

TIMING ELECTIVE C-SECTIONS

Ana J. Adams, DVM, MS, Diplomate, ACT

Atlanta Veterinary Reproductive Services

Hamby Road Animal Hospital

3785 Hamby Road

Alpharetta, GA 30004

(770) 521-1314

amontes@adelphia.net

With the advent of advanced reproductive techniques in canine breeding programs, breeders now have numerous different resources available in order to achieve what they consider to be **the** optimal breeding. Service by stud dogs who may have previously been considered inaccessible due to busy show schedules or long distances, for example, is now possible through the use of chilled or frozen semen. With the use of more sophisticated breeding programs, however, comes a greater commitment on the part of the bitch owner to invest the necessary time and expense required for more precise ovulation timing that such techniques demand for optimal conception rates and litter sizes. As a result, puppies born from litters resulting from such breeding programs may frequently have a greater relative value simply due to the initial investment on the part of the bitch owner, who in turn may have an increased motivation to maximize the puppy survival rate in any way possible. In natural deliveries numerous maternal and / or fetal factors (such as uterine inertia or fetal malpresentation/position/posture) can contribute to decreased puppy survival rates, which can oftentimes be avoided via the decision to perform a properly timed, elective Cesarean section. In many cases there may be a certain reluctance on the part of many veterinarians to perform a C-section on a pregnant bitch that is not showing overt signs of stage II or even stage III labor due to a prudent fear of delivering fetuses prematurely, which would ultimately compromise their future survival. However, knowing how to reliably predict the onset of parturition greatly minimizes the risk of the premature or untimely delivery of a litter, and also allows for more careful planning on the part of both breeder and veterinarian by avoiding late night emergency visits and unplanned, undesirable circumstances.

The duration of gestation in the bitch can be calculated from several different specific events, such as the LH peak, ovulation or the first day of cytological diestrus, which consistently occur during the estrous cycle of the bitch. Difficulty may arise when breeders have been unable to perform the tests required to identify such events, or, as is frequently the case with natural breeding, such precise ovulation timing has not been necessary for a successful mating due to the longevity of canine spermatozoa in the reproductive tract of the bitch (up to 7 days) (1). It is well-known that gestation length from a single natural breeding in dogs can range from 57 to 72 days (2). An important factor to keep in mind as well is the fact that anxious breeders, when calculating the bitch's due date, almost inevitably refer to the *first* breeding date as the day of conception, which can result in premature calculation of her delivery date.

When ovulation timing has been performed during estrous, the bitch's due date can be estimated in 3 basic ways: 1) 64-66 days from the LH peak (defined as the initial significant rise in progesterone concentration, typically between 1.0-1.9 ng/ml), 2) 62-64 days from ovulation (progesterone concentrations in the range of 4-10 ng/ml) (3,4), or 56-58 days from the first day of cytological diestrus (5). In general, dams with larger litter sizes tend to have longer gestation periods than those with smaller litters (6). When interpreting hormonal profiles obtained during estrous, it is important to recognize that in the occasional bitch, what may appear as a significant progesterone rise early in the cycle may not, in fact, always be immediately followed by ovulation but rather a short delay prior to the final P4 rise (consistent with true ovulation) and therefore should be interpreted with caution when planning elective C-sections. It has also been stated that concentrations of serum progesterone levels fall below 1 ng/ml 24-48 hours prior to whelping. In areas where short turn-around times for P4 assays are unavailable, however, using this parameter as an indicator of a bitch's "readiness" for surgery may be unrealistic. Moreover, it has recently been demonstrated that once again, not all bitches fall within these guidelines, sometimes delivering naturally without P4 concentrations ever having reached true baseline levels (7).

Breeders can easily be instructed to perform daily vaginal smears beginning the last few days of estrous through the following 5-7 days, which can then be stained and interpreted at the time of ultrasound pregnancy diagnosis or later, allowing for precise identification of the first day of cytological diestrus. More variable predictors include a drop in rectal temperature between 8-24 hours prior to parturition (to a mean of 98.8°F)(8), radiographic appearance of various fetal parts, ultrasonographic appearance of fetuses, onset of lactation, and cervical, vaginovestibular, and vulvar relaxation (5).

General anesthetic considerations and puppy revival techniques for elective C-sections are similar to those used in emergency / dystocia-relieving C-section situations, centering around minimizing exposure of both dam and fetuses to anesthesia via the use of short-acting induction agents and inhalant anesthetics, as well as providing adequate oxygen during surgery and recovery. Pre-oxygenation of the dam, induction with propofol and isoflurane maintenance is a common protocol used in our practice, and shorter revival times are achieved through the use of a mini-oxygen face mask available for use immediately following delivery of puppies.

In conclusion, at our practice we have found elective C-sections to be a valuable technique that, when compared to natural delivery or dystocia-relieving C-sections, result in higher puppy survival rates and greater client satisfaction.

References

1. Johnston SD et al, Canine and Feline Theriogenology, 2001, page 49.
2. Concannon P, Whaley S, Lein D, et al: Canine gestation length: Variation related to time of mating and fertile life of sperm. *Am J Vet Res* 44: 1819-1821, 1983.
3. Concannon PW, McCann JP, Temple M: Biology and endocrinology of ovulation, pregnancy and parturition in the dog. *J Reprod Fertil Suppl* 39:3-25, 1989.
4. Concannon PW: Reproductive physiology and endocrine patterns of the bitch. *Curr Vet Ther Small Anim Pract* 8:886-900, 1983.
5. Johnston SD et al, Canine and Feline Theriogenology, 2001, p. 106.
6. Okkens AC, Teunissen JM, Van Osch W, et al: Influence of litter size and breed on the duration of gestation in dogs. *J Reprod Fertil* 2001; Supplement 57:193-7.
7. Cathy Gartley, personal communication.
8. Concannon PW, Powers ME, Holder W, et al: Pregnancy and parturition in the bitch. *Biol Reprod* 16:517-526, 1977.