

## What is Artificial Insemination?

Artificial insemination (AI) is the process of collecting semen and depositing it through artificial means into the vagina of the receptive bitch.

Today, many dog breeders and veterinarians have found artificial insemination (AI) to be an invaluable tool. Many see it as a way of increasing the quality of a breed by overcoming limitations of both time and space. An exceptional male, chosen for his intelligence, temperament, athleticism, and skills can continue to produce offspring long after his death, or be mated with females from which he is separated by thousands of miles. Additionally, by saving his semen, he will be able to breed with many more females than would be physically possible through normal one-on-one mating.

There are also cases where valuable males have been injured or become infertile and are no longer able to breed. Whilst breeding bitches can visit your stud dog and his fertility is intact, all is well. But what happens if he is ill, loses his fertility or even when he eventually passes away? Artificial insemination allows them to continue to contribute to their breed. Quality frozen semen from an important sire can be an insurance against losing him from stud and a valuable breeding resource long, long into the future. Today, the actual technique and methods of artificial insemination are relatively easy and done by many private individuals and veterinary clinics.

## Collecting semen

Collecting semen from a stud dog is very simple. A female in heat is brought together with the male. When he tries to mount her, his penis is redirected into an artificial vagina and stimulated to cause an ejaculation. The presence of the female is useful to excite the male and makes collection easier. (During estrus, organic compounds known as 'pheromones' are excreted from the female's vagina. These airborne chemicals are responsible for attracting males from long distances to the female. They even indicate the stage of her heat.) However, such females are not always available when a male is to be sampled. In that case, a common practice is to save and freeze cotton swabs that we have wiped through the vagina of a female when she was in peak estrus. At the time of semen collection, the swabs can be wiped around the tail area of any dog (even a *spayed* one). The male will then respond to her just as if she were in heat. At the time of semen collection we also physically examine the dog and note any evidence of reproductive disease such as testicular degeneration or the progressive problems of the prostate often found in the older stud dog.

## Semen evaluation

After collecting the semen, the sperm cells are checked to ensure that they are sufficiently concentrated, adequately motile, and appear anatomically normal. This is done because we know that in many 'sterile' males, the problem is not that they do not produce sperm cells, but rather their quality or quantity is very low. Infertile males may have abnormal sperm cells, which are unable to travel all the way to the oviducts of the female, or cannot penetrate the ovum for fertilization to occur. The microscopic semen evaluation is no

guarantee that the sperm present are in fact capable of fertilization. There may be flaws all the way down to the molecular level of the DNA in the sperm that make a male dog sterile.

## Insemination

If the sperm cells seem to be adequate in number and appear normal, they may be immediately infused into a female using a long plastic or glass tube. Attempts are made to at least reach the level of her cervix, which in large dogs may be several inches inside the animal.

If the bitch is not going to be bred immediately, the semen may either be chilled or frozen. Chilled semen should be used within 24 hours and can therefore be shipped 'Next Day Air' to anywhere in the country or even overseas, and a female can be bred with it the next day. This has made males available to appropriate females all over the world without either one of them needing to travel.

## Freezing semen

Semen can also be frozen in liquid nitrogen canisters and kept that way for years. This allows females to be bred with males who are also miles away or who have even died years before. When we consider the expense of stud fees and/or transporting one or both of the breeding animals, frozen and chilled semen is relatively inexpensive. Furthermore, it greatly increases the number of potential mates to choose from.

A breeding unit is normally 2 straws per breeding. Inseminating larger quantities would be a waste of semen in the vaginal tract.

Most of the semen provided by us is now stored in **straws**. The straws are marked with the number of the dog, an identification letter of the straw, the date of freezing, the breed of the dog and the registration number of the dog. All this has been found to be very important for the identification of the semen and no mix ups are possible as the ID is checked on the straw before the thawing. We are moving away from the use of frozen semen in pellets not because of quality issues with the semen but because the pellet system lacks the level of identification and therefore security we desire. Pellets cannot be identified, only the vials they are in and there lies the risk of a possible mix.

## The heat cycle in a bitch

In a typical canine heat cycle (we underline the word typical because in some breeds 'typical' bitches are getting harder and harder to find), the bitch's vagina swells and she bleeds for 7 to 9 days. This is the preparatory Proestrus stage. Next, the bleeding diminishes and she becomes receptive to the male and allows him to mate. This is Estrus. Only during the 3 to 7 days of Estrus will the bitch be in the proper stage to become pregnant. After 3 to 7 days, she moves into the Metestrus stage, is no longer fertile, and will not accept a male's advances.

## Calculating the Optimum Time for Insemination (information supplied by UK Clone)

There are many systems available for the breeders to calculate the optimum time for breeding and insemination. The most reliable by far is based on Quantitative Blood Progesterone levels. This allows us to quite accurately determine the time of ovulation. There is no specific blood progesterone level at which a bitch should be bred. Instead we aim to inseminate during a certain period after the calculated time of ovulation as when a bitch ovulates her eggs are immature and cannot be penetrated by sperm until they have matured. This takes between 40 and 60 hours. To mate a bitch naturally we make the first time 24 - 36 hours after ovulation and then again the next day. There is no reason to skip a day if you have accurately identified the most fertile period.

Chilled semen survives quite well in the bitch's uterus so we aim to inseminate it 36 to 48 hours after ovulation. With frozen semen, it is deposited directly into the uterus and you breed a little bit later – approximately 60 - 72 hours after the blood progesterone levels indicate ovulation. This is the time when most of the eggs are mature and ready for fertilization. Thus the sperm can almost immediately penetrate the eggs and they are not required to survive so long before fertilization.

## Methods of Insemination

The main methods of artificial insemination are:

*Vaginal insemination* involves inserting a rod or catheter loaded with semen into the bitch's vagina and advancing it to the cervix opening. Called the OS, the cervical opening is the ideal place to deposit semen. Once the rod or catheter is in place, the semen is deposited and the rod or catheter withdrawn. Contrary to what some people believe, this is a safer way of breeding than natural breeding, as no contamination of diseases from direct contact between the male and the female is transferred.

*Surgical insemination* allows for direct insemination of the semen into the uterus. Similar to the technique used to spay a bitch, it involves injecting semen into the exposed uterus through a needle. Surgical conception rates using frozen semen closely match those of natural mating.

*Laparoscopic or trans-cervical insemination*, a less invasive and potentially faster surgical procedure, is a new technique becoming more prevalent. Non-surgical insemination of frozen-thawed semen requires that we pass through the cervix to deposit it directly into the uterus. Fibre-optic endoscopes similar to those used in key-hole surgery allow us to visualise the cervix which can, in larger breeds, be more than 25 cm forward from the vulva. With the correct equipment, training and skills we can, in most bitches, visualize the cervix, and inseminate through it with a narrow soft plastic catheter. No general anaesthetic is required and in our experience few bitches even require the optional light sedation.

**We strongly recommend you consult your specialist A.I. vet to determine the most appropriate method of insemination for your bitch.**

## Success Rates

It must be remembered that artificial insemination in canine medicine does not have the level of success seen in natural intercourse. Depending on the technique and ability of those performing it, breeders should only expect a 65 to 85% success rate and usually somewhat smaller litters would be noted.

## Artificial Insemination is Not for Everyone

There are no guarantees with canine AI. While success rates are generally quite good, sometimes a pregnancy does occur. Although the field is relatively new in canine medicine, it has been successfully practiced in cattle and other species for many decades. While we rest on the shoulders of the research and experience developed in bovine practice, we have not yet duplicated their rate of success. This is not because of our technique, but rather the relative instability of canine sperm when frozen or chilled. In cattle, the regularity and competency of the reproductive physiology of the female has been consistently selected for breeding, while this is not the case in dogs. Cattle that do not have a predictable estrus cycle or high levels of fertility are eliminated from the herd. In the canine world, breeders are often much more emotionally attached to their animals. They routinely keep and repeatedly attempt to breed problem bitches and those with irregular cycles, thus allowing undesirable traits to maintain themselves in the genetic pool.