometimes long-standing misconceptions about the birth process. Such ideas and views may have to be diplomatically ignored and possibly corrected.

Much veterinary obstetric work is still of a ‘fire brigade’ nature with the parturient mother not having been seen prior to the emergency consultation. Clearly this is unsatisfactory and many problems could, with prior knowledge of the case, have been anticipated and prevented. Although it may be difficult to justify provision of the standard of antenatal care available to people, small animal and equine practice does offer the opportunity for some degree of antenatal care.

In some cases, contact is first made when the dog or cat is presented for pregnancy diagnosis but advice may be sought at an earlier stage regarding mating and other matters.

PREMATING CONSULTATION

The scope of this consultation will depend upon the owner’s knowledge and the history of the patient. Advice regarding the patient’s suitability for breeding from the breed-standard viewpoint or the show potential of progeny is probably best sought from experienced breeders. Veterinary input is, however, most important. A full clinical examination of both participants of the proposed breeding pair (if both are available) should be carried out to ensure they are fit and well. They should be skeletally mature as breeding from very small members of a breed may predispose to dystocia caused by fetopelvic disproportion. If there is any history of previous infertility then this must be investigated.

In addition to the clinical examination the following matters should be considered:

- The patient’s medical and reproductive history.
- The patient’s body weight: problems of obesity or malnutrition should be resolved before a decision to attempt breeding is made.
- Pelvic capacity: this should be large enough to allow the passage of fetuses of normal dimension. An external indication of pelvic size can be obtained by noting the distance between the wings of the ilia and between the tubera ischii. A digital rectal examination will allow further estimation of pelvic size. Suspected deformity possibly caused by an earlier road accident can be further evaluated by radiographic examination.
- Vaccination history of the patient: booster vaccination should be carried out before pregnancy. In the bitch, canine herpesvirus vaccination should be carried out during pregnancy, this is discussed on p. 145.
- Detailed examination of the genital system.
- Screening for specific problems: for example, hip dysplasia, feline leukemia virus.
- Bacterial investigation of the genital tract of breeding bitches may be necessary if there has been a history of previous infertility. Cultures may reveal the presence of mixed commensals only. In problem bitches, profuse growth of potential pathogens such as β-hemolytic streptococcus may be significant. Appropriate antibiotic therapy may be prescribed around the time of mating.
• Cytological and hormonal appraisal of the female.
• Hematological and biochemical appraisal if health is suspect.
• Genetic counseling.
• Monitoring the approach of ovulation with the aid of a progesterone profile and vaginal smears in the bitch.

Inherited malformations and diseases are relatively rare in the dog and cat. Selection for specific phenotypic qualities by inbreeding may increase the incidence of fetal abnormalities. However, the breeding of close relatives is quite frequently seen in pedigrees. Adverse consequences are fortunately not often encountered.

Where problems have occurred, evaluation of the pedigree for the degree of inbreeding may help to suggest a mode of inheritance of adverse factors. Test matings may be necessary and if a stud is suspected of carrying an abnormal gene a mating to a female also showing the trait is the quickest way of identifying the carrier, because the off-spring have a 1:1 chance of showing the abnormality.

Age of breeding
Male dogs are capable of breeding from around the time of puberty at 6 months and if the dog is to be used at stud in later life it is important not to suppress signs of potential libido during puppyhood. Regular stud use should be avoided until the dog is 1–2 years of age, and even then it should be introduced gradually.

Ideally, the mature stud should have not more than one bitch per week, allowing two or three services per bitch. There is some evidence that breeding in the female should not be delayed in either the bitch or queen much later than 3 years of age as it is claimed that subsequent fertility may be lower than in animals bred at an earlier age. The Kennel Club has recently prohibited the registration of puppies born to bitches that are over 7 years of age. Although bitch puppies can theoretically breed from the age of puberty, breeding is best delayed until the bitch is skeletally mature at about 18 months of age. The tomcat should not be used at stud until he is able to dominate his partner at successful coitus. It is advisable not to present a queen for breeding until her weight reaches at least 2.5 kg and she is at least 1 year old.

Selection of sire
This is chiefly influenced by pedigree and showing considerations, but with novice owners or where there has been a history of previous infertility, ease of access to the sire is very important. Wherever possible, a stud animal near to home should be selected. Good temperament is an essential quality in both members of the breeding pair. In the cat disparity of size between the sexes should be avoided because a short-bodied male may have difficulty in mating a long-bodied female.

Place of mating
In both dog and cat some degree of male aggression is necessary to allow coitus to occur. Taking the female to the male’s established territory will normally encourage this. Time may be needed – especially in the cat – for dominance to be established. Where the male and female partners have lived together for some time before estrus there may be some reluctance to breed – especially in the dog – and it is wise to separate the pair before estrus is expected. The animals can be reintroduced for breeding once estrus has started.

Time of mating
Despite the longevity of canine spermatozoa, studies of infertility cases and the estrus behavior of bitches suggest that correct timing of mating is important. The most reliable indicator in normal animals is the willingness of the bitch to allow mating. Other indicators of potential receptivity include:

• Cessation of proestral bleeding (but this does not cease in 5% of bitches).
• Vulval relaxation.
• Vaginal cytology: the point of maximum cornification of superficial cells.
• Electrical resistance of the vaginal mucosa (unreliable).
• Second negative glucose test in vaginal mucus.
• Response to perineal stimulation.
• Rise in plasma progesterone, indicating approaching ovulation.

In the cat, estrus usually lasts 4–6 days with mating followed by reflex ovulation being permitted by the queen on the third day. There is no proestral bleeding in the queen cat.

Frequency of mating
In the dog, the pair will naturally mate up to five times daily. In controlled breeding mating should normally
be allowed every 48 hours as long as the bitch remains receptive. More than one mating is undoubtedly beneficial because studies have shown that conception rate following a single mating may be approximately 60%, rising to >80% with two matings. Despite this, many stud owners and breeders claim excellent results over many years following a single mating on a specified day of the estrous cycle.

Ovulation in the queen cat is induced by coitus and several matings may be required before ovulation occurs. Estrus often ends abruptly 24 hours after coitus, thus allowing no further breeding to occur.

**Mating behavior**

When the bitch is fully in estrus she will stand to be mated after a period of play and mutual interest during which sniffing of the genitalia and attempts at mounting may occur. The bitch raises her tail and should show no objection to being mated. Coitus in dogs is prolonged as a result of the canine tie phenomenon, which can last up to 1 hour but is not absolutely essential for successful conception. Partial penile erection is seen as attempts to gain intromission are made with thrusting movements as the bitch is mounted. Further erection is stimulated by tight contraction of the vestibular muscles of the bitch. The dog’s penis is trapped by the erection of the bulbus glandis held by the vestibular muscle and the tie commences. Ejaculation commences as the tie becomes more intense and the dog turns, still in the tied position, to stand facing in the opposite direction to his mate. Occasionally the tie is prolonged and causes concern to the owner. Sedation of both partners with acepromazine is effective in such cases, as is the traditional method of applying cold water to the pair!

In the cat coitus is brief and quite violent, and is often accompanied by noise and aggression. Signs of estrus include vocalization, posturing lordosis with the tail raised and treading movements of the hindlimbs, and frequent urination. Some of these signs may be intensified if the cat is grasped by her scruff. After some initial aggression mounting occurs, with the male grasping the female firmly by the scruff.

Treading movement with all four legs is displayed by the male and vigorous thrusting movements are seen as he attempts to achieve intromission. Mating is brief and the female shows signs of discomfort as the penis is withdrawn and she may turn and strike the male before vigorously licking her vulva. Occasionally the male does not release his grip on the female and mates her again before releasing her.

**ANTENATAL CONSULTATION**

The pregnant animal should be seen at least once during gestation or more frequently if necessary. Time must be allowed not only for a thorough clinical examination but also for the owner to ask questions and seek advice about matters of concern. Time can be saved by producing leaflets covering certain aspects of antenatal care and birth. The following points should be covered during the examination.

**Case history**

This should be reviewed in detail. Important points include the history of any previous parturition and of dystocia, infertility, metabolic disease, genital tract disease, clotting defects, etc. The management of bitches suffering from diabetes mellitus can be very difficult during pregnancy. Stabilization is difficult and puppies may be either markedly overweight or underweight at birth. If there is a history of road accident, pelvic patency should be checked by a digital rectal examination and radiography later in the consultation. Vaccination status should ideally be checked and brought up to date if necessary before mating. If booster vaccination is overdue it should be administered to the pregnant patient after careful consultation of the vaccine data sheets. Many of the infectious diseases of cats and dogs can have a devastating effect on pregnancy. Poor immunity in the dam can also result in suboptimal passive transfer of immunity to the litter. Vaccination against canine herpesvirus during pregnancy is recommended and details are given below.

**Pregnancy diagnosis**

Numerous methods of pregnancy diagnosis are available to confirm that the patient is really pregnant. **Abdominal palpation** This is best carried out at 3–4 weeks gestation when the firm amniotic vesicles of the fetuses may be palpated in the uterine horns. At this stage each vesicle has a bead-like consistency and is between 1 and 2 cm in diameter. Palpation may be difficult in tense or obese mothers. Palpation beyond 4 weeks of pregnancy is less satisfactory because the
amniotic vesicles enlarge rapidly and become less tense after this stage of pregnancy. In late pregnancy – from 6 weeks onwards – individual fetuses may be palpable and fetal movement detected.

**Ultrasonographic scanning of the abdomen**

B-mode real-time ultrasonography provides a highly accurate method of diagnosing pregnancy in both dog and cat. At 5 weeks of pregnancy fetuses are readily detected, fetal hearts can be visualized, and the heart rate counted. Fetal numbers can be quite accurately assessed. If more than four fetuses are present the accuracy of estimation of fetal numbers is reduced. Owners should not be given a guarantee of the number of fetuses present in their animal. Some offspring may be lost through fetal resorption during pregnancy. The clarity of the amniotic fluid may also be observed and gross fetal defects may be seen. In some dogs, pregnancy may be detected as early as 14 days postcoitus, while in late pregnancy confirmation of fetal numbers becomes less accurate. Evidence of fetal life – through fetal heart beats and movements – may also be detected using Doppler ultrasound from approximately 21 days of pregnancy.

**ELISA test**

In both the bitch and queen the hormone relaxin is found in the blood of pregnant animals from day 25 of pregnancy. Relaxin can be readily detected by an ELISA test. As each fetus produces relaxin, it may eventually be possible to estimate fetal numbers by estimating the amount of relaxin present. The possibility of later fetal losses must be borne in mind. A further estimation of blood relaxin may be made later in pregnancy.

**Acute-phase proteins**

In the bitch, acute-phase proteins appear in the maternal blood – their presence in a healthy animal indicates pregnancy – between 27 and 35 days of gestation. Acute-phase proteins also rise in cases of pyometra, which may develop 21 days after estrus. The bitch must receive a thorough clinical examination when the blood sample is taken to ensure that she is free from inflammatory diseases that might cause elevation of the acute-phase proteins unrelated to pregnancy.

**Abdominal radiography**

Pregnancy can be confirmed by abdominal radiography, but only after 35 days of pregnancy when organogenesis is complete. Ossification of the fetal skeletons is demonstrable at about 40 days of pregnancy. Radiography of the entire abdomen will enable a count of fetal numbers to be made. It should be avoided if other methods of pregnancy assessment are available but can be used in safety during the management of a dystocia case.

**Confirmation of whelping/kittening date**

It is essential to check the owner's note of prospective whelping or kittening dates because miscalculations are often made. The gestation period for both species is an average of 63 days but if a number of services have taken place considerable variation from this figure may occur. In dogs it is known that acceptance of the male can occur up to 11 days before and up to 3 days after ovulation. The point of ovulation is indicated by the rising progesterone profile and the appearance of the vaginal cell cytology. The concentration of progesterone in the bitches’ blood may rise to approximately 20 ng/ml just prior to ovulation. Vaginal smears stained with Shorr’s trichrome stain will show the highest percentage of orange staining cornified cells just prior to ovulation.

A peak in the blood concentration of luteinizing hormone (LH) occurs 48 hours prior to ovulation. A study of 290 bitches showed that parturition was highly likely to occur 64–66 days after the LH peak. Frequent LH assays would be required to identify the timing of peak secretion and is not a practical proposition in most cases.

**General clinical examination**

A comprehensive health check should be carried out with special attention being paid to the genital system, the mammary glands, and pelvic capacity. If pelvic capacity is in any way doubtful it should be further assessed by digital rectal examination and radiography at an appropriate time. Fetal organogenesis is complete by 35 days of gestation and limited radiography can be safely used after that time.

Few problems should be found in the healthy breeding female but any abnormalities should be appropriately followed up and, if necessary, monitored throughout pregnancy. The animal should be in good bodily condition. Weight problems should ideally be recognized and addressed before pregnancy is contemplated. Obese animals should not be bred from – fertility is lowered and there is a greater risk of abortion, stillbirths, and dystocia in overweight animals. If the dam is malnourished her conception rate is reduced and the risk of pregnancy loss is increased. Any offspring born may be underweight and may also fail to thrive in later life. There is also a risk of hypoglycemia occurring in underweight bitches in late pregnancy and early lactation.
Canine herpesvirus vaccination

A vaccine is available for active immunization of bitches to prevent mortality, clinical signs and lesions in puppies arising from infection by canine herpesvirus in the first few days of life. Two doses (1 mL administered subcutaneously) are given to the bitch as follows: First dose: during estrus or 7–10 days after mating; second dose: 1–2 weeks before the expected whelping date. The vaccination program should be repeated each time the bitch is bred.

HEALTH DURING PREGNANCY

Pregnancy is not a disease but a natural reproductive function and health should be good throughout its duration. The desire for and the ability to take exercise become less and in some bitches a period of mild illness may be seen about the third or occasionally as late as the fifth week of pregnancy. The condition has been likened to morning sickness in people but does not share the same cause. Appetite may be reduced and some vomiting and increased thirst may be seen. The condition and the time that it occurs – about 3 weeks after mating – may raise suspicions that the bitch is developing pyometra. A careful clinical examination should differentiate the two conditions and ensure that no other disease process is present. In cases of pyometra, uterine enlargement may be palpable or demonstrable by ultrasonographic scan. The latter technique should enable positive signs of pregnancy to be confirmed even though a slightly later scan at 35 days is preferable. Radiography before 35 days of a possible pregnancy is best avoided because fetal organogenesis is incomplete. If the pyometra is open there may be evidence of a vaginal discharge and profuse bacterial growths, especially of *Escherichia coli*, may be obtained on culture. Other diagnostic features, such as a pronounced neutrophilia, may be of value. Acute-phase protein levels also rise in pyometra cases and may interfere with the pregnancy test which relies on estimation of these proteins between days 27 and 35 of pregnancy.

Although this form of illness is uncommon in bitches the obstetrician should be careful to ensure that it is not forgotten in bitches that show pyometra-like symptoms 3 weeks or so after service. Hysterectomy should never be performed unless the obstetrician is quite sure that the patient is not pregnant.

Pregnancy

Seventy per cent of the puppies’ growth takes place in the last 3–4 weeks of pregnancy. For this
reason, and to prevent excessive weight gain, the bitch should receive a well-balanced diet at maintenance level for the first 5–6 weeks of pregnancy. The energy intake of the bitch should only be increased for the last 4 weeks of pregnancy. The energy intake should then increase by 15% per week so that it is up by 60% at the time of whelping. Puppy foods may be used to provide the extra energy required. There may be a temporary drop in appetite during the fourth week of pregnancy (reason unknown) but in the last 3 weeks the food requirement rises to 25% above the maintenance level. Appetite may also be temporarily reduced at whelping time. The bitch should ideally return to her premating weight after whelping and maintain her weight during lactation.

**Lactation**  
The energy demands of a litter of puppies that are to be supplied by the maternal milk are considerable. The bitch’s diet must be adequate to support these demands. She will probably need 2.5 times her maintenance requirement of food to support herself and feed her litter.

**Calcium supplementation**  
It is not known whether calcium supplementation during pregnancy in small animals causes reduced availability of calcium after birth as it does in the cow. Neither increased nor decreased levels of calcium should be fed during gestation. The diet should contain 1.0–1.8% calcium and 0.8–1.6% phosphorus. The calcium content should be greater than the phosphorus content.

During lactation the diet should contain 1.4% calcium, with a calcium : phosphorus ratio of 1 : 1.

**Vitamin C supplementation**  
It is claimed that 250 mg vitamin C per day stops the bitch becoming ‘disgruntled’ during lactation but the reason for this is unknown.

**The cat**  
Kitten growth and the queen’s dietary needs rise on a more linear plane than in the dog and by the end of lactation the cat may eat at least twice her normal maintenance requirement. Energy intake in the pregnant queen should rise steadily from 60–90 kcal/kg/day in early pregnancy to 100–140 kcal/kg/day in late pregnancy. Fat reserves are laid down in early pregnancy and form a useful source of energy in lactation. Queens tend to lose weight in early lactation but should regain weight loss by weaning. The queen should receive normal cat food with 20–30% dietary protein with all the required amino acids, including taurine. A severe taurine deficiency during pregnancy may lead to fetal death or to the birth of deformed kittens. A short period of anorexia may be seen at about 2 weeks into pregnancy and also in the last week of pregnancy.

**Exercise**  
Active exercise should be maintained throughout pregnancy but exercise tolerance and agility are reduced towards the end of gestation. The heavily pregnant bitch may require help when jumping up into a car or climbing stairs. The heavily pregnant cat seldom needs assistance but her ability and willingness to climb trees may decrease as parturition approaches.

**Worming**  
**Dog**  
To reduce the risk of pre- and postnatal transfer of toxocara larvae, fenbendazole (25 mg/kg) given daily from day 40 of pregnancy to day 2 of lactation is recommended. This regime is thought to be 98% effective. Puppies should be given a 3-day course of fenbendazole at 2 and 5 weeks of age. A further dose is recommended when puppies leave their breeder’s premises.

**Cat**  
There is no evidence of transplacental transfer but transfer through the milk of *Toxocara cati* larvae to sucking kittens may occur. The pregnant queen should be given 100 mg/kg of fenbendazole as a single dose during pregnancy.

If no worm-control program has been put in place, puppies and kittens can be safely treated with fenbendazole from the age of 2 weeks.

**External parasites**  
The bitch or queen must be carefully examined for any evidence of infestation by external parasites. It is essential that the pregnant bitch or queen, and the environment, should be free from external parasites. Infestations of fleas, lice, and ear-mites can, if present, readily spread to the puppies or kittens. Dosing for external parasites in puppies and kittens can be difficult as some preparations are unsuitable and too toxic for use on the young. If the mother is already on a flea-control program there should be no need for additional precautions during pregnancy.

If no flea-control program has been used, the following regime is recommended to control fleas on the mother and also in her environment: The egg and larval stages of fleas can be controlled by spraying the environment with cyromazine or methoprene. Permethrin controls emerging adults and also pupae. The bitch or queen...
should be treated at intervals with fipronil, imidacloprid, or selamectin at intervals prescribed by the data sheets.

Neonatal puppies and kittens with a flea infestation can be treated, if over 48 hours old, with fipronil spray. Permethrin can be used in puppies over 24 days of age but other products should not be used until the young are aged 6–8 weeks.

The bitch and queen should be checked for evidence of ear-mite infestation and treated if necessary.

**Accommodation**

**Whelping accommodation**

Ideally, a whelping box in a warm (29°C), quiet, but accessible room should be provided. The box should have raised sides and be of sufficient size to accommodate the bitch and pups until weaning. One side of the box – the entrance – should have a slightly lower wall to allow access by the bitch without repeated but minor trauma being caused to her mammary glands. Anti-crush puppy bars should be provided around all the walls. The box should be raised above ground level to prevent draughts and insulate the puppies from the cold floor. Strict attention to hygiene in the whelping quarters is essential. During birth, newspaper provides a useful and disposable floor covering and can be changed at intervals. After whelping, paper or a washable warm fabric may be used. Supplementary heating should be available – either underfloor or as an overhead heat lamp. The bitch should be introduced to her proposed quarters well before parturition is due.

**Kittening accommodation**

A cardboard or wooden box with a side entrance (above ground level) and a removable lid provides a useful kittening area. Floor covering is as for the bitch.

**NORMAL BIRTH**

The inexperienced owner should be given an account of normal birth and of the basic care of the mother and offspring during parturition (see Chapter 1).

**Advising the owner when to seek veterinary help**

If problems are anticipated or if there is a history of previous dystocia, the practice may wish to book the date of anticipated delivery. They may ask to be informed when birth commences and to be given updated reports by the owner at specified intervals. It is essential to make sure that the owner reports any abnormality or suspected abnormality. Abnormalities should be explained in as simple a manner as possible. A brief written account of normal birth may help the inexperienced owner. Specific signs of abnormality and hence possible dystocia include:

- Gestation prolonged beyond the expected date of parturition.
- Prolonged non-progressive preparations for birth.
- Vigorous straining for 20–30 minutes without fetal delivery.
- Weak, intermittent straining for 1–2 hours without fetal delivery.
- An interval of >2 hours between fetuses.
- Fetus apparently stuck in the birth canal and partially visible.
- Green vaginal discharge (in the dog), red–brown discharge (in the cat) but no fetus delivered.
- Delivery of dead puppies/kittens.
- Cessation of birth process but the owner thinks some fetuses remain undelivered.
- Owner uncertain whether birth process is complete.
- Signs of maternal illness, distress or unexpected blood loss.

In general terms, the owner should be advised to report any apparent abnormality and to contact the obstetrician immediately if he or she has any worries about their parturient pet.

**INCIDENCE OF DYSTOCIA**

There are few references to the true incidence of dystocia in cats and dogs. There is a reluctance on the part of some breeders to admit to problems in their reputable stock. There is also a lack of a central coordinating body taking the part of, for example the artificial insemination companies, which evaluate calving problems in their bulls. Occasionally, a breed society may comment on the high incidence of cesarean section among their breed or report that uterine inertia appears to be more common than it used to be. Following-up such claims and observations is difficult because there is often no definitive baseline with which to compare present trends. Dystocia may occur in about 5% of canine births but in the brachycephalic breeds this may be an extremely low estimate.

The incidence of feline dystocia in pet cats is probably lower than in dogs, although a higher incidence is seen in the ‘exotic breeds’ than in the ‘ordinary’ cat.
In a survey of dystocia reported by the owners of mainly pedigree cats, Gunn-Moore & Thrusfield (1995) noted that dystocia occurred in 5.8% of nearly 3000 litters. Dystocia occurred in 0.4% of litters of a colony of cats of mixed breeding but in 18.2% of litters of Devon Rex cats. The authors suggested that the low incidence of dystocia in the colony cats may have been related to the fact that they were not bred for ‘breed type’. Those cats in the colony that suffered from dystocia were not kept for further breeding, thus reducing the possibility of a further dystocia. Their high health status and minimal interference during gestation and parturition may have also contributed to a low level of dystocia. The head shape of the cat’s breed influenced the incidence of dystocia. Breeds with dolicocephalic and brachycephalic head shape had a higher incidence of dystocia than mesocephalic breeds.

Some years ago, a survey of canine dystocia was carried out by 12 practices in South Wales. Dystocia in 265 bitches presented for treatment was reported: 20% of the bitches had suffered a previous episode of dystocia; 37% were primiparous animals and 26% were smaller than the breed average; 24% of cases were in Yorkshire terriers, 8% in Corgis and 8% in Jack Russell terriers but the incidence of these breeds within the local population was not stated. It is interesting to note that 60% of cases of dystocia were resolved by cesarean section.

**CAUSES OF DYSTOCIA**

**Causes of dystocia in the bitch**

In the South Wales survey the causes of canine dystocia were distributed as shown in Table 9.1.

In another retrospective study of 182 cases of dystocia in Sweden (Darvelid & Linde-Forsberg 1994), the causes of dystocia were as shown in Table 9.2. This survey found no relationship between the incidence of dystocia and the age or breed of the bitch; 42% of those bitches that had whelped before had suffered a previous episode of dystocia.

| Table 9.1 Dystocia in the bitch (South Wales survey) |
|-----------------|-------|
| Cause           | %     |
| Uterine inertia  | 36    |
| Fetopelvic disproportion | 22    |
| Fetal maldisposition | 11    |
| Abnormalities of birth canal | 9     |
| Other causes    | 22    |

From Ekstrand & Linde-Forsberg (1994).

**Causes of dystocia in the queen cat**

In a retrospective study of 155 cases of feline dystocia seen in Sweden (Ekstrand & Linde-Forsberg 1994), the causes of dystocia were as shown in Table 9.3.

| Table 9.2 Dystocia in the bitch (Swedish survey) |
|-----------------|-------|
| Cause            | No. of cases | %  |
| Maternal        |           |     |
| Primary complete uterine inertia | 89    | 48.9|
| Primary partial uterine inertia | 42    | 23.1|
| Narrow bony birth canal | 2     | 1.1 |
| Uterine torsion  | 2        | 1.1 |
| Hydroallantois   | 1        | 0.5 |
| Vaginal septum formation | 1  | 0.5 |
| Total (maternal) | 137      | 75.3|

| Fetal           |           |     |
| Fetal maldisposition | 28   | 15.4|
| Fetal oversize   | 12       | 6.6 |
| Fetal malformation | 3     | 1.6 |
| Fetal death      | 2        | 1.1 |
| Total (fetal)    | 45       | 24.7|

From Darvelid & Linde-Forsberg (1994).

| Table 9.3 Causes of dystocia in the queen cat |
|-----------------|-------|
| Cause            | No. of cases | %  |
| Maternal        |           |     |
| Uterine inertia  | 94       | 60.6|
| Narrow birth canal | 8     | 5.2 |
| Uterine obstruction | 1     | 0.6 |
| Uterine prolapse | 1        | 0.6 |
| Total (maternal) | 104      | 67.0|

| Fetal           |           |     |
| Fetal maldisposition | 24   | 15.5|
| Fetal malformation | 12    | 7.7 |
| Fetal oversize   | 3        | 1.9 |
| Fetal death      | 7        | 4.5 |
| Total (fetal)    | 46       | 29.6|

| Other causes    |           |     |
|-----------------|           | 3.2 |

From Ekstrand & Linde-Forsberg (1994).
incidence of dystocia in Persian cats was believed to be higher than in other breeds.

Fetal malposition and primary uterine inertia were reported by Gunn-Moore & Thrusfield (1995) to be the main causes of dystocia in brachycephalic breeds. The flattened head shape of brachycephalic cats may predispose them to fetal malposition involving the head. The longer head of the dolicocephalic breeds may aid fetal entry into the maternal pelvis as birth commences.

** FAILURE OF THE EXPULSIVE FORCES **

** Uterine inertia **
This, the most common cause of dystocia, is divisible into the two main categories of primary and secondary uterine inertia.

** Primary uterine inertia **
In the polytocous small animals there may be a complete or a partial failure of the uterus to start contracting. In partial failure the uterus may bring the first fetus to the pelvic inlet from whence it is delivered by abdominal straining. No further fetuses are presented and uterine contraction ceases.

An idiopathic type of primary inertia has been described, in which delivery starts normally and several members of the litter are delivered normally. There is no evidence of obstruction to birth through maternal or fetal cause. The uterus stops contracting and does not resume unless ecbolic therapy is given. It could be argued that this could be classified as a partial rather than a complete primary uterine inertia.

** The single pup syndrome ** This can occur in any breed but the highest incidence is said to occur in the Scottish terrier, in which breed fetal viability is also said to be low. It is believed that the single puppy fails to produce sufficient ACTH and cortisol to initiate the birth process. Having outgrown its placental supply of oxygen and nutrients the puppy dies in utero and becomes mummified or macerated. If the cervix remains closed the fetus becomes mummified. It may remain in the uterus and be discovered later during an examination unrelated to pregnancy. When infection enters the uterus via the diluted cervix the puppy becomes infected, emphysematous, and macerated. A life-saving hysterectomy may be the only way of resolving such cases. In some cases of the single pup syndrome the bitch is not known to be pregnant until there is evidence of fetal death.

If the bitch is known to be pregnant and the presence of a single fetus has been confirmed by ultrasonography both she and the puppy should be carefully monitored throughout pregnancy. An elective cesarean section or induction of birth may be necessary at term. A cesarean section would be the safest option.

** The single kitten ** A single kitten can also fail to initiate its own birth but the problem is less well documented than in the bitch. Queen cats often continue to breed at least until teenage. Litter size decreases with advancing age. Special care should be taken of the queen cat known (for example through pregnancy diagnosis) to be pregnant with a single kitten. Approaching birth should be carefully managed and the kitten monitored if possible. An elective cesarean section may be needed if spontaneous birth fails to occur.

** Calcium ** The role of calcium in small animals uterine inertia is not entirely clear. There are many anecdotal accounts of cases that have responded to calcium therapy. However, in a small trial by the author (unpublished data) no significant difference was observed in the calcium levels in the plasma in animals suffering from primary uterine inertia and those whelping normally.

** Hysteria ** An extreme state of excitement at whelping is seen chiefly in the toy breeds but is also prevalent in some strains of Cocker spaniels. It may be predisposed by environmental disturbance, although the latter is not always harmful. There have been a number of reports of bitches taken to the surgery for cesarean section that have given birth in transit. In Bull terriers an acute state of hysteria has been reported in which aggression towards both pups and owners is seen. This condition appears responsive to calcium therapy.

** Secondary uterine inertia **
This type of uterine inertia is a consequence of another cause of dystocia, such as fetopelvic disproportion, in which uterine contraction ceases after a period of non-productive activity.

** Abdominal muscle tone ** This may deteriorate in old and fat animals, reducing the efficiency of the abdominal straining that is so important in the second stage of labor. This problem of inefficient abdominal musculature is also seen in elderly parturient cats. Damage to the tendinous attachment of the abdominal muscles to the pubis may be sustained by cats in road traffic accidents. Surgical repair may be possible to avoid various potential problems, including the animal having a reduced ability to strain.
OBSTRUCTION OF THE BIRTH CANAL

Obstruction of the birth canal can result from bony or soft tissue abnormality.

Bony abnormalities

Pelvic fracture is a common sequel to road traffic accidents in cats and the subsequent displacement of the bones can severely obstruct the birth canal. In some breeds of dog – notably the Scottish terrier – the pelvis is relatively small. Pelvic size is sometimes very small in members of the brachycephalic toy breeds of dog and also in the Welsh Corgi. Gross pelvic abnormalities should ideally have been detected and avoided at the prebreeding examination or during an antenatal consultation. The internal pelvic dimensions can be evaluated by a digital rectal examination before birth or to a limited extent by vaginal examination during birth. A radiographic examination of the pelvis may be useful in cases where a pelvic abnormality is suspected but cannot be palpated.

Soft tissue abnormalities

Congenital stenosis may affect any part of the soft tissue component of the birth canal and the other abnormalities listed are seen occasionally. Vaginal stenosis in the vestibular region appears to be particularly common in Cavalier King Charles spaniels (author’s unpublished data). Affected animals may be unable to mate and in any case should not be used for breeding.

Deviation of the uterus

Deviation has been described in the Boxer and occasionally in other breeds. In affected animals the heavily gravid uterus falls steeply away from the pelvic inlet and cervix. The steep ascent to the cervix and the partial obstruction caused by the deviation appears to interfere with fetal passage. Very rarely a portion of one uterine horn containing a fetus enters the sac of an inguinal hernia. The growing fetus becomes too large to pass into the abdomen and surgical removal is necessary.

Torsion of the uterus

Torsion has been reported in both the dog and cat. One or both uterine horns may be involved. Cesarean section is necessary to resolve (and possibly to diagnose) the problem.

FETAL MALDISPOSITION

The basic reason for the development of such malpositions is not known. Abnormal maternal hormone levels have been blamed but it is possible that there may be some abnormality in the fetal nervous system. Prior to birth the small animal fetus is normally in the ventral position (‘upside down’) and rotates through 180° just before entering the pelvis. Failure to achieve this rotation may result in the fetus being born in a lateral or ventral position. Maldisposition of the fetal head appears to occur most frequently in the brachycephalic breeds.

Posterior presentation

In small animals this is not considered abnormal, with up to 40% of offspring being born in this manner. This presentation is often erroneously described as a ‘breech birth’ by owners – true breech birth is a posterior presentation with bilateral hip flexion.

Deviation of the head

Deviation of the head either laterally or downwards is one of the most common fetal malpostures in small animals (Fig. 9.1). Lateral deviation appears to be
most common in the ‘long-necked’ breeds such as collies. Downward deviation is seen chiefly in the brachycephalic breeds in which the dome-shaped cranium of the puppy or kitten so easily enters the pelvic inlet with the fetal muzzle catching on the pelvic brim. It is also seen in the ‘long-headed’ canine breeds, e.g. Sealyham and Scottish terrier, and in the dolicocephalic feline breeds.

**FETOPELVIC DISPROPORTION**

This is chiefly seen in the small breeds where litter size is numerically small and individual fetal size is large. In Welsh Corgis, considerable variation in the size of litter mates has been reported, with some fetuses passing easily through the pelvis whereas others are unable to do so. Yorkshire terriers seem particularly prone to fetopelvic disproportion.

**Fetal monsters**

Those causing dystocia in small animals include hydrocephalus, schistosomus reflexus, anasarca, and conjoined twins. In most cases the abnormal fetus is too large to enter the maternal pelvis. Vaginal delivery is impossible and delivery by cesarean section is necessary. The exact nature of the deformity may only become apparent when the fetus is delivered.

**DYSTOCIA CAUSED BY FETAL DEATH**

Up to 5% of the members of small animal litters may be stillborn. Stillbirth rates increase with the duration of labor and may rise to substantially above 5% in cases of dystocia that are not dealt with quickly. Stillborn fetuses may be either prepartum or intrapartum deaths. Some fetuses that die before birth become mummified and are usually passed without difficulty between the delivery of normal living members of the litter. Intrapartum deaths are often the result of asphyxia caused by inhalation of fetal fluids. Most occur as the result of delayed delivery, the loss of placental functional, and fetal hypoxia. Provided their presentation and size are normal they are often passed without difficulty. Fetal malposition may be predisposed and exacerbated by fetal death, the dead fetus being unable to make the small spontaneous movements that can result in the correction of a minor maldisposition.

It may be possible to use transabdominal ultrasonography to determine whether a puppy at the pelvic inlet has a heart beat and is therefore alive. Spontaneous movements are a further indication of fetal life. Evidence of maldisposition may be detected by digital examination. If the presentation is normal, administration of oxytocin should encourage passage of the fetus into the pelvic inlet. Once in that position abdominal straining should result in fetal delivery.

Fetal death followed by maceration can be a life-threatening problem to the dam. The problem usually arises when parturition is unobserved and the patient fails to deliver all her litter. It is seen in both dogs and cats but especially in the latter species. The cat may attempt to deliver her kittens away from home or may be disturbed during parturition. One or more kittens are left in the uterus. Infection enters the uterus via the cervix. Fetal emphysema and partial maceration follow. The cat rapidly becomes toxemic and often severely dehydrated. Straining is not always seen but an unpleasant vaginal discharge is often present. Vaginal examination is difficult but with the aid of generous lubrication it may be possible to palpate a fetal part, often the head. An X-ray can be taken to confirm the diagnosis and the degree of fetal emphysema. Vaginal delivery is impossible as the fetal body is grossly enlarged (see Fig. 11.19). The cat should be given immediate fluid therapy and once the patient is well enough for surgery hysterectomy should be performed. For details of surgical treatment please see Chapter 11.

**SIGNS OF DYSTOCIA**

The signs of dystocia were discussed in the section ‘Advising the owner when to seek veterinary help’, see p. 147.

**APPROACH TO A CASE OF DYSTOCIA IN SMALL ANIMALS**

**General points**

Cases of dystocia must always be seen as a matter of urgency. Any delay can be dangerous, even if the owner’s message suggests that the situation is not serious. The parturient animal is probably best seen in the surgery
where full facilities, including X-ray and ultrasonography, are available.

**Case history**

Although some information may be available from the antenatal consultation, the clinician should review the history of previous births and the general health record of the patient. Information about the present birth is obtained: Duration of gestation, history of illness or abnormal discharge in the last few days, duration and signs of labor, number of offspring born – live and dead, interval between births, intensity and pattern of straining, passage of placenta, lay interference.

**Clinical examination**

**General clinical examination**

This should be thorough and comprehensive and should result in an assessment of the animal’s health status and signs of any adverse effects of parturition. The patient should be restrained gently but firmly either on a table or on the floor. Signs of toxemia or cardiovascular compromise must be sought and an examination of the mammary glands made to assess the level of milk production. The degree of abdominal distension and the shape of the abdomen may give some indication of the number of unborn offspring, although this observation is unreliable. Fetal movements may be felt when the hands are placed gently around the patient’s abdomen (Fig. 9.2).

**OBSTETRICIAN’S CHECK LIST**

**Call received**

- Receive call concerning the dystocia case from the owner
- Take a brief note of the patient’s immediate history and date of expected birth
- Arrange to see the patient as soon as possible – preferably in the surgery
- Check patient’s case records for details of any antenatal visits and previous occurrence of dystocia

**Owner and patient arrive at the surgery**

- Further assessment of case history: how many offspring already born, approximate time of births and living state of any fetuses delivered, passage of placenta?
- General clinical examination of the patient: visual inspection of the vulva, visual inspection of mammary glands
- Palpate contours of the abdomen: note any fetal movements, the degree of abdominal distension, and the presence of milk in the mammary glands

**Examination of the genital system**

**Inspection of vulva**

The quantity and nature of any discharge is noted. A foul smell may be indicative of fetal death and putrefaction. The presence of fetal parts, placenta, and their condition is noted. Quantities of fetal meconium passed into the amniotic cavity may be indicative of fetal anoxia. Vulval dimension and any obvious damage or constriction is noted.

**Vaginal examination**

Strictest attention to hygiene, gentleness, and careful restraint of the mother are essential prerequisites for this procedure (Fig. 9.3). In the average bitch the forefinger may be used but in the toy bitch or cat entry may be restricted to the little finger. In the bitch the vagina initially runs in an upward direction underneath the perineum before inclining anteriorly to pass through the pelvis. In the cat the vagina passes directly into the pelvis from its vulval opening. The vagina is assessed for moistness or dryness and for any sign of damage. The presence of any bony or soft tissue constriction or other obstruction is also noted.

The presence of a fetus in the birth canal – its location, presentation, position, and posture – is noted. Signs of life may include spontaneous or reflex movement and occasionally sucking of the operator’s finger. The absence of these signs does not necessarily mean that the fetus is dead. In anterior presentation the fetal head with its ears and mouth, and occasionally one or both forelegs, may be palpable. The presence of covering amnion may make detailed palpation difficult. In posterior presentation the fetal hindlimbs and tail are
Figure 9.2 Fetal movements may be felt and assessed when the hands are placed gently over the patient's abdomen.

Figure 9.3 Vaginal examination in the parturient bitch.
recognized but in true breech presentation only the tail and the hindquarters are palpable. Lateral deviation of the head may be difficult to recognize, especially in the long-necked breeds. Although a limb – possibly recognized as a forelimb – may be palpated, the head may be so deviated that only the base of the fetal neck can be palpated as a second landmark.

Quite frequently an amniotic vesicle can be palpated (Fig. 9.4), although its gossamer-like thinness can cause it to be easily missed unless the fetal head is immediately behind. The presence of an approaching amniotic vesicle normally means that a fetus is also approaching. Palpation a few minutes later will often reveal the fetal head (Fig. 9.5).

The fetus is usually palpable within the amnion but if the fetus has not fully engaged in the pelvis it is wise to avoid excessive interference at this stage. Touching the fetal head at this stage can cause the fetus to move back vigorously from the pelvic inlet and occasionally result in the establishment of a malpresentation.

**Figure 9.4** Palpation of the gossamer-like amniotic vesicle, which may herald the approach of a fetus (see also Fig. 9.5).

**Figure 9.5** The fetal head may be palpable shortly after the amniotic vesicle (see also Fig. 9.4).
In the ‘average patient’ the cervix and uterus cannot be palpated per vaginam but the palpable characteristics of the anterior vagina in the bitch may give some indication of what is happening at the cervix and within the uterus (Fig. 9.6). A dilated anterior vagina may indicate that the cervix is dilated – and indeed some obstetricians are convinced that they are actually palpating the cervix and beyond. Pronounced tone in the wall of the anterior vagina may be indicative of satisfactory activity in the uterine musculature. The presence of the finger just caudal to the cervix may provoke uterine activity via Ferguson’s reflex. Flaccidity of the anterior vaginal wall and failure to stimulate the reflex may indicate the presence of uterine inertia. If the cervix is closed (either before or after whelping) the walls of the anterior vagina are slightly constricted and press on the obstetrician’s finger (Fig. 9.7).

In the cat the obstetrician is mostly able to palpate the caudal parts of the vagina. Palpation of the anterior vagina and indirect assessment of cervical dilation or uterine tone in the cat is seldom possible unless the obstetrician has very small fingers. Movement of the finger against the dorsal wall of the vagina in the bitch (sometimes termed ‘feathering’) may provoke straining and assist fetal delivery.

**OBSTETRICIAN’S CHECK LIST**

**Gynecological examination: digital vaginal examination**

- Check for presence of an amniotic vesicle or fetus
  - Check presentation of fetus
  - Assess tone and dimensions of the anterior vagina
  - Determine the presence and nature of vaginal fluids
  - Assess dimensions of the bony pelvis

**Abdominal palpation** A careful, gentle, and systematic examination of the abdomen is carried out. In the obese or tense animal this can be difficult and often
unrewarding. If a single fetus is present its size, its position in relation to the pelvic inlet and – if possible – its presentation should be determined. Two fetuses, if present, may be identified. If a larger number of fetuses are present it may be impossible to be sure of their number.

It is very easy to mistake the firmly contracted empty uterus for a fetus. The slightly more flaccid uterus containing portions of placenta can also be mistaken for a retained fetus. It may be possible to recognize with certainty the characteristic head–neck–thorax sequence of the fetus (Fig. 9.8) but if there is any doubt an X-ray must be taken.

Abdominal auscultation/ultrasonographic evaluation  Fetal heart beats can often be heard through a clinical stethoscope in quiet surroundings and can also be appraised with a Doppler or real-time ultrasound instrument. Although fetal cardiac activity is easily detected in pregnancy, during parturition it can be frustratingly more difficult. The difficulty may arise through air entering the uterus and interfering in particular with ultrasound waves. With Doppler and B-mode instruments, fetal limited movement may be appreciated – as it may by direct palpation. Excessive fetal movement may ominously suggest the presence of severe fetal hypoxia. Normal fetal heart rate in puppies and kittens is in the region of 150–220/min. Severe bradycardia or dysrhythmia also suggests developing anoxia and fetal distress. The rate and vigour of fetal cardiac activity and the degree of fetal movement can be particularly well demonstrated using real-time ultrasound. Loss of amniotic fluid – already relatively small in quantity in dogs and cats – may result in less effective differential acoustic impedance. Thus once birth is actually underway in these and other species, ultrasonographic evaluation of fetal viability may actually become less rather than more reliable. The presence of fetal hearts beating at a regular rate is a reassuring sign of fetal life. The absence of detectable heart beats may not necessarily (for the reasons mentioned above) be a certain sign of fetal death.

Radiographic examination of the abdomen  A single radiographic exposure of the gravid canine or feline abdomen to the diagnostic beam is unlikely to prove harmful to the unborn litter at term. This examination is essential if there is any doubt about the nature of the abdominal contents. The number and position of any unborn fetuses can be detected immediately. Signs of gross fetal malposition – such as transverse presentation at the pelvic inlet – may be seen radiographically. Signs of fetal death, including overlapping of the cranial bones – Spalding’s sign (Fig. 9.9) – gas shadows in the fetal heart and stomach and in advanced cases fetal emphysema may also be seen. The spine of the dead fetus may be in a more tightly flexed position than that seen in the living fetus. In recently dead fetuses no radiographic abnormality is visible. An indication of the number of remaining fetuses can sometimes also be obtained by real-time ultrasonography subject to the limitations mentioned above.
Diagnosis of the cause of dystocia and formulation of a tentative plan of treatment

The case history and clinical examination of the case should enable the cause or causes of dystocia to be established and a tentative plan of treatment to be drawn up. Treatment is aimed at assisting in the delivery of any fetuses within the birth canal and encouraging the uterus to deliver any further fetuses in an orderly fashion at the pelvic inlet. It is important that the planned course of treatment can be completed in a reasonable time so that fetal survival is not compromised. If there is evidence on clinical examination that fetal life is already at risk, emergency treatment such as an immediate cesarean section may be required.

Most planned courses of action in obstetrics are inevitably tentative and alterations to the plan may prove necessary from time to time. It may be anticipated that a case of fetal malposition may be corrected by manual manipulation. If attempts to achieve this do not prove possible, to protect both mother and offspring from further damage, surgical treatment may now be the only option. Treatment may: (1) be conservative – when a period of limited delay is thought likely to allow delivery to proceed; (2) involve ecbolic therapy; (3) be assisted delivery, possibly preceded by correction of a malposition; or (4) be surgical treatment.

It is essential that the treatment plan and any changes to it are discussed fully with the owner at every stage.

