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## Breeding Options in the Bitch

### Natural Cover

Natural breeding is best used for young fertile females and males with good fertility. It is typically performed every other day beginning one day post ovulation and repeated three times total or on days 3, 5, and 7 after the progesterone surge (2 ng/ml). Natural breeding should be supervised to ensure the bitch is receptive and that no fighting occurs between the dog and the bitch during the tie. In young or inexperienced males, assistance may be required with intromission. The hair should be trimmed from the end of the prepuce in males and from the vulva in females of long coated breeds. Semen cannot be evaluated with natural cover, so pregnancy rates and litter size should be monitored as an indicator of semen quality. It is also not possible to ensure that ejaculation has actually occurred with natural service.

### Vaginal Artificial Insemination

Vaginal insemination allows for the evaluation of the semen prior to insemination. The ejaculate is collected with minimal prostatic fluid and prepared for insemination into the bitch. The bitch's hind end is elevated to 45 degrees. An insemination pipette is inserted into the vagina of the bitch and gently pushed forward using a twisting action until resistance is met indicating that the front of the vagina has been reached. Feathering of the vagina can facilitate passage of the pipette to the full extent of the vaginal canal. Once the pipette is in place the syringe loaded with semen is attached and then the semen deposited slowly into the vaginal vault. Feathering is continued during and immediately after the insemination to increase forward contractions that help the sperm move forward into the bitch's uterus. The bitch's hind end remains elevated for 15 minutes to allow the spermatozoa time to move forward through the cervix and into the uterine body. Vaginal AI is usually performed 2 and 4 days after ovulation or on day 4 and 6 after the progesterone surge.

### Transcervical Insemination (TCI)

Transcervical insemination involves the use of an endoscope (camera) to visualize the cervix and facilitate passage of a catheter through the cervix and into the uterine body. Placing the semen directly into the uterus increases the number of spermatozoa that will reach the oviducts by reducing loss of sperm in the vaginal and cervical folds. Use of TCI will also decrease the number of sperm required in a breeding dose since there is less sperm loss associated with this type of breeding. Semen is collected and centrifuged to concentrate the ejaculate. The pellet of sperm is re-suspended in semen extender which contains sugars for energy, fats for protection of the sperm and antibiotics. The volume of semen that will fit in the uterus is significantly smaller than what will fit into the vagina (typically 2 ml or less depending on the breed).

TCI is performed in the standing, unsedated (in most cases) bitch. The size of the vagina is the limiting factor to the success of TCI in the bitch. In small breed and toy breed bitches there is often not enough room in the front of the vagina for the endoscope to fit. The endoscope usually needs to be manipulated under or around the cervix to get the catheter to pass. In some of the giant breed dogs, the length of the vagina exceeds the length of the endoscope preventing visualization of the cervix. TCI can be more difficult in maiden bitches than in bitches that have had at least one litter due to the stretching of the vagina that occurs with whelping. This stretching provides additional room in the vagina in which the endoscope can be manipulated. Other problems with visualization can occur as a result of excess blood, discharge or urine accumulating near the cervix.

The benefits of TCI include: a lower breeding dose is required; higher conception rates than for vaginal AI (especially in bitches or dogs with fertility problems); and a reduced number of



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breedings are required. The disadvantages include higher cost than vaginal AI due to the cost of the equipment used and extensive training is required to have good conception rates. TCI can be performed with fresh; fresh, chilled; or frozen semen. TCI is highly recommended for chilled semen and for bitches that are slightly older but don't have significant pathology in the uterus yet. Frozen semen can be used with TCI as well, but surgical AI is preferred. TCI is usually performed twice on days 2 and 4 post ovulation or days 4 and 6 after the progesterone surge. Alternatively, a single TCI can be performed on day 3 post ovulation or day 5 after the surge.

### Surgical Insemination (SAI)

Surgical insemination is performed under general anesthesia. A small incision is made in the abdominal wall between the umbilicus and the pelvis and the uterus is located. The uterine body and horns are lifted out of the incision and the uterus is examined for the presence of any cysts that can be felt within the lining of the uterus or other abnormalities. Any cysts that are large enough to be felt are ruptured prior to the insemination. Then a small needle or catheter is placed either in the uterine body or in each horn and a small volume of semen is inseminated directly into the uterus. The entire procedure takes less than 30 minutes.

If semen quality is compromised the semen can be placed very close to the ovary so the sperm do not have to move very far to reach the oviducts where fertilization will occur. The semen volume instilled is quite small (usually less than 2 ml) as uterine capacity is limited. The smaller breed dogs may only be able to hold 1 ml of semen within their uterus. If fresh or fresh, chilled semen is used it must be centrifuged to concentrate the ejaculate and then is re-extended with semen extender to the desired volume.

The benefits of SAI include: the ability to evaluate the uterus for pathology and potentially treat uterine cysts to result in increased conception rates; ability to place the semen closer to the ovaries and oviducts; and the highest conception rates of all forms of AI. The disadvantages include the cost and the need for general anesthesia. SAI is ideal for frozen semen and for subfertile males or females. In males with fertility problems, SAI can be performed using fresh or fresh chilled semen to increase chances of conception even further. SAI is usually performed only once 3 days after ovulation or on day 5 after the progesterone surge.

### Heterospermic (Dual Sire) Insemination

Heterospermic insemination is becoming increasingly popular in dog breeding. It involves using 2 or more males to inseminate or breed one bitch on a single cycle. The benefits of heterospermic insemination include the ability to obtain puppies from multiple genetic backgrounds in a single litter and the improvement of fertility in subfertile males when in the presence of a more potent sire. DNA typing is required of both the sire and dam and all the puppies for parentage determination. This is typically performed if the desired sire has poor fertility and we do not want to take the chance of losing a cycle for the bitch. In these cases, the lesser quality semen is inseminated 12 – 24 hours prior to the higher quality semen. This allows the poorer fertility semen to fertilize as many eggs as possible before the higher quality semen is inseminated. Inseminating both sires at the same time will inevitably end up with all the puppies being sired by the sire that is more prepotent.