Figure 9.9 Radiography of a dead puppy showing overlapping of the cranial bones (Spalding’s sign).

OBSTETRICIAN’S CHECK LIST

Diagnosis of the cause(s) of dystocia and tentative plan of treatment

Evaluate case history, health check, and the results of vaginal and abdominal examinations.

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TREATMENT OF DYSTOCIA

Conservative treatment

In some circumstances – such as the presence of an amniotic vesicle approaching the pelvic inlet and when uterine tone is thought to be satisfactory – it may be decided to advise a period of controlled waiting. Such periods should always have a time limit after which – if the anticipated event has not occurred – a further period of waiting or alternative treatment will be used. It is essential that whenever such conservative treatment is used, and especially when the client leaves the surgery, arrangements are made for a report to be given to the obstetrician concerning progress within a finite time interval. Contact must be maintained with the owner until there is a successful termination of the case.

Ecbolic therapy

Drug therapy to stimulate uterine contraction may be used to treat uterine inertia and to hasten the presentation of the next fetus at the pelvic inlet. It will also encourage passage of the fetal membranes and postparturient uterine involution. Ecbolic drugs must never be used in cases of obstructive dystocia and their use should always be preceded and followed by vaginal examination.

Oxytocin (dose: dog 2–5 IU; cat 2–5 IU) is normally given by intramuscular injection. It can cause pain on administration and make the patient attempt to bite the obstetrician. After injection the patient should be left quietly for 10–15 minutes. The temptation to make more frequent vaginal examinations must be resisted. Excessively large doses of oxytocin may cause uterine spasm and occasionally signs of maternal distress.

If a single dose of oxytocin fails to produce the desired effect a further dose may be given after 20–30 minutes. Sometimes a single dose will be sufficient to achieve the desired object. In some cases of uterine inertia a number of injections given at strategic intervals may be required. Provided a reasonably rapid response to oxytocin is obtained, further doses can be used. The author has often used as many as five doses of oxytocin in cases of uterine inertia before the whole litter has been delivered. Occasionally, further doses are used but each dose must be preceded by evaluation of the progress of the case and the response to previous doses. Each dose should be preceded and followed by a digital vaginal examination of the patient. The presence of the obstetrician’s finger in the anterior vagina may provoke straining and also stimulate further uterine contraction. If there is no response at all to oxytocin within 30 minutes and further fetuses remain in utero, surgical intervention is likely to be required.

The role of calcium in the treatment of uterine inertia is somewhat controversial (see p. 149) but undoubtedly some cases which have failed to respond to oxytocin are responsive to calcium. Calcium borogluconate 10% (dose: dog 5–15 mL; cat 2–5 mL) is given by slow intravenous injection with careful monitoring of heart rate. A 10% solution of calcium borogluconate is not commercially available but can be produced by dilution of a standard 20% solution used for treating milk fever in cows.

Assisted delivery of the fetus

Attempts to deliver the fetus should not be made until it is at the pelvic inlet and in the correct position and posture for delivery. Before any attempt at fetal delivery the whole perineal area must be cleaned. The obstetrician must scrub the hands and may choose to wear gloves. In cases presented early in dystocia where the fetus is malpresented it may be possible, using the finger tip and aided by external manipulation, to correct the displaced fetal part. In longer-standing cases the ‘log jam’ of fetuses building up behind the obstruction may not allow any fetal repulsion and loss of fetal fluid may prevent any

↓

What is the cause(s) of the dystocia?

The basic plan of treatment will be to deliver any presenting fetuses and encourage the uterus to present the remaining puppies at the pelvic inlet.

Is the litter at immediate risk?

Is immediate emergency delivery by cesarean section necessary?

Tentative plan of treatment – explain/discuss with owner

Report any changes of plan as the case progresses to the owner
attempt to correct the malpresentation. Lubrication using KY jelly or an obstetric lubricant should be introduced into the birth canal whenever natural fluids have been lost. Lubricant can be gently introduced into the more anterior parts of the vagina using a syringe and wide-bore male dog catheter. Correction of fetal malpresentation using instruments in the form of hooks or Rampley’s sponge-holding forceps has been described but lack of space and difficulty of access may limit their use.

The arrival of a fetus in the maternal pelvis usually stimulates straining, causing the fetus to pass along the vagina and be delivered. The presence of the obstetrician’s finger in the vagina and stimulating the roof of the vagina (‘feathering’) may encourage straining. The strength and success of straining can be assessed by fetal movement along the birth canal. The finger may also stimulate uterine contraction encouraging the presentation of the next fetus.

Episiotomy – to relieve tightness of the vulva that is preventing fetal passage – is seldom required in small animals. In cases of severe stricture there is a risk that the vulva may tear and a small incision in the vulval lip in a dorsolateral direction is made using scissors. The wound should be repaired immediately after parturition is complete.

**Manual delivery**

If fetal parts are visible or palpable just within the vulva they may be gently grasped and cautious traction applied in a caudal and ventral direction. Adequate lubrication is again essential and lubricants can be introduced into the birth canal and alongside the fetus using a syringe and wide-bore male dog urinary catheter. If the fetus is in anterior presentation, a grip may be obtained just behind the head (Fig. 9.10). In posterior presentation, the fetal hindlegs, or preferably the hindquarters, are grasped. Whenever even modest traction is applied to the fetal limbs, the grip of the obstetrician’s finger should be softened by enclosing the fetal part in surgical gauze.
before traction is applied. Severe fetal damage can be sustained by excessive pressure being placed on the distal portions of the fetal limbs. Passage of the fetus through the vulva is aided by moving the fetus gently from side to side while traction is carefully applied (Fig. 9.11).

If resistance to delivery is encountered, further lubrication should be instilled alongside the fetus and the fetus should be rotated through 45° before a further attempt at delivery by traction is made. If the fetal head is too far anterior to the vulval lips for a grip to be applied, it may be possible – in the bitch, where the vagina has a long perineal section – to apply external pressure via the perineum and ease the fetus closer to the vulva and delivery as described above.

An obstetrical vectis or a small teaspoon may be placed over the crown of the fetal head with counterpressure being applied upwards between the fetal mandibles by the obstetrician’s finger. Using this grip upon the head the fetus is delivered. A snare made of bandage is an alternative.

Assisting the efficiency of straining

This technique can be particularly useful if the fetus has just entered the pelvic inlet but progress through the pelvic canal is slow. Maternal straining is normally stimulated by the fetus passing the cervix and may be further stimulated by movements of the obstetrician’s finger within the vagina. The efficiency of straining is increased by grasping the abdomen between the palms of the hands and gently but firmly compressing the abdomen when the animal strains. This ensures